European Commission

#EUBudget

EU BUDGET FOR THE FUTURE

Volume 4

Research and Innovation

- Horizon Europe
- Euratom Research and Training Programme
- Interinstitutional Thermonuclear Experimental Reactor (ITER)

Proposal of the Commission for 2021-2027 spending programmes

in the field of Research and Innovation

Volume 4

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Proposal for a Regulation of the European Parliament and of the Council establishing Horizon Europe – the Framework Programme for Research and Innovation, laying down its rules for participation and dissemination

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(COM(2018) 435 final)

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Proposal for a

REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL

establishing Horizon Europe – the Framework Programme for Research and Innovation, laying down its rules for participation and dissemination

(Text with EEA relevance)

{SEC(2018) 291 final} - {SWD(2018) 307 final} - {SWD(2018) 308 final} -
{SWD(2018) 309 final}

EXPLANATORY MEMORANDUM

1. CONTEXT OF THE PROPOSAL

• Reasons and objectives

The 'Horizon Europe' proposal is fully in line with the Commission's proposal on the next long-term Union budget for 2021 to 2027 as well as the Commission's priorities as set out in its Agenda for Jobs, Growth, Fairness and Democratic Change and global policy priorities (the Sustainable Development Goals). It supports the agenda of the Union post-2020 as agreed in the Rome Declaration of 25 March 2017.

The proposal is framed by the premise that research and innovation (R&I) delivers on citizens' priorities, boosts the Union's productivity and competitiveness, and is crucial for sustaining our socio-economic model and values, and enabling solutions that address challenges in a more systemic way.

The Horizon Europe package consists of proposals for:

1. a Framework Programme for Research and Innovation entitled 'Horizon Europe', including laying down its rules for participation and dissemination (as per Treaty on the Functioning of the European Union – 'TFEU'),
2. a specific programme to implement 'Horizon Europe' ('TFEU'),
3. a Research and Training Programme under the Euratom Treaty complementing Horizon Europe, along with the
4. associated impact assessment and legal financial statements.

A specific programme on defence research is proposed to be established by Regulation …/…/EU of the European Parliament and the Council establishing the European Defence Fund for the period 2021-2027.

The package merges two current legal acts (the Framework Programme and the Rules for Participation and Dissemination) into a single legal act and makes a number of improvements in terms of simplification along the way.

Specifically, Horizon Europe will strengthen the Union's scientific and technological bases in order to help tackle the major global challenges of our time and contribute to achieving the Sustainable Development Goals (SDGs). At the same time, the programme will boost the Union's competitiveness, including that of its industries. Horizon Europe will help deliver on the Union's strategic priorities and support the development and implementation of Union policies. In a swiftly changing world, Europe's success increasingly depends on its ability to transform excellent scientific results into innovation that have a real beneficial impact on our economy and quality of life, and create new markets with more skilled jobs.

To achieve this aim and build on the success of its predecessor, Horizon Europe continues to support the whole R&I cycle in an integrated manner.

The principle of a single set of rules for participation and dissemination is maintained, while this proposal improves further on these rules.

This proposal provides for a date of application as of 1 January 2021 and is presented for a Union of 27 Member States, in line with the notification by the United Kingdom of its intention to withdraw from the European Union and Euratom based on Article 50 of the Treaty on European Union received by the European Council on 29 March 2017.

- **Consistency with existing policy provisions**

The Framework Programme is the Union's flagship programme to support R&I from concept to market uptake. It aims to complement national and regional funding. The framework programme has already provided unique European added value in supporting continent-wide competition and collaboration for the very best science and innovation. This has resulted in scientific breakthroughs, increased competitiveness, and solutions to societal challenges. The new proposed framework programme, Horizon Europe, will aim to have an even greater impact than the current one, Horizon 2020 which is a widely acknowledged asset towards achieving Europe's ambitions. The rapidly evolving nature of research and innovation in a context of global competition makes public support for R&I more essential than ever, in particular at Union level where its added value is undisputed. The proposal is fully in line with the Commission's agenda for R&I, including the headline target of investing 3% of the Union's GDP on research and development, as well as with the Communication "A renewed European agenda for Research and Innovation – Europe's chance to shape its future" (the European Commission's contribution to the informal leaders' meeting on 16-17 May 2018).

- **Consistency with other Union policies**

The proposal is fully consistent with existing Union policies. Horizon Europe was developed taking into account the current Commission's priorities, the Budget for Results policy (which demands that Union spending programmes must – more than ever – deliver value for money), the implementation of the 2030 Agenda on sustainable development, the implementation of the Union Global Strategy and the Commission's proposal on the next long-term Union budget.

In areas like health, digital technologies, industrial transformation, inclusive and democratic societies, natural resources, energy, mobility, environment, food, low-carbon economy, space and security, R&I is critical to the successful delivery on Union priorities: in particular jobs and growth, the Digital Single Market, the Energy Union and climate action. R&I is at the core of productivity and the competitiveness of an advanced economy like the Union's.

R&I investment will be complementary and mutually reinforcing with that of other Union programmes. R&I results will be exploited in synergy with other Union programmes to foster their uptake at national and regional level, thereby maximising the European innovation potential. This will be complemented by effective R&I communication and outreach campaigns targeting the general public. Complementarity and synergy of R&I support and exploitation across the Union's long-term budget will be maximised through a strategic R&I planning process, which will be sufficiently flexible to allow the Commission and Union institutions to swiftly react to urgent needs and new priorities.

The proposal is also fully consistent with the approach taken under the European Semester process of economic policy co-ordination. Those links should be continued and reinforced, building on the relevant contributions already made under Horizon 2020 in support of structural reforms to improve the quality and efficiency of national research and innovation

systems at three levels: firstly, through substantial investment in scientific and technological research and innovation; secondly, by making the business environment more innovation-friendly and less risk-averse; and thirdly, by ensuring that European citizens get supported through what will be a fast and, for some, turbulent transition driven by innovation, digitisation and global megatrends such as artificial intelligence and the circular economy.

The Programme's actions should be used to address market failures or sub-optimal investment situations, in a proportionate manner, without duplicating or crowding out private financing and have a clear European added value. This will ensure consistency between the actions of the programme and EU State aid rules, avoiding undue distortions of competition in the internal market.

2. LEGAL BASIS, SUBSIDIARITY AND PROPORTIONALITY

• Legal basis

'Horizon Europe' is based on the TFEU Titles 'Industry' and 'Research and technological development and space' (Articles 173, 182, 183 and 188).

Due to its strong support to innovation, the Specific Programme implementing Horizon Europe is now based on the TFEU Titles 'Industry' and 'Research and technological development and space'(Articles 173 and 182), as is the specific programme on defence research (*ibid*).

The European Institute for Innovation and Technology (EIT) derives from the 'Industry' title and will continue to be funded by a financial contribution from Horizon Europe.

The proposal for the Euratom research and training programme is based on Article 7 of the Euratom Treaty.

• Subsidiarity (for non-exclusive competence)

The Union has a shared (parallel) competence in this area based on Article 4(3) TFEU. In order to address the challenges Europe is currently facing, the Union needs to invest in R&I in order to reach economies of scale, scope and speed. Union-funded R&I activities produce demonstrable benefits compared to national and regional R&I support: they create critical mass to address global challenges; strengthen the Union's scientific excellence through competitive funding; create cross-border, multidisciplinary networks; reinforce human capital; structure national R&I systems; increase the Union's competitiveness; and create new market opportunities.

• Proportionality

Actions at Union level will enable trans-national collaboration and world-wide competition to ensure the best proposals are selected. This raises levels of excellence and provides visibility for leading R&I, but also supports trans-national mobility and attracts the best talents. A Union-level programme is best placed to take on high-risk and long-term R&I, thereby sharing the risk and generating a breadth of scope and economies of scale that could not otherwise be achieved. Interlinkages with national initiatives will be sought, in particular in the area of innovation.

Similarly, it can leverage additional public and private investments in R&I; contribute to further strengthening the European R&I landscape; and accelerate the commercialisation and

diffusion of innovation. Union-level programmes can also support policy-making and policy objectives.

The proposed actions do not go beyond what is required for Union objectives.

- **Choice of the instrument**

As in the past, the legal act is in a form of a regulation since it creates rights for and obligations on beneficiaries, binding in their entirety and directly applicable in all Union Member States and countries associated to the Framework Programme.

3. RESULTS OF RETROSPECTIVE EVALUATIONS, STAKEHOLDER CONSULTATIONS AND IMPACT ASSESSMENTS

- **Retrospective evaluations/fitness checks of existing legislation**

Union Framework Programmes have generated significant and long-lasting impacts as has been shown by successive evaluations since the Union started investing in R&I in 1984.

This proposal is built on the feedback from stakeholders, findings of the interim evaluations of the current programmes, the ex-post evaluations of previous programmes, and foresight activities.

The Communication on the interim evaluation of Horizon 2020 identified several areas for improvement. In addition to an in-depth analysis, the findings of the interim evaluation of Horizon 2020 were based on extensive stakeholder feedback and the strategic recommendations of the independent High Level Group on maximising the impact of EU R&I Programmes (the 'Lamy' High Level Group). In a nutshell, these conclusions could be summarised as to:

(a) continue simplification;

(b) support breakthrough innovation;

(c) create more impact by being focused around missions and by citizen involvement;

(d) increase synergies with other Union funding programmes and Union policies;

(e) strengthen international cooperation;

(f) reinforce openness; and

(g) rationalise the funding landscape.

- **Stakeholder consultations**

Through open consultations, the Commission sought feedback on the key elements of the design of the post-2020 Union programme for R&I. The results of these consultations fed into the Impact Assessment for the programme and helped shape the drafting of the present legal proposal.

Consultations were run at different times to ensure systematic account of stakeholder views in the design and formulation of the Horizon Europe programme. To take account of different information needs, consultations ranged from stakeholder conferences and events, to expert

groups, online consultations, workshops, meetings and seminars and analyses of position papers.

Fostering R&I in the Union emerged as the most important policy challenge by 97% of respondents to the cluster-based open public consultation on the Union's next long-term budget in the areas of investment, R&I, SMEs and the single market.

Stakeholders' key messages can be summarised as follows:

- The three-pillar structure of Horizon 2020 should be kept, though better links between the pillars are needed;
- Successful individual researchers' schemes (ERC, MSCA) need increased budgets;
- Grants should remain the main funding model, complemented with dedicated financial instruments, when appropriate;
- Support should be provided to activities that help spread or share excellence;
- Smaller-scale collaborative projects are important for widening participation;
- Missions have all the hallmarks of being an impactful way forward;
- Citizens should be made more involved with the Framework Programme;
- The European Innovation Council should be an European accelerator of innovation;
- There is a need to boost international cooperation to tackle global challenges;
- Data and knowledge produced from Union-funded projects should be accessible by all;
- There is a marked need to make the R&I landscape simpler;
- Synergies with other Union programmes are difficult to achieve but are a must;
- The programming process for the calls and missions needs to be enhanced;
- The drive for simplification needs to continue; and
- Being able to measure and communicate impact is key.

- **External expertise**

The Commission has relied extensively on external expertise. This includes in particular the recommendations and findings of the High Level Group chaired by Pascal Lamy, presented in the report '*LAB – FAB – APP: Investing in the European future we want, Report of the independent High Level Group on maximising the impact of EU Research & Innovation Programmes*', adopted in July 2017.

The *European Innovation Council High Level Group of Innovators* was set up in January 2017 and mandated to support the European Commission in developing the European Innovation Council. The report '*Europe is back: Accelerating breakthrough innovation*' with 14 recommendations was adopted in January 2018.

Following the recommendations of the Lamy report on missions, an external expert was appointed to advise the Commission on the mission-oriented approach. In February 2018, Professor Mariana Mazzucato presented a report '*Mission-Oriented Research & Innovation in the European Union - A problem-solving approach to fuel innovation-led growth*'[1] in which she recommended five key criteria for the selection of missions at Union level.

Furthermore, the High-Level Strategy Group on industrial technologies, chaired by Professor Jürgen Rüttgers, proposed a redefinition of key enabling technologies and made

[1] https://ec.europa.eu/info/news/bold-science-meet-big-challenges-independent-report-calls-mission-oriented-eu-research-and-innovation-2018-feb-22_en

recommendations for ways to maximise their contribution to inclusive growth and democracy, prosperity, more equality and better jobs.

An extensive list of reports from high level groups and studies are given in the annex to the impact assessment.

- **Impact assessment**

This proposal is supported by an impact assessment. The opinion of the Regulatory Scrutiny Board was "positive with reservations", recommending to better describe (i) the balance between the Programme pillars, (ii) the rationale and value added of the EIC and R&I Missions, and (iii) the streamlined delivery mechanisms[2].

In a globally competitive, increasingly knowledge-based economy, R&I determine the productivity and competitiveness of an advanced economy like Europe's: about two-thirds of Europe's economic growth over the last decades has been driven by innovation. They drive and support the creation of new and better jobs, and the development of knowledge-intensive activities, which account for more than 33% of total employment in Europe. Europe must maintain and even step up its technological, industrial and innovation capacities in a sustainable way, in strategic areas that underpin our society, economy and international commitments.

More must be done to stimulate widespread innovation in Europe, which is at the basis of maintaining Europe's socio-economic model and values. The expected impacts of continuing the Programme were analysed in the impact assessment. Compared to the ongoing Programme, Horizon Europe is expected to generate:

- **new and more knowledge and technologies, promoting scientific excellence and significant scientific impact.** The Programme will continue to facilitate cross-border collaboration between top scientists and innovators, allowing for trans-national and cross-sector coordination between public and private R&I investment. Horizon 2020 has already attracted the world's best research institutions and researchers, supported 340 000 researchers, and developed Europe's skilled human capital. Scientific publications from Horizon 2020 are world class (cited more than twice the world average) and have contributed to major scientific breakthroughs.
- **positive effects on growth, trade and investment** flows, and on quality jobs and international mobility for researchers in the European Research Area. The Programme is expected to increase GDP on average by 0.08% to 0.19% over 25 years, which means that each euro invested can potentially generate a return of up to 11 euro of GDP over the same period. Union investments in R&I are expected to directly generate an estimated gain of up to 100 000 jobs in R&I activities in the 'investment phase' (2021-2027). The economic activity generated by the Programme is expected to foster an indirect gain of up to 200 000 jobs over 2027-2036, of which 40% will be highly skilled.
- **significant social and environmental impact**. This impact will be created by disseminating, exploiting and taking up scientific results and translating them into new products, services and processes, which in turn will help successfully deliver on political objectives, as well as social and eco-innovation.

[2] A detailed analysis of how these recommendations were addressed is annexed to the Impact Assessment.

These impacts mean that **the potential cost of discontinuing the Union R&I Programme (i.e. the cost of non-Europe) is substantial**. Discontinuation could result in a decline of competitiveness and growth (up to EUR 720 billion of GDP loss over 25 years[3]), sharp reductions in the private and national investments that are currently leveraged by Union-level co-investments, and significant losses of social, environmental and economic impacts.

Moreover, the new Programme will further simplify rules, increase legal certainty and reduce administrative burden for beneficiaries and programme administrators.

- **Simplification**

Simplification is key to reaching the objectives of Horizon Europe. To attract the best researchers and the most innovative entrepreneurs, the administrative burden of participating must be kept to a minimum.

The main simplification features set out, for the most part, in the rules for participation and dissemination are (further details further below):

- **Continuity** in the simplification measures applied to Horizon 2020 which were appreciated by participants, such as the three-pillar programme structure, the simple funding model and the Participant Portal;
- **Simplification of the funding landscape**: the approach to partnership, for example, is streamlined, with only three types and a clear set of criteria for their selection and implementation, to ensure that they contribute to the general and specific objectives of Horizon Europe;
- **Further simplification of the current real cost reimbursement system**, in particular as regards personnel costs;
- **Broader acceptance of beneficiaries' usual accounting practice**, in particular for internal invoicing and services which would also cover the equivalent to Horizon 2020 large research infrastructures;
- **Increased use of simplified cost options**, as provided for by the new Financial Regulation, in particular of lump-sum project funding in appropriate areas and taking account of the lessons from the pilot under Horizon 2020;
- **An increased cross-reliance on audits** to reduce the audit burden for beneficiaries taking part in several Union funding programmes;
- **Extending the Participants' Guarantee Fund (renamed Mutual Insurance Mechanism)** to beneficiaries of any directly managed Union programme, and for actions not covered by the fund under Horizon 2020 (Article 185 Initiatives);
- An acceptance of the **seal of excellence**, for which proposals may receive support from the European Regional Development Fund, the Cohesion Fund, the European Social Fund+ or the European Agricultural Fund for Rural Development;
- Maintaining **key elements of the proposal evaluation** and selection process, throughout all parts of Horizon Europe. A broader range of expertise will however be sought, in function of the scope of the calls, including expertise from user groups and civil society organisations[4]. The novelty of the missions-based approach will be to go from assessing excellence and impact only at the level of individual proposals, to also assessing how excellent proposals fit together as a portfolio. While the main

[3] Based on the NEMESIS model, which corresponds to the highest impact of the Programme.

[4] Network Analysis of Civil Society Organisations' participation in the EU Framework Programmes

principles are spelled out in advance in the rules, the work programmes will provide further details on the application of the award criteria depending on the objectives of the calls and instruments (e.g. the aspects to be taken into account in the evaluation procedures).

Beyond the Horizon Europe basic legal acts, steps will be taken to simplify the implementation of the Programme, starting with the model grant agreements and covering all processes, documentation, helpdesks, support services, and IT systems, alleviating further the administrative burden for participants and accelerating the granting process. The Commission will develop such improved implementation tools in parallel with the legislative process, in consultation with stakeholders.

- **Fundamental rights**

This Regulation respects fundamental rights and observes the principles recognised in the Charter of Fundamental Rights of the European Union.

4. BUDGETARY IMPLICATIONS

The budget of all proposals is presented in current prices. The Commission may continue, on the basis of a cost-benefit analysis, to use executive agencies to implement of Horizon Europe.

5. OTHER ELEMENTS

- **Implementation plans and monitoring, evaluation and reporting arrangements**

The Commission may increase the share of the budget delegated to **executive agencies**, subject to the outcome of the mandatory cost-benefit analysis. Given the new elements in the remit of the new Framework Programme (e.g. missions and the European Innovation Council) and the increased budget to be delegated, changes to agencies' mandates will be needed[5].

This approach will help reduce of administrative costs, improve synergies with other programmes and help focus more on performance.

Activities with a particularly substantial policy content are in principle excluded from delegation to executive agencies, but the feedback of R&I data and results from these agencies to the Commission will be stepped up in line with the dissemination and exploitation strategy, in order to strengthen the evidence-base for policy-making.

Evaluations will be carried out in line with paragraphs 22 and 23 of the Interinstitutional Agreement of 13 April 2016[6], where the three institutions confirmed that evaluations of existing legislation and policy should provide the basis for impact assessments of options for further action. The evaluations will assess the programme's effects on the ground based on the programme indicators/targets and a detailed analysis of the degree to which the programme

[5] Further elements can be found in the Annex to the Impact Assessment

[6] Interinstitutional Agreement between the European Parliament, the Council of the European Union and the European Commission on Better Law-Making of 13 April 2016; OJ L 123, 12.5.2016, p. 1–14

can be deemed relevant, effective, efficient, provides enough Union added value and is coherent with other Union policies. They will include lessons learnt to identify any deficiencies/problems or any potential to further improve the actions or their results and to help maximise their exploitation/impact.

In order to be able to better track and communicate the Programme's impact, the Horizon Europe **monitoring and evaluation system** will have three main building blocks:

- Annual monitoring of the programme performance: tracking of performance indicators in the short, medium and longer-term according to key impact pathways towards Programme objectives, based on baselines and targets where possible;
- Continuous collection of programme management and implementation data;
- Two fully-fledged (meta)-evaluations of the programme at mid-term and ex-post (upon completion). These evaluations will build on the coordinated evaluations of each programme part, type of actions and delivery mechanism according to common evaluation criteria and standard methodologies and will inform adaptations to be made to the programme.

Impact pathways, and related key impact pathway indicators, will structure the annual monitoring of the programme performance towards its objectives. These pathways reflect three complementary impact categories, reflecting the non-linear nature of R&I investment:

1. Scientific impact: related to supporting the creation and diffusion of high-quality new knowledge, skills, technologies and solutions to global challenges;
2. Societal impact: related to strengthening the impact of research and innovation in developing, supporting and implementing Union policies, and support the uptake of innovative solutions in industry and society to address global challenges;
3. Economic impact: related to fostering all forms of innovation, including breakthrough innovation, and strengthening market deployment of innovative solutions.

For each of these impact categories, proxy indicators will be used to track on progress distinguishing between the short, medium and longer term.

Management and implementation data[7] for all parts of the Programme and all delivery mechanisms will continue to be collected in close to real-time. This data will be collected in a centrally managed and harmonised way. It will also continue to be publicly available on a dedicated on-line portal in close to real-time allowing extraction per programme parts, types of actions and types of organisations (including specific data for SMEs). This will include inter alia proposals, applications, participations and projects (number, quality, Union contribution etc.); success rates; profiles of evaluators, applicants and participants (partly based on unique identifiers, and including country, gender, turnover, role in project etc.); implementation (including time-to-grant, error rate, satisfaction rate and the rate of risk taking etc.); communication, dissemination and exploitation activities; and contribution to Union climate and environmental objectives. In order to better track investments towards a knowledge-based society, information on the Union funding allocated to the exploitation and deployment of R&I results, notably from the Framework Programmes, may be collected over the course of the programmes.

[7] Further elements can be found in the Annex to the Impact Assessment.

- **Detailed explanation of the specific provisions of the proposal**

Horizon Europe is a new framework programme designed for maximum impact in the context of the evolving nature of research and innovation, with an architecture designed for enhanced coherence and performance. It is proposed to use a three-pillar structure, with each pillar interconnected with the others and complemented by underpinning activities, to strengthen the European Research Area.

The three-pillar structure

The first pillar on Open Science will ensure strong continuity with Horizon 2020 in supporting excellent science within a bottom-up approach in order to reinforce the Union's scientific leadership, high-quality knowledge and skills development, through the European Research Council, Marie Skłodowska-Curie Actions and research infrastructures. The principles and practices of open science will be mainstreamed across the entire Programme.

The second pillar on Global Challenges and Industrial Competitiveness will take forward the societal challenges and industrial technologies in a more 'top down' directed approach addressing Union and global policy and competitiveness challenges and opportunities These are integrated into five clusters ('health'; 'inclusive and secure society'; 'digital and industry'; 'climate, energy and mobility'; and 'food and natural resources'), aligned with Union and global policy priorities (the Sustainable Development Goals) and having cooperation and competitiveness as key drivers. The integration in clusters, each having a number of intervention areas, is designed to incentivise cross-disciplinary, cross-sectoral, cross-policy and international collaboration, thereby achieving higher impact and better seizing the innovation potential that is often greatest at the intersection of disciplines and sectors.

Alongside the regular calls for proposals, **a limited set of highly visible missions will be introduced**. These will be designed in the context of a strategic planning process. Missions, with ambitious but time-bound and achievable goals, should speak to the public and engage it where relevant. They will be co-designed with Member States, the European Parliament, stakeholders and citizens.

The second pillar embodies industry's essential role in achieving all the Programme's objectives. To ensure industrial competitiveness and the capacity to address the global challenges ahead, the Union needs to reinforce and maintain its technological and industrial capacities in key areas that underpin the transformation of our economy and society. Priority will be given to investments in the key enabling technologies of the future.

The second pillar will also provide scientific evidence and technical support to Union policies, including through the activities of the Joint Research Centre. This pillar will help realise Union policy objectives within the spirit of the Innovation Principle as put forward in the European Commission's Communication of 15 May 2018 on Research and Innovation: a renewed European agenda. Particular attention should be given to increasing the share of participation in research and funding of entities from low-to-mid income third countries.

While innovation will be supported throughout the whole programme, the **third pillar on Open Innovation will essentially focus on scaling up breakthrough and market-creating innovation by establishing a European Innovation Council**, support the enhancement of European ecosystems of innovation and continued support to the European Institute of Innovation and Technology (EIT). The European Innovation Council will offer a one-stop-shop to high-potential innovators**.** Activities will be defined mainly bottom-up. This should significantly simplify and streamline current support, and fill any gap between the grant

funding in other parts of Horizon Europe and the financial instruments of InvestEU. Support will also be provided for collaboration with and between national and regional innovation agencies but also any other public or private and general or sectoral actor of the European innovation landscape.

The European Institute of Innovation and Technology will complement the European Innovation Council by promoting sustainable innovation ecosystems and developing entrepreneurial and innovation skills in priority areas through its Knowledge and Innovation Communities. The European Institute of Innovation and Technology will contribute to the entrepreneurial transformation of EU universities, and its activities will maximise synergies and complementarities with actions under the Global Challenges and Industrial Competitiveness Pillar.

Europe's economic and social prosperity, the quality of life and jobs, and of the environment, depend on its ability to create knowledge and to innovate. The bottom-up approaches in the first and third pillars aim primarily at reinforcing excellence, creating knowledge and innovation and encouraging greater investment especially in new, fast-growing areas of cutting-edge science and breakthrough innovation with the potential to scale up. These are essential to address the knowledge and innovation gap and strengthen the Union's scientific and technological bases, thereby supporting Union strategic objectives and policy priorities and contributing to long-term growth and competiveness.

The three pillars will be underpinned by **activities to strengthening the European Research Area**, specifically: sharing excellence to fully exploit the potential in less R&I performing countries so that they attain high Union standards of excellence (e.g., via teaming, twinning, ERA chairs); and reforming and enhancing the European R&I system, covering the next generation Policy Support Facility.

This part will also include activities on: foresight activities; monitoring and evaluating the Framework Programme and disseminating and exploiting results; modernising European universities; supporting enhanced international cooperation; and science, society and citizens.

The three-pillar structure will reinforce the **internal coherence of the different programme parts** towards achieving programme level objectives. The clearly defined and complementary rationales for intervention will enhance their interconnectivity, with open science and open innovation being common threads. It will ensure a systemic, **impact-based approach** that cuts across disciplines and silos for better impact. For example, missions will have a pull effect on activities in the open science and open innovation pillars, while innovations with rapid scale-up potential arising from collaborative research, the European Research Council's proof of concept or the EIT's *Knowledge and Innovation Communities* will be rapidly signposted to the European Innovation Council. Strategic planning will reinforce the programme's internal coherence even more.

Cross-cutting elements

Horizon Europe will significantly **strengthen international cooperation** which is crucial to ensure access to talent, knowledge, know-how, facilities and markets worldwide, to effectively tackle global challenges and to implement global commitments. The Framework Programme will intensify cooperation and extend association agreements to include countries with excellent science, technology and innovation capacities. The Programme will continue to fund entities from low-to-mid income countries, and to fund entities from industrialised and emerging economies only if they possess essential competence or facilities.

The principle of open science will become the modus operandi of the new Programme. It will go beyond the open access policy of Horizon 2020 and require open access to publications and data (with robust opt-outs for the latter), and to research data management plans. The Programme will foster the widespread use of FAIR (findable, accessible, interoperable, and re-usable) data; and activities that enhance researchers' skills in open science and support reward systems that promote open science. Research integrity and citizen science will play a central role, as will the development of a new generation of research assessment indicators.

Horizon Europe will take a **new and more impact-focussed** approach **to partnerships**. The current plethora of European Partnerships will be rationalised, so that they can continue in simplified forms that are open to all (such as academia, industry, Member States, and philanthropic foundations), while ensuring that they can effectively contribute to the general and specific objectives of Horizon Europe. They will be designed on the basis of Union added value, transparency, openness, impact, leverage effect, the long-term financial commitment of all the involved parties, flexibility, coherence and complementarity with Union, national and regional initiatives. This approach aims at a consolidated and rationalised number of partnerships that avoid overlaps and duplication and that are better aligned with Union policy priorities.

There will be three levels of partnerships:

(a) co-programmed, based on memoranda of understanding or contractual arrangements with partners;

(b) co-funded, based on a single, flexible programme co-fund action;

(c) institutionalised partnerships (based on Articles 185 or 187 TFEU, and the EIT Regulation for the *Knowledge and Innovation Communities*).

The areas for partnerships, including the possible continuation of existing ones, will be identified during the strategic planning process (the proposed legal basis sets out only the instruments and criteria that will guide their use). Proposals for future EIT Knowledge and Innovation Communities (KICs) will be indicated in the EIT Strategic Innovation Agenda (SIA), and will take into account the outcomes of the strategic planning process. Themes will be identified and selected in a way that maximises complementarities and synergies with actions under the 'Global Challenges and Industrial Competitiveness' Pillar.

The Commission proposal for the 2021-2027 Multiannual Financial Framework set a more ambitious goal for climate **mainstreaming** across all EU programmes, with an overall target of 25% of EU expenditure contributing to climate objectives. The contribution of this programme to the achievement of this overall target will be tracked through an EU climate marker system at an appropriate level of disaggregation, including the use of more precise methodologies where these are available. The Commission will continue to present the information annually in terms of commitment appropriations in the context of the annual draft budget.

To support the full utilisation of the potential of the programme to contribute to climate objectives, the Commission will seek to identify relevant actions throughout the programme preparation, implementation, review and evaluation processes.

Synergies

Synergies between different Union programmes will be highly encouraged and enhanced through the strategic planning process, which will act as a reference framework for R&I support across the Union's budget. Effective and operational synergies will thus be ensured with other Union programmes, notably to develop a more effective science-policy interface and address policy needs, as well as promote faster dissemination and uptake of research and innovation results and to enable the pursuit of common objectives and common areas for activities (such as partnership areas or mission areas).

These programmes would include, among others, the common agricultural policy (CAP); the European Regional Development Fund (ERDF); the European Social Fund (ESF+); the European Space Programme; the Single Market Programme; the Programme for Environment & Climate Action (LIFE); the Connecting Europe Facility (CEF); the Digital Europe Programme (DEP); the Erasmus Programme; the InvestEU Fund; and the external action instruments (Neighbourhood, Development and International Cooperation Instrument (NDICI) and Instrument for Pre-accession Assistance (IPA III)). Particular attention will be paid to links with the European Semester and the Reform Delivery Tool, including via the Policy Support Facility.

In full complementarity with Horizon Europe, these programmes may provide support for research and innovation activities, including demonstration of solutions tailored to specific national/regional contexts/needs, as well as bilateral and interregional initiatives. In particular, the European Regional Development Fund will support the building of research and innovation eco-systems in the Member States in terms of infrastructures, human resources, modernisation of the public and private sectors, and (inter)regional cooperation networks, such as clusters structures.

Programmes such as the Connecting Europe Facility (CEF), the Digital Europe Programme (DEP), the European Regional Development Fund, European Social Fund, the European Agricultural Fund for Rural Development, or LIFE will make use of public procurement as a key instrument to deploy physical infrastructures and innovative technologies and solutions that can originate from Framework Programme activities and beyond.

The rules for participation and dissemination

The following main new features have been introduced in the **rules for participation and dissemination**:

- **The principle of a single set of rules will continue, but with further improvements.** In line with the corporate approach towards a single-rule book and the preparation of the MFF, the new Union Financial Regulation[8] will be used as a common reference under which the rules applicable to all Union funding programmes will be aligned.
- **Horizon 2020 funding rates will be maintained.** The funding rate will be a maximum that can be reduced when justified for implementing specific actions. This will ensure the programme remains attractive.

[8] European Commission (2017), Financial Regulation applicable to the general budget of the Union and its rules of application, available at: http://ec.europa.eu/budget/library/biblio/documents/regulations/financial_regulation_2017_en.pdf

- **The cost reimbursement scheme will be further simplified,** in particular in what concerns the actual costs scheme for personnel costs: the distinction between basic and additional remuneration will be removed and the Horizon 2020 cap on the additional remuneration abolished.
- **Broader acceptance of the usual cost accounting practice**: the unit cost for internally invoiced goods and services will make it possible to cover actual indirect costs calculated in accordance with the usual cost accounting practices.
- **A wider cross-reliance on audits and assessments – including with other Union programmes – is envisaged**. This should reduce the administrative burden on beneficiaries of Union funds by further aligning the rules. The rules explicitly provide for cross-reliance by considering also other elements of assurance resulting in a need for fewer financial audits on beneficiaries that have positive results on their systems audits. Moreover, cross-reliance can be part of the conditions for lifting the obligation for the beneficiary to submit a certificate on the financial statement.
- The **Participant Guarantee Fund (renamed Mutual Insurance Mechanism) will be extended** to all forms of institutionalised partnerships, including Article 185 initiatives not covered under Horizon 2020, and to beneficiaries from other directly managed Union programmes.
- **Dissemination and exploitation**: most provisions of the Horizon 2020 rules for participation and dissemination are maintained, with further improvements where appropriate. This includes reinforcing the focus on exploitation, in particular within the Union and the role of the plan for the dissemination and exploitation during and after the end of the project. Moreover, the Commission will provide dedicated support to dissemination, exploitation and knowledge diffusion and put more emphasis on promoting the exploitation of R&I results.
- **Communication by the beneficiaries of Union funds**: in line with the recommendations of the Lamy report, the Rules underline the role of beneficiaries in providing coherent, effective and proportionate targeted information to multiple audiences, including the media and the public. Building on experience in Horizon 2020, guidance to beneficiaries will show how they can become principal communicators of all aspects of their project activities.
- **Fostering open science** will ensure better exploitation of R&I results within the Union. This will assist market uptake, boost impact, maximise synergies with other Union initiatives and increase the innovation potential of results generated by Union funding.

The following actions are in particular envisaged:

- Supporting R&I stakeholders in fully endorsing the principle of the open access and working with them to make the European Open Science Cloud a reality;
- Strengthening the European data space[9] that allows for unrestricted and constant knowledge and data circulation and creating the necessary incentives for programme beneficiaries and innovators to share their results and data for reuse.

[9] EC Communication "Towards a common European data space", COM(2018)232 final

- Putting in place incentives for the exploitation of Programme results by helping beneficiaries to find the most appropriate instruments and channels for market uptake of their innovation;
- Putting in place a strategy for increasing the availability of R&I results and accelerating their uptake, including for policy, thereby boosting the overall impact of the programme and the European innovation potential;
- Providing holistic support throughout the dissemination and exploitation lifecycle to ensure a constant stream of innovation coming from the programme.

For Horizon Europe, the **award criteria** will be excellence; impact; and quality and efficiency of the implementation. These are the same criteria as for previous Framework Programmes.

The proposed Regulation specifies excellence as the sole criterion for the European Research Council (ERC), in line with the objective of advancing the frontiers of knowledge. This provision does not represent a deviation from the agreed need to boost impact in the Programme. In fact, impact can refer to scientific, technological, socio-economic or other types of impact. In the case of the ERC, the emphasis is on scientific impact, which is the foundation for many other types of impact, including socio-economic impact. The ERC will continue to set a clear and inspirational ambition for European science by creating pan-European competition for ideas and talent.

The European Institute for Innovation and Technology

The **European Institute for Innovation and Technology**, primarily through its *Knowledge and Innovation Communities* (KICs) will aim at strengthening innovation ecosystems that tackle global challenges, by fostering the integration of business, research, higher education and entrepreneurship. While the EIT's focus on innovation ecosystems make it naturally fit within the Open Innovation pillar of Horizon Europe, the cross-pillar nature of the EIT can bring an additional targeted approach towards the global challenges highlighted in the programme. Proposals for future EIT KICs in compliance with the EIT Regulation will be indicated in the EIT Strategic Innovation Agenda (SIA) and will take into account the outcome of the strategic planning process and the priorities of the Global Challenges and Industrial Competitiveness pillar.

The Joint Research Centre (JRC)

While the **Joint Research Centre** will contribute broadly to other parts of Horizon Europe, the JRC will play a strong supporting role in the Global Challenges and Industrial Competitiveness pillar. In this context, it will continue to provide scientific advice and support to Union policy throughout the policy cycle.

2018/0224 (COD)

Proposal for a

REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL

establishing Horizon Europe – the Framework Programme for Research and Innovation, laying down its rules for participation and dissemination

(Text with EEA relevance)

THE EUROPEAN PARLIAMENT AND THE COUNCIL OF THE EUROPEAN UNION,

Having regard to the Treaty on the Functioning of the European Union, and in particular Article 173(3), Article 182(1), Article 183, and the second paragraph of Article 188 thereof,

Having regard to the proposal from the European Commission,

After transmission of the draft legislative act to the national parliaments,

Having regard to the opinion of the European Economic and Social Committee[10],

Having regard to the opinion of the Committee of the Regions[11],

Acting in accordance with the ordinary legislative procedure[12],

Whereas:

(1) It is the Union's objective to strengthen its scientific and technological bases and encourage its competitiveness, including in its industry, while promoting all research and innovation activities to deliver on the Union's strategic priorities, which ultimately aim at promoting peace, the Union's values and the well-being of its peoples.

(2) To deliver scientific, economic and societal impact in pursuit of this general objective, the Union should invest in research and innovation through Horizon Europe - a Framework Programme for Research and Innovation 2021-2027 (the 'Programme') to support the creation and diffusion of high-quality knowledge and technologies, to strengthen the impact of research and innovation in developing, supporting and implementing Union policies, to support the uptake of innovative solutions in industry and society to address global challenges and promote industrial competitiveness; to foster all forms of innovation, including breakthrough innovation, and strengthen market deployment of innovative solutions; and optimise the delivery of such investment for increased impact within a strengthened European Research Area.

(3) The promotion of research and innovation activities deemed necessary to help realise Union policy objectives should take into account the innovation principle as put forward in the Commission Communication of 15 May 2018 'A renewed European

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10 OJ C […], […], p. […].

11 OJ C […], […], p. […].

12 Position of the European Parliament of … [(not yet published in the Official Journal)] and decision of the Council of ….

Agenda for Research and Innovation - Europe's chance to shape its future' (COM(2018)306).

(4) Open Science, Open Innovation, Open to the World constitute general principles, which should ensure excellence and impact of the Union's investment in research and innovation. They should be adhered in the implementation of the Programme, in particular for the strategic planning in respect of the pillar 'Global Challenges and Industrial Competitiveness'.

(5) Open science, including open access to scientific publications and research data, has the potential to increase the quality, impact and benefits of science and to accelerate the advancement of knowledge by making it more reliable, more efficient and accurate, better understandable by society and responsive to societal challenges. Provisions should be laid down to ensure that beneficiaries provide open access to peer-reviewed scientific publications, research data and other research outputs in an open and non-discriminatory manner, free of charge and as early as possible in the dissemination process, and to enable their widest possible use and re-use. More emphasis should in particular be given to the responsible management of research data, which should comply with the FAIR principles of 'Findability', 'Accessibility', 'Interoperability' and 'Reusability', notably through the mainstreaming of Data Management Plans. Where appropriate, beneficiaries should make use of the possibilities offered by the European Open Science Cloud and adhere to further open science principles and practices.

(6) The conception and design of the Programme should respond to the need for establishing a critical mass of supported activities, throughout the EU Union and through international cooperation, in line with the UN Sustainable Development Goals (SDGs). Programme implementation should reinforce the pursuit of this aim.

(7) Activities supported under the Programme should contribute towards the achievement of the Union's objectives and priorities, the monitoring and assessment of progress against those objectives and priorities and for the development of revised or new priorities.

(8) The Programme should maintain a balanced approach between bottom-up (investigator or innovator driven) and top-down (determined by strategically defined priorities) funding, according to the nature of the research and innovation communities that are engaged, the types and purpose of the activities carried out and the impacts that are sought. The mix of these factors should determine the choice of approach for the respective parts of the Programme, all of which contribute to all of the Programme's general and specific objectives.

(9) Research activities carried out under the pillar 'Open Science' should be determined according to the needs and opportunities of science. The research agenda should be set in close liaison with the scientific community. Research should be funded on the basis of excellence.

(10) The pillar 'Global Challenges and Industrial Competitiveness' should be established through clusters of research and innovation activities, in order to maximise integration across the respective work areas while securing high and sustainable levels of impact in relation to the resources that are expended. It will encourage cross-disciplinary, cross-sectoral, cross-policy and cross-border collaboration in pursuit of the UN SDGs and the competitiveness of the Union's industries therein.

(11) Full engagement of industry in the Programme, at all levels from the individual entrepreneur and small and medium-sized enterprises to large scale enterprises, should constitute one of the main channels through which the Programme's objectives are to be realised, specifically towards the creation of sustainable jobs and growth. Industry should contribute to the perspectives and priorities established through the strategic planning process which should support the development of work programmes. Such engagement by industry should see its participation in the actions supported at levels at least commensurate with those under the previous framework programme Horizon 2020 established by Regulation (EU) No 1291/2013 of the European Parliament and the Council[13] ('Horizon 2020').

(12) It is important to support industry to stay or become world leader in innovation, digitisation and decarbonisation, notably through investments in key enabling technologies that will underpin tomorrow's business. The Programme's actions should be used to address market failures or sub-optimal investment situations, in a proportionate manner, without duplicating or crowding out private financing and have a clear European added value. This will ensure consistency between the actions of the programme and EU State aid rules, avoiding undue distortions of competition in the internal market.

(13) The Programme should support research and innovation in an integrated manner, respecting all relevant provisions of the World Trade Organisation. The concept of research, including experimental development should be used in accordance with the Frascati Manual developed by the OECD, whereas the concept of innovation should be used in accordance with the Oslo Manual developed by the OECD and Eurostat, following a broad approach that covers social innovation. The OECD definitions regarding Technological Readiness Level (TRL) should continue, as in the previous Framework Programme Horizon 2020, to be taken into account in the classification of technological research, product development and demonstration activities, and the definition of types of action available in calls for proposals. In principle grants should not be awarded for actions where activities go above TRL 8. The work programme for a given call under the pillar 'Global Challenges and Industrial Competitiveness' could allow grants for large-scale product validation and market replication.

(14) The Commission's Communication on the interim evaluation of Horizon 2020 (COM(2018) 2 final) has provided a set of recommendations for this Programme, including its Rules for participation and dissemination, building on the lessons learnt from the previous Programme as well as input from EU institutions and stakeholders. Those recommendations include to invest more ambitiously in order to reach critical mass and maximise impact; to support breakthrough innovation; to prioritise Union research and innovation (R&I) investments in areas of high added value, notably through mission-orientation, citizen involvement and wide communication; to rationalise the Union funding landscape, including by streamlining the range of partnership initiatives and co-funding schemes; the development of more and concrete synergies between different Union funding instruments, notably with the aim of helping to mobilise under-exploited R&I potential across the Union; to strengthen international cooperation and reinforce openness to third countries' participation; and to continue simplification based on implementation experiences from Horizon 2020.

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(15) The Programme should seek synergies with other Union programmes, from their design and strategic planning, to project selection, management, communication, dissemination and exploitation of results, to monitoring, auditing and governance. With a view to avoiding overlaps and duplication and increasing the leverage of Union funding, transfers from other Union programmes to Horizon Europe activities can take place. In such cases they will follow Horizon Europe rules.

(16) In order to achieve the greatest possible impact of Union funding and the most effective contribution to the Union's policy objectives, the Programme should enter into European Partnerships with private and/or public sector partners. Such partners include industry, research organisations, bodies with a public service mission at local, regional, national or international level, and civil society organisations such as foundations that support and/or carry out research and innovation, provided that desired impacts can be achieved more effectively in partnership than by the Union alone.

(17) The Programme should strengthen cooperation between European Partnerships and private and/or public sector partners at the international level including by joining up research and innovation programmes and cross-border investment in research and innovation bringing mutual benefits to people and businesses while ensuring that the EU can uphold its interests in strategic areas.[14]

(18) The Joint Research Centre (JRC) should continue to provide Union policies with independent customer-driven scientific evidence and technical support throughout the whole policy cycle. The direct actions of the JRC should be implemented in a flexible, efficient and transparent manner, taking into account the relevant needs of the users of the JRC and the needs of Union policies, and ensuring the protection of the financial interests of the Union. The JRC should continue to generate additional resources.

(19) The pillar 'Open Innovation' should establish a series of measures for integrated support to the needs of entrepreneurs and entrepreneurship aiming at realising and accelerating breakthrough innovation for rapid market growth. It should attract innovative companies with potential for scaling up at international and at Union level and offer fast, flexible grants and co-investments, including with private investors. These objectives should be pursued through the creation of a European Innovation Council (EIC). This Pillar should also support the European Institute of Innovation and Technology (EIT) and European innovation ecosystems at large, notably through co-funding partnerships with national and regional innovation support actors.

(20) The policy objectives of this Programme will be also addressed through financial instruments and budgetary guarantee under the policy windows of the InvestEU Fund. Financial support should be used to address market failures or sub-optimal investment situations, in a proportionate manner and actions should not duplicate or crowd out private financing or distort competition in the Internal market. Actions should have a clear European added value.

(21) The EIC through its instruments – Pathfinder and Accelerator – should aim at identifying, developing and deploying breakthrough market creating innovations and supporting their rapid scale-up to EU and international levels. Through coherent and streamlined support to breakthrough innovation the EIC should fill the current vacuum

[14] See e.g. the Commission's proposal for a regulation establishing a framework for screening Foreign Direct Investment into the EU (COM (2017)487).

in public support and private investment for breakthrough innovation. The instruments of the EIC call for dedicated legal and management features in order to reflect its objectives, in particular market deployment activities.

(22) Through EIC blended finance, the Accelerator should bridge the "valley of death" between research, pre-mass commercialisation and the scaling-up of companies. In particular, the Accelerator should provide support to operations presenting such technological or market risks that they are not considered as bankable and cannot leverage significant investments from the market, hence complementing the InvestEU programme established by Regulation …[15]..

(23) The EIT, primarily through its Knowledge and Innovation Communities (KICs), should aim at strengthening innovation ecosystems that tackle global challenges, by fostering the integration of business, research, higher education and entrepreneurship. The EIT should foster innovation in its activities and should support the integration of higher education within the innovation ecosystem, in particular by: stimulating entrepreneurial education, fostering strong non-disciplinary collaborations between industry and academia; and identifying prospective skills for future innovators to address global challenges, which includes advanced digital and innovation skills. Support schemes provided by the EIT should benefit to EIC beneficiaries, while start-ups emerging from EIT KICs should have access to EIC actions. While the EIT's focus on innovation ecosystems should make it naturally fit within the pillar 'Open Innovation', the planning of its KICs should be aligned through the strategic planning process with the pillar 'Global Challenges and Industrial Competitiveness'.

(24) Ensuring and preserving a level playing field for companies that compete in a given market should be a key requirement for breakthrough or disruptive innovation to flourish thereby enabling in particular small and medium-size innovators to reap the benefits of their investment and to capture a share of the market.

(25) The Programme should promote and integrate cooperation with third countries and international organisations and initiatives based on common interest, mutual benefit and global commitments to implement the UN SDGs. International cooperation should aim to strengthen the Union's research and innovation excellence, attractiveness and economic and industrial competitiveness, to tackle global challenges, as embodied in the UN SDGs, and to support the Union's external policies. An approach of general opening for international participation and targeted international cooperation actions should be followed, including through appropriate eligibility for funding of entities established in low to middle income countries. At the same time, association of third countries to the Programme should be promoted.

(26) With the aim of deepening the relationship between science and society and maximising benefits of their interactions, the Programme should engage and involve citizens and civil society organisations in co-designing and co-creating responsible research and innovation agendas and contents, promoting science education, making scientific knowledge publicly accessible, and facilitating participation by citizens and civil society organisations in its activities. It should do so across the Programme and through dedicated activities in the part 'Strengthening the European Research Area'. The engagement of citizens and civil society in research and innovation should be coupled with public outreach activities to generate and sustain public support for the Programme. The programme should also seek to remove barriers and boost synergies

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between science, technology, culture and the arts to obtain a new quality of sustainable innovation.

(27) Pursuant to Article 349 of the TFEU, the Union's outermost regions are entitled to specific measures (taking into account their structural, social and economic situation) regarding access to horizontal Union programmes. The Programme should therefore take into account the specific characteristics of those regions in line with the Commission's Communication on 'A stronger and renewed strategic partnership with the EU's outermost regions' (COM (2017) 623 final) as endorsed by the Council on 12 April 2018.

(28) The activities developed under the Programme should aim at eliminating gender inequalities and promoting equality between women and men in research and innovation, in compliance with Articles 2 and 3 of the Treaty on European Union and Article 8 of the TFEU. The gender dimension should be adequately integrated in research and innovation content and followed through at all stages of the research cycle.

(29) In light of the specificities of the defence industry sector, the detailed provisions for Union funding to defence research projects should be fixed in the Regulation … establishing the European Defence Fund[16] which defines the rules of participation for defence research. Research and innovation activities carried out under the European Defence Fund should have an exclusive focus on defence applications.

(30) This Regulation lays down a financial envelope for the Programme. The amount indicated for the specific programme referred to in Article 1(3)(a) is to constitute the prime reference amount, within the meaning of [*reference to be updated as appropriate according to the new inter-institutional agreement:* point 17 of the Interinstitutional Agreement of 2 December 2013 between the European Parliament, the Council and the Commission on budgetary discipline, on cooperation in budgetary matters and on sound financial management[17]], for the European Parliament and the Council during the annual budgetary procedure.

(31) Regulation (EU, Euratom) No [the new FR] (the 'Financial Regulation') applies to this Programme, unless otherwise specified. It lays down rules on the implementation of the Union budget, including the rules on grants, prizes, procurement, indirect implementation, financial assistance, financial instruments and budgetary guarantees.

(32) In accordance with the Financial Regulation, Regulation (EU, Euratom) No 883/2013 of the European Parliament and of the Council[18], Council Regulation (Euratom, EC) No 2988/95[19],Council Regulation (Euratom, EC) No 2185/96[20] and Council

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17 Reference to be updated: OJ C 373, 20.12.2013, p. 1. The agreement is available at: *http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.C_.2013.373.01.0001.01.ENG&toc=OJ:C:2013:373:TOC*

18 Regulation (EU, Euratom) No 883/2013 of the European Parliament and of the Council of 11 September 2013 concerning investigations conducted by the European Anti-Fraud Office (OLAF) and repealing Regulation (EC) No 1073/1999 of the European Parliament and of the Council and Council Regulation (Euratom) No 1074/1999,(OJ L248, 18.9.2013, p. 1.

19 Council Regulation (EC, Euratom) No 2988/95 of 18 December 1995 on the protection of the European Communities financial interests (OJ L 312, 23.12.95, p.1).

20 Council Regulation (Euratom, EC) No 2185/96 of 11 November 1996 concerning on-the-spot checks and inspections carried out by the Commission in order to protect the European Communities' financial interests against fraud and other irregularities (OJ L292,15.11.96 , p.2).

Regulation (EU) 2017/1939[21], the financial interests of the Union are to be protected through proportionate measures, including the prevention, detection, correction and investigation of irregularities, including fraud, the recovery of funds lost, wrongly paid or incorrectly used and, where appropriate, the imposition of administrative sanctions. In particular, in accordance with Regulation (EU, Euratom) No 883/2013 and Regulation (Euratom, EC) No 2185/96 the European Anti-Fraud Office (OLAF) may carry out administrative investigations, including on-the-spot checks and inspections, with a view to establishing whether there has been fraud, corruption or any other illegal activity affecting the financial interests of the Union. In accordance with Regulation (EU) 2017/1939, the European Public Prosecutor's Office (EPPO) may investigate and prosecute fraud and other criminal offences affecting the financial interests of the Union as provided for in Directive (EU) 2017/1371 of the European Parliament and of the Council[22]. In accordance with the Financial Regulation, any person or entity receiving Union funds is to fully cooperate in the protection of the Union's financial interests, to grant the necessary rights and access to the Commission, OLAF, the EPPO and the European Court of Auditors (ECA) and to ensure that any third parties involved in the implementation of Union funds grant equivalent rights.

(33) Pursuant to [reference to be updated as appropriate according to a new decision on OCTs: Article 94 of Council Decision 2013/755/EU[23]], persons and entities established in overseas countries and territories (OCTs) are eligible for funding subject to the rules and objectives of the Programme and possible arrangements applicable to the Member State to which the relevant overseas country or territory is linked.

(34) Pursuant to paragraph 22 and 23 of the Inter-institutional agreement for Better Law-Making of 13 April 2016, there is a need to evaluate this Programme on the basis of information collected through specific monitoring requirements, while avoiding overregulation and administrative burdens, in particular on Member States. These requirements, where appropriate, can include measurable indicators, as a basis for evaluating the effects of the Programme on the ground.

(35) In order to be able to supplement or amend the impact pathway indicators, where considered necessary, the power to adopt acts in accordance with Article 290 of the Treaty on the Functioning of the European Union should be delegated to the Commission. It is of particular importance that the Commission carry out appropriate consultations during its preparatory work, including at expert level, and that those consultations be conducted in accordance with the principles laid down in the Interinstitutional Agreement on Better Law-Making of 13 April 2016. In particular, to ensure equal participation in the preparation of delegated acts, the European Parliament and the Council receive all documents at the same time as Member States' experts, and their experts systematically have access to meetings of Commission expert groups dealing with the preparation of delegated acts.

(36) Coherence and synergies between Horizon Europe and the EU's Space Programme will foster a globally competitive and innovative European space sector; reinforce Europe's autonomy in accessing and using space in a secure and safe environment;

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21 Council Regulation (EU) 2017/1939 of 12 October 2017 implementing enhanced cooperation on the establishment of the European Public Prosecutor's Office ('the EPPO') (OJ L283, 31.10.2017, p.1).

22 Directive (EU) 2017/1371 of the European Parliament and of the Council of 5 July 2017 on the fight against fraud to the Union's financial interests by means of criminal law (OJ L 198, 28.7.2017, p. 29).

23 Council Decision 2013/755/EU of 25 November 2013 on the association of the overseas countries and territories with the European Union (Overseas Association Decision) (OJ L 344, 19.12.2013, p. 1).

and strengthen Europe's role as a global actor. Breakthrough solutions in Horizon Europe will be supported by data and services made available by the Space Programme.

(37) The rules for participation and dissemination should adequately reflect the needs of the Programme taking into account the concerns raised and the recommendations made by various stakeholders.

(38) Common rules across the Programme should ensure a coherent framework which facilitates participation in programmes financially supported by the budget of the Programme, including participation in programmes managed by funding bodies such as the EIT, joint undertakings or any other structures under Article 187 TFEU, and participation in programmes undertaken by Member States pursuant to Article 185 TFEU. Flexibility to adopt specific rules should be ensured when justified.

(39) Actions which fall within the scope of the Programme should respect fundamental rights and observe the principles acknowledged in particular by the Charter of Fundamental Rights of the European Union. Such actions should be in conformity with any legal obligation including international law and with any relevant Commission decisions such as the Commission notice of 28 June 2013[24], as well as with ethical principles, which include avoiding any breach of research integrity. Article 13 TFEU should also be taken into account in research activities, and the use of animals in research and testing should be reduced, with a view ultimately to replacing their use.

(40) In line with the objectives of international cooperation as set out in Articles 180 and 186 TFEU, the participation of legal entities established in third countries and of international organisations should be promoted. The implementation of the Programme should be in conformity with the measures adopted in accordance with Articles 75 and 215 TFEU and should be in compliance with international law. For actions related to Union strategic assets, interests, autonomy or security, the participation to specific actions of the Programme may be limited to entities established in Member States only, or to entities established in specified associated or other third countries in addition to Member States.

(41) Reflecting the importance of tackling climate change in line with the Union's commitments to implement the Paris Agreement and the United Nations Sustainable Development Goals, this Programme will contribute to mainstream climate actions and to the achievement of an overall target of 25 % of the EU budget expenditures supporting climate objectives.

(42) Horizontal financial rules adopted by the European Parliament and the Council on the basis of Article 322 of the Treaty on the Functioning of the European Union apply to this Regulation. These rules are laid down in the Financial Regulation and determine in particular the procedure for establishing and implementing the budget through grants, procurement, prizes, indirect implementation, and provide for checks on the responsibility of financial actors. Rules adopted on the basis of Article 322 TFEU also concern the protection of the Union's budget in case of generalised deficiencies as regards the rule of law in the Member States, as the respect for the rule of law is an essential precondition for sound financial management and effective EU funding.

[24] OJ C 205, 19.7.2013, p. 9.

(43) Use of sensitive background information or access by unauthorized individuals to sensitive results may have an adverse impact on the interests of the Union or of one or more of the Member States. Thus handling of confidential data and classified information should be governed by all relevant Union law, including the Institutions' internal rules, such as Commission Decision (EU, Euratom) 2015/444, which lays down the provisions on security rules for protecting EU classified information.

(44) It is necessary to establish the minimum conditions for participation, both as a general rule where the consortium should include at least one legal entity from a Member State, and with regard to the specificities of particular type of actions under the Programme.

(45) It is appropriate to establish the terms and conditions for providing Union funding to participants in actions under the Programme. Grants should be implemented taking into account all forms of contribution set out in the Financial Regulation, including lump sums, flat rates or unit costs, with the view to further simplification.

(46) The funding rates in this Regulation are referred to as maximums in order to comply with the co-financing principle.

(47) In accordance with the Financial Regulation, the Programme should provide the basis for a wider acceptance of the usual cost accounting practices of the beneficiaries as regards personnel costs and unit costs for internally invoiced goods and services.

(48) The current system of reimbursement of actual personnel costs should be further simplified building on the project-based remuneration approach developed under Horizon 2020 and further aligned to the Financial Regulation.

(49) The participant Guarantee Fund set up under Horizon 2020 and managed by the Commission has proved to be an important safeguard mechanism which mitigates the risks associated with the amounts due and not reimbursed by defaulting participants. Therefore, the Beneficiary Guarantee Fund, renamed Mutual Insurance Mechanism ("the Mechanism") should be continued and enlarged to other funding bodies in particular to initiatives pursuant to Article 185 of the TFEU. The Mechanism should be opened to beneficiaries of any other directly managed Union programme.

(50) Rules governing the exploitation and dissemination of results should be laid down to ensure that beneficiaries protect, exploit, disseminate and provide access to those results as appropriate. More emphasis should be given to exploiting the results, in particular in the Union. Beneficiaries should update their plans regarding the exploitation and dissemination of their results during and after the end of the action.

(51) The key elements of the proposal evaluation and selection system of the predecessor programme Horizon 2020 with its particular focus on excellence should be maintained. Proposals should continue to be selected based on the evaluation made by independent experts. Where relevant, the necessity to ensure the overall coherence of the portfolio of projects should be taken into account.

(52) A wider cross-reliance on audits and assessments – including with other Union programmes – should be envisaged, in order to reduce administrative burden for beneficiaries of Union funds. Cross reliance should be explicitly provided for by considering also other elements of assurance such as systems and processes audits.

(53) Specific challenges in the area of research of innovation should be addressed by prizes, including through common or joint prizes where appropriate, organised by the

Commission or funding body with other Union bodies, third countries, international organisations or non-profit legal entities.

(54) The types of financing and the methods of implementation under this Regulation shall be chosen on the basis of their ability to achieve the specific objectives of the actions and to deliver results, taking into account, in particular, the costs of controls, the administrative burden, and the expected risk of non-compliance. For grants, this shall include consideration of the use of lump sums, flat rates and scales of unit costs.

HAVE ADOPTED THIS REGULATION:

TITLE I

GENERAL PROVISIONS

Article 1

Subject matter

1. This Regulation establishes Horizon Europe - the Framework Programme for Research and Innovation ('the Programme') and the rules for participation and dissemination in indirect actions under the Programme.

2. It lays down the objectives of the Programme, the budget for the period 2021 – 2027, the forms of Union funding and the rules for providing such funding.

3. The Programme shall be implemented through:

   (a) the specific programme established by Decision …/…/EU[25], which includes a financial contribution to the EIT;

   (b) the specific programme on defence research established by Regulation …/…/EU.

4. The terms 'Horizon Europe', 'the Programme' and 'specific programme' used in this Regulation address matters relevant only to the specific programme described in paragraph 3(a), unless otherwise explicitly stated.

Article 2

Definitions

For the purposes of this Regulation, the following definitions apply:

(1) 'research infrastructures' mean facilities that provide resources and services for the research communities to conduct research and foster innovation in their fields. This definition includes the associated human resources, and it covers major equipment or sets of instruments; knowledge-related facilities such as collections, archives or scientific data infrastructures; computing systems, communication networks, and any other infrastructure, of a unique nature and open to external users, essential to achieve excellence in research and innovation. Where relevant, they may be used

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beyond research, for example for education or public services and they may be 'single sited', 'virtual' or 'distributed';

(2) 'smart specialisation strategy' has the same meaning as smart specialisation strategy as defined in Regulation (EU) No 1303/2013 of the European Parliament and of the Council[26] and fulfilling the enabling conditions set out in Regulation (EU) XX [Common Provisions Regulation];

(3) 'European Partnership' means an initiative where the Union, together with private and/or public partners (such as industry, research organisations, bodies with a public service mission at local, regional, national or international level or civil society organisations including foundations), commit to jointly support the development and implementation of a programme of research and innovation activities, including those related to market, regulatory or policy uptake;

(4) 'open access' means the practice of providing online access to research outputs resulting from actions funded under the Programme, in particular scientific publications and research data, free of charge to the end-user;

(5) 'mission' means a portfolio of actions intended to achieve a measurable goal within a set timeframe, and impact for science and technology and/or society and citizens that could not be achieved through individual actions;

(6) 'pre-commercial procurement' means the procurement of research and development services involving risk-benefit sharing under market conditions, and competitive development in phases, where there is a clear separation of the research and development services procured from the deployment of commercial volumes of end-products;

(7) 'public procurement of innovative solutions' means procurement where contracting authorities act as a launch customer for innovative goods or services which are not yet available on a large-scale commercial basis, and may include conformity testing.

(8) “access rights” means rights to use results or background;

(9) “background” means any data, know-how or information whatever its form or nature, tangible or intangible, including any rights such as intellectual property rights, that is: (i) held by beneficiaries prior to their accession to the action; (ii) identified by the beneficiaries in writing in any manner as needed for implementing the action or for exploiting its results;

(10) “dissemination” means the public disclosure of the results by appropriate means (other than resulting from protecting or exploiting the results), including by scientific publications in any medium;

(11) “exploitation” means the use of results in further research and innovation activities other than those covered by the action concerned, or in developing, creating, manufacturing and marketing a product or process, or in creating and providing a service, or in standardisation activities;

[26] Regulation (EU) No 1303/2013 of the European Parliament and of the Council of 17 December 2013 laying down common provisions on the European Regional Development Fund, the European Social Fund, the Cohesion Fund, the European Agricultural Fund for Rural Development and the European Maritime and Fisheries Fund and laying down general provisions on the European Regional Development Fund, the European Social Fund, the Cohesion Fund and the European Maritime and Fisheries Fund and repealing Council Regulation (EC) No 1083/2006.

(12) "fair and reasonable conditions" means appropriate conditions, including possible financial terms or royalty-free conditions, taking into account the specific circumstances of the request for access, for example the actual or potential value of the results or background to which access is requested and/or the scope, duration or other characteristics of the exploitation envisaged;

(13) "funding body" means a body or organisation, other than the Commission, as referred to in point (c) of Article 62(1) of the Financial Regulation, to which the Commission has entrusted budget implementation tasks under the Programme;

(14) "international European research organisation" means an international organisation, the majority of whose members are Member States or associated countries, and whose principal objective is to promote scientific and technological cooperation in Europe;

(15) 'legal entity' means any natural or legal person created and recognised as such under national law, Union law or international law, which has legal personality and which may, acting in its own name, exercise rights and be subject to obligations, or an entity without a legal personality in accordance with Article 197(2)(c) of the Financial Regulation;

(16) "non-profit legal entity" means a legal entity which by its legal form is non-profit-making or which has a legal or statutory obligation not to distribute profits to its shareholders or individual members;

(17) "mid-cap" means a company that is not a micro-, small- and medium-sized enterprise ('SME') as defined in Commission Recommendation 2003/361/EC[27], and that has a number of employees of up to 3000 where the staff headcount is calculated in accordance with Articles 3, 4, 5 and 6 of Title I of the Annex of that Recommendation;

(18) "results" means any tangible or intangible effect of the action, such as data, know-how or information, whatever its form or nature, whether or not it can be protected, as well as any rights attached to it, including intellectual property rights;

(19) "seal of excellence" means a certified label which shows that a proposal submitted to a call for proposals exceeded all of the thresholds set out in the work programme, but could not be funded due to lack of budget available to that call in the work programme;

(20) "work programme" means the document adopted by the Commission for the implementation of the specific programme[28] in accordance with its Article 12 or the equivalent document in content and structure adopted by a funding body.

(21) "reimbursable advance" means the part of a Horizon Europe or EIC blended finance corresponding to a loan under Title X of the Financial Regulation, but that is directly awarded by the Union on a non-profit basis to cover the costs of activities corresponding to an innovation action, and to be reimbursed by the beneficiary to the Union under the conditions provided for in the contract;

(22) "contract" means the agreement concluded between the Commission or a funding body with a legal entity implementing an innovation and market deployment action and supported by a Horizon Europe or EIC blended finance.

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(23) “classified information” means EU classified information ad defined in Article 3 of Commission Decision (EU, Euratom) 2015/444 as well as classified information of Member States, classified information of third countries with which the Union has a security agreement and classified information of international organisation with which the Union has a security agreement;

(24) 'Blending operation' means actions supported by the EU budget, including within blending facilities pursuant to Article 2(6) of the Financial Regulation, combining non-repayable forms of support and/or financial instruments from the EU budget with repayable forms of support from development or other public finance institutions, as well as from commercial finance institutions and investors.

(25) “Horizon Europe or EIC blended finance” means a single financial support to an innovation and market deployment action, consisting in a specific combination of a grant or a reimbursable advance with an investment in equity;

Article 3

Programme objectives

1. The Programme’s general objective is to deliver scientific, economic and societal impact from the Union’s investments in research and innovation so as to strengthen the scientific and technological bases of the Union and foster its competitiveness, including in its industry, deliver on the Union strategic priorities, and contribute to tackling global challenges, including the Sustainable Development Goals.

2. The Programme has the following specific objectives:

   (a) to support the creation and diffusion of high-quality new knowledge, skills, technologies and solutions to global challenges;

   (b) to strengthen the impact of research and innovation in developing, supporting and implementing Union policies, and support the uptake of innovative solutions in industry and society to address global challenges;

   (c) to foster all forms of innovation, including breakthrough innovation, and strengthen market deployment of innovative solutions;

   (d) to optimise the Programme's delivery for increased impact within a strengthened European Research Area.

Article 4

Programme structure

1. The Programme is structured in the following parts contributing to the general and specific objectives set out in in Article 3:

   (1) Pillar I 'Open Science', pursuing the specific objective set out in Article 3(2)(a) and also supporting specific objectives set out in Article 3(2)(b) and (c), with the following components:

      (a) the European Research Council (ERC);

      (b) Marie Skłodowska-Curie Actions (MSCA);

      (c) research infrastructures.

(2) Pillar II 'Global Challenges and Industrial Competitiveness', pursuing the specific objective set out in Article 3(2)(b) and also supporting the specific objectives set out in Article 3(2)(a) and (c), with the following components:

(a) cluster 'Health';

(b) cluster 'Inclusive and Secure Society';

(c) cluster 'Digital and Industry';

(d) cluster 'Climate, Energy and Mobility';

(e) cluster 'Food and Natural Resources';

(f) non-nuclear direct actions of the Joint Research Centre (JRC).

(3) Pillar III 'Open Innovation', pursuing the specific objective set out in Article 3(2)(c) and also supporting the specific objectives set out in Article 3(2)(a) and (b), with the following components:

(a) the European Innovation Council (EIC);

(b) European innovation ecosystems;

(c) the European Institute of Innovation and Technology (EIT).

(4) Part 'Strengthening the European Research Area', pursuing the specific objective set out in Article 3(2)(d) and also supporting the specific objectives set out in Article 3(2)(a), (b) and (c), with the following components:

(a) sharing excellence;

(b) reforming and enhancing the European R&I System.

2. The broad lines of activities are set out in Annex I.

Article 5

Defence research

1. Activities to be carried out under the specific programme referred to in Article 1(3)(b) and which are laid down in Regulation …. establishing the European Defence Fund, shall be research with an exclusive focus on defence applications, with the objective to foster the competitiveness, efficiency and innovation of defence industry.

2. This Regulation does not apply to the specific programme referred to in Article 1(3)(b), with the exception of this Article, Article 1(1) and (3) and Article 9(1).

Article 6

Implementation and forms of EU funding

1. The Programme shall be implemented in direct management in accordance with the Financial Regulation or in indirect management with funding bodies referred to in Article 62(1)(c) of the Financial Regulation.

2. The Programme may provide funding to indirect actions in any of the forms laid down in the Financial Regulation, in particular grants (including operating grants), prizes and procurements It may also provide financing in the form of financial instruments within blending operations.

3. The rules for participation and dissemination laid down in this Regulation shall apply to indirect actions.

4. The main types of action to be used under the Programme are set out and defined in Annex II. All forms of funding shall be used in a flexible manner across all objectives of the Programme with their use being determined on the basis of the needs and the characteristics of the particular objectives.

5. The Programme shall also support direct actions undertaken by the JRC. Where these actions contribute to initiatives established under Article 185 or Article 187 TFEU, this contribution shall not be considered as part of the financial contribution allocated to those initiatives.

6. The implementation of the specific programme[29] shall be based on a transparent and strategic multiannual planning of research and innovation activities, in particular for the pillar 'Global Challenges and Industrial Competitiveness', following consultations with stakeholders about priorities and the suitable types of action and forms of implementation to use. This shall ensure alignment with other relevant Union programmes.

7. Horizon Europe activities shall be primarily delivered through calls for proposals, some of which organised as parts of missions and European Partnerships.

8. Research and innovation activities carried out under Horizon Europe shall have a focus on civil applications.

9. The Programme shall ensure the effective promotion of gender equality and the gender dimension in research and innovation content. Particular attention shall be paid to ensuring gender balance, subject to the situation in the field of research and innovation concerned, in evaluation panels and in bodies such as expert groups.

Article 7

Missions

1. Missions shall be programmed within the pillar 'Global Challenges and Industrial Competitiveness', but may also benefit from actions carried out within other parts of the Programme.

2. The missions shall be implemented in accordance with Article 5 of the Specific Programme. Evaluation shall be carried out in accordance with Article 26.

3. Missions shall:

   (a) have a clear EU-added value and contribute to reaching Union priorities;

   (b) be bold and inspirational, and hence have wide societal or economic relevance;

   (c) indicate a clear direction and be targeted, measurable and time-bound;

   (d) be centered on ambitious but realistic research and innovation activities;

   (e) spark activity across disciplines, sectors and actors;

   (f) be open to multiple, bottom-up solutions.

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Article 8

European Partnerships

1. Parts of Horizon Europe may be implemented through European Partnerships. The involvement of the Union in European Partnerships may take any of the following forms:

   (a) participation in partnerships set up on the basis of memoranda of understanding and/or contractual arrangements between the Commission and the partners referred to in Article 2(3), specifying the objectives of the partnership, related commitments for financial and/or in-kind contributions of the partners, key performance and impact indicators, and outputs to be delivered. They include the identification of complementary research and innovation activities that are implemented by the partners and by the Programme (Co-programmed European Partnerships);

   (b) participation in and financial contribution to a programme of research and innovation activities, based on the commitment of the partners for financial and in-kind contributions and integration of their relevant activities using a Programme co-fund action (Co-funded European Partnerships);

   (c) participation in and financial contribution to research and innovation programmes undertaken by several Member States in accordance with Article 185 TFEU, or by bodies established pursuant to Article 187 TFEU, such as Joint Undertakings, or by the EIT Knowledge and Innovation Communities in compliance with the [EIT Regulation] (Institutionalised European Partnerships), to be implemented only where other forms of European Partnerships would not achieve the objectives or would not generate the necessary expected impacts, and if justified by a long-term perspective and high degree of integration including central management of all financial contributions.

2. European Partnerships shall:

   (a) Be established in cases where they will more effectively achieve objectives of Horizon Europe than the Union alone;

   (b) Adhere to the principles of Union added value, transparency, openness, impact, leverage effect, long-term financial commitment of all the involved parties, flexibility, coherence and complementarity with Union, local, regional national and international initiatives;

   (c) Be time limited and include conditions for phasing-out the Programme funding.

   Provisions and criteria for their selection, implementation, monitoring, evaluation and phasing-out are set out in Annex III.

Article 9

Budget

1. The financial envelope for the implementation of the Framework Programme for the period 2021 – 2027 shall be EUR 94 100 000 000 in current prices for the specific programme referred to in Article 1(3)(a) and, in addition, the amount for the specific

programme referred to in Article 1(3)(b), as laid down in Regulation…. establishing the European Defence Fund.

2. The indicative distribution of the amount referred to in paragraph 1, first half sentence, shall be:

(a) EUR 25 800 000 000 for Pillar I 'Open Science' for the period 2021-2027, of which

(1) EUR 16 600 000 000 for the European Research Council;

(2) EUR 6 800 000 000 for Marie Skłodowska-Curie Actions;

(3) EUR 2 400 000 000 for research infrastructures;

(b) EUR 52 700 000 000 for Pillar II 'Global Challenges and Industrial Competitiveness' for the period 2021-2027, of which

(1) EUR 7 700 000 000 for cluster 'Health';

(2) EUR 2 800 000 000 for cluster 'Inclusive and Secure Society';

(3) EUR 15 000 000 000 for cluster 'Digital and Industry';

(4) EUR 15 000 000 000 for cluster 'Climate, Energy and Mobility';

(5) EUR 10 000 000 000 for cluster 'Food and Natural Resources';

(6) EUR 2 200 000 000 for the non-nuclear direct actions of the Joint Research Centre (JRC);

(c) EUR 13 500 000 000 for Pillar III 'Open Innovation' for the period 2021-2027, of which

(1) EUR 10 500 000 000 for the European Innovation Council, including up to EUR 500 000 000 for European Innovation Ecosystems;

(2) EUR 3 000 000 000 for the European Institute of Innovation and Technology (EIT);

(d) EUR 2 100 000 000 for Part 'Strengthening the European Research Area' for the period 2021-2027, of which

(1) EUR 1 700 000 000 for 'sharing excellence';

(2) EUR 400 000 000 for 'reforming and enhancing the European R&I System'.

3. In order to respond to unforeseen situations or to new developments and needs, the Commission may, within the annual budgetary procedure, deviate from the amounts referred to in paragraph 2 up to a maximum of 10%. No such deviation shall be allowed in respect of the amounts referred to in points (b) (6) of paragraph 2 of this Article and the total amount set out for Part 'Strengthening the European Research Area' of paragraph 2 of this Article.

4. The amount referred to in paragraph 1, first half sentence, may also cover expenses for preparation, monitoring, control, audit, evaluation and other activities and expenditures necessary for managing and implementing the Programme, including all administrative expenditure, as well as evaluating the achievement of its objectives. It may moreover cover expenses relating to the studies, meetings of experts, information and communication actions, in so far as they are related to the objectives of the Programme, as well as expenses linked to information technology

networks focusing on information processing and exchange, including corporate information technology tools and other technical and administrative assistance needed in connection with the management of the Programme.

5. If necessary, appropriations may be entered in the budget beyond 2027 to cover the expenses provided for in paragraph 4, to enable the management of actions not completed by 31 December 2027.

6. Budgetary commitments for actions extending over more than one financial year may be broken down over several years into annual instalments.

7. Without prejudice to the Financial Regulation, expenditure for actions resulting from projects included in the first work programme may be eligible as from 1 January 2021.

8. Resources allocated to Member States under shared management and transferrable in accordance with Article 21 of Regulation (EU) XX […Common Provisions Regulation] may, at their request, be transferred to the Programme. The Commission shall implement those resources directly in accordance with point (a) of Article 62(1) of the Financial Regulation or indirectly in accordance with point (c) of that Article. Where possible, those resources shall be used for the benefit of the Member State concerned.

9. Horizon Europe is designed to be implemented in synergy with other Union funding programmes. A non-exhaustive list of synergies with other Union funding programmes is included in Annex IV.

Article 10

Open access and open data

1. Open access to scientific publications resulting from research funded under the Programme shall be ensured in accordance with Article 35(3). Open access to research data shall be ensured in line with the principle 'as open as possible, as closed as necessary'. Open access to other research outputs shall be encouraged.

2. Responsible management of research data shall be ensured in line with the principles ‘Findability’, ‘Accessibility’, ‘Interoperability’ and ‘Reusability’ (FAIR).

3. Open science practices beyond open access to research outputs and responsible management of research data shall be promoted.

Article 11

Complementary and combined funding

Actions awarded a Seal of Excellence certification, or which comply with the following cumulative, comparative, conditions:

(a) they have been assessed in a call for proposals under the Programme;

(b) they comply with the minimum quality requirements of that call for proposals;

(c) they may not be financed under that call for proposals due to budgetary constraints,

may receive support from the European Regional Development Fund, the Cohesion Fund, the European Social Fund+ or the European Agricultural Fund for Rural Development, in

accordance with paragraph 5 of Article [67] of Regulation (EU) XX [Common Provisions Regulation] and Article [8] or Regulation (EU) XX [Financing, management and monitoring of the Common Agricultural Policy], provided that such actions are consistent with the objectives of the programme concerned. The rules of the Fund providing support shall apply.

Article 12

Third countries associated to the Programme

1. The Programme shall be open to association of the following third countries:

   (a) European Free Trade Association (EFTA) members which are members of the European Economic Area (EEA), in accordance with the conditions laid down in the EEA agreement;

   (b) acceding countries, candidate countries and potential candidates, in accordance with the general principles and general terms and conditions for the participation of those countries in Union programmes established in the respective framework agreements and Association Council decisions, or similar agreements, and in accordance with the specific conditions laid down in agreements between the Union and those countries;

   (c) countries covered by the European Neighbourhood Policy, in accordance with the general principles and general terms and conditions for the participation of those countries in Union programmes established in the respective framework agreements and Association Council decisions, or similar agreements, and in accordance with the specific conditions laid down in agreements between the Union and those countries;

   (d) third countries and territories that fulfil all of the following criteria:

      i. a good capacity in science, technology and innovation;

      ii. commitment to a rules-based open market economy, including fair and equitable dealing with intellectual property rights, backed by democratic institutions;

      iii. active promotion of policies to improve the economic and social well-being of citizens.

   Association to the Programme of each of the third countries under point(d) shall be in accordance with the conditions laid down in a specific agreement covering the participation of the third country to any Union programme, provided that the agreement:

   – ensures a fair balance as regards the contributions and benefits of the third country participating in the Union programmes;

   – lays down the conditions of participation in the programmes, including the calculation of financial contributions to individual programmes and their administrative costs. These contributions shall constitute assigned revenues in accordance with Article 21(5) of the Financial Regulation;

   – does not confer to the third country a decisional power on the programme;

   – guarantees the rights of the Union to ensure sound financial management and to protect its financial interests.

2. The scope of association of each third country to the Programme shall take into account the objective of driving economic growth in the Union through innovation. Accordingly, with the exception of EEA members, acceding countries, candidate countries and potential candidates, parts of the Programme may be excluded from an association agreement for a specific country.

3. The association agreement shall, where appropriate, provide for the participation of legal entities established in the Union in equivalent programmes of associated countries in accordance with the conditions laid down therein.

4. The conditions determining the level of financial contribution shall ensure an automatic correction of any significant imbalance compared to the amount that entities established in the associated country receive through participation in the Programme, taking into account the costs in the management, execution and operation of the Programme.

TITLE II

RULES FOR PARTICIPATION AND DISSEMINATION

CHAPTER I

General provisions

Article 13

Funding bodies and direct actions of JRC

1. Funding bodies may depart from the rules set out in this Title only if this is provided for in the basic act setting up the funding body or entrusting budget implementation tasks to it or, for funding bodies under Article 62(1)(c)(ii), (iii) or (v) of the Financial Regulation, if it is provided for in the contribution agreement and their specific operating needs or the nature of the action so require.

2. The rules set out in this Title shall not apply to direct actions undertaken by the JRC.

Article 14

Eligible actions

1. Without prejudice to paragraphs 2 and 3 of this Article, only actions implementing the objectives referred to in Article 3 shall be eligible for funding.

   The following fields of research shall not be financed:

   (a) activities aiming at human cloning for reproductive purposes;

   (b) activities intended to modify the genetic heritage of human beings which could make such changes heritable[30];

   (c) activities intended to create human embryos solely for the purpose of research or for the purpose of stem cell procurement, including by means of somatic cell nuclear transfer.

[30] Research relating to cancer treatment of the gonads can be financed.

2. Research on human stem cells, both adult and embryonic, may be financed, depending both on the contents of the scientific proposal and the legal framework of the Member States involved. No funding shall be granted for research activities that are prohibited in all the Member States. No activity shall be funded in a Member State where such activity is forbidden.

3. The fields of research set out in paragraph 1 may be reviewed within the context of the interim evaluation referred to in Article 47(2) in the light of scientific advances.

Article 15

Ethics

1. Actions carried out under the Programme shall comply with ethical principles and relevant national, Union and international legislation, including the Charter of Fundamental Rights of the European Union and the European Convention on Human Rights and its Supplementary Protocols.

   Particular attention shall be paid to the principle of proportionality, the right to privacy, the right to the protection of personal data, the right to the physical and mental integrity of a person, the right to non-discrimination and the need to ensure high levels of human health protection.

2. Entities participating in the action shall provide:

   (a) an ethics self-assessment identifying and detailing all the foreseeable ethics issues related to the objective, implementation and likely impact of the activities to be funded, including a confirmation of compliance with paragraph 1, and a description of how it will be ensured;

   (b) a confirmation that the activities will comply with the European Code of Conduct for Research Integrity published by All European Academies and that no activities excluded from funding will be conducted;

   (c) for activities carried out outside the Union, a confirmation that the same activities would have been allowed in a Member State; and

   (d) for activities making use of human embryonic stem cells, as appropriate, details of licensing and control measures that shall be taken by the competent authorities of the Member States concerned as well as details of the ethics approvals that shall be obtained before the activities concerned start.

3. Proposals shall be systematically screened to identify those actions raising complex or serious ethics issues and submit them to an ethics assessment. The ethics assessment shall be carried out by the Commission unless it is delegated to the funding body. For actions involving the use of human embryonic stem cells or human embryos, an ethics assessment shall be mandatory. Ethics screenings and assessments shall be carried out with the support of ethics experts. The Commission and the funding bodies shall ensure the transparency of the ethics procedures as much as possible.

4. Entities participating in the action shall obtain all approvals or other mandatory documents from the relevant national, local ethics committees or other bodies such as data protection authorities before the start of the relevant activities. Those documents shall be kept on file and provided to the Commission or funding body upon request.

5. If appropriate, ethics checks shall be carried out by the Commission or funding body. For serious or complex ethics issues, the checks shall be carried out by the Commission unless it is delegated to the funding body.

   Ethics checks shall be carried out with the support of ethics experts.

6. Actions which are not ethically acceptable may be rejected or terminated at any time.

Article 16

Security

1. Actions carried out under the Programme shall comply with the applicable security rules and in particular rules on protection of classified information against unauthorised disclosure, including compliance with any relevant national and Union law. In case of research carried out outside the Union using and/or generating classified information, it is necessary that, in addition to the compliance with those requirements, a security agreement shall have to be concluded between the Union and the third country in which the research is conducted.

2. Where appropriate, proposals shall include a security self-assessment identifying any security issues and detailing how these issues will be addressed in order to meet the relevant national and Union law.

3. Where appropriate, the Commission or funding body shall carry out a security scrutiny for proposals raising security issues.

4. Where appropriate, the actions shall comply with Decision (EU, Euratom) 2015/444, and its implementing rules.

5. Entities participating in the action shall ensure the protection against unauthorised disclosure of classified information used and/or generated by the action. They shall provide proof of personal and/or facility security clearance from the relevant national security authorities, prior to the start of the activities concerned.

6. If external experts have to deal with classified information, the appropriate security clearance shall be required before those experts are appointed.

7. Where appropriate, the Commission or funding body may carry out security checks.

8. Actions which do not comply with security rules may be rejected or terminated at any time.

CHAPTER II

Grants

Article 17

Grants

Grants under the Programme shall be awarded and managed in accordance with Title VIII of the Financial Regulation, unless otherwise specified in this Chapter.

Article 18

Entities eligible for participation

1. Any legal entity, regardless of its place of establishment, or international organisation may participate in actions under the Programme, provided that the conditions laid down in this Regulation have been met together with any conditions laid down in the work programme or call.

2. Entities shall be part of a consortium that shall include at least three independent legal entities each established in a different Member State or associated country and with at least one of them established in a Member State, unless:

   (a) the work programme provides otherwise, if justified;

   (b) the action is one referred to in paragraphs 3 or 4.

3. European Research Council (ERC) frontier research actions, European Innovation Council (EIC) actions, training and mobility actions or programme co-fund actions may be implemented by one or more legal entities, one of which must be established in a Member State or associated country.

4. Coordination and support actions may be implemented by one or more legal entities, which may be established in a Member State, associated country or in another third country.

5. For actions related to Union strategic assets, interests, autonomy or security, the work programme may provide that the participation can be limited to those legal entities established in Member States only, or to those legal entities established in specified associated or other third countries in addition to Member States.

6. The work programme may provide for eligibility criteria in addition to those set out in paragraphs 2, 3, 4, and 5 according to specific policy requirements or to the nature and objectives of the action, including the number of legal entities, the type of legal entity and the place of establishment.

7. For actions benefiting from amounts under Article 9(8), the participation shall be limited to a single legal entity established in the jurisdiction of the delegating Managing Authority, except if otherwise agreed with the Managing Authority and provided for in the work programme.

8. Where indicated in the work programme, the Joint Research Centre may participate in actions.

9. The Joint Research Centre, international European research organisations and legal entities created under Union law shall be deemed to be established in a Member State other than the ones in which other legal entities participating in the action are established.

10. For European Research Council (ERC) frontier research actions and training and mobility actions, international organisations with headquarters in a Member State or associated country shall be deemed to be established in this Member State or associated country.

Article 19

Entities eligible for funding

1. Entities are eligible for funding if they are established in a Member State or associated country.

   For actions benefiting from amounts under Article 9(8), only entities established in the jurisdiction of the delegating Managing Authority shall be eligible for funding out of these amounts.

2. Entities established in a non-associated third country should in principle bear the cost of their participation. However, for low to middle income countries and exceptionally for other non-associated third countries they could be eligible for funding in an action if:

   (a) the third country is identified in the work programme adopted by the Commission ; or

   (b) the Commission or funding body consider that its participation is essential for implementing the action;

3. Affiliated entities are eligible for funding in an action if they are established in a Member State, Associated country, or in a third country identified in the work programme adopted by the Commission.

Article 20

Calls for proposals

1. For all actions, except for EIC Pathfinder transition activities, the content of the calls for proposals shall be included in the work programme.

2. For EIC Pathfinder transition activities:

   (a) the launch and the content of the calls for proposals shall be determined with regard to objectives and budget established by the work programme in relation with the concerned portfolio of actions;

   (b) grants for a fixed amount not exceeding EUR 50,000 may be awarded without a call for proposals to carry out urgent coordination and support actions for reinforcing the portfolio's community of beneficiaries or assessing possible spin-offs or potential market creating-innovation.

3. If necessary to achieve their objectives, calls may be restricted to develop additional activities or to add additional partners to existing actions.

4. A call for proposals is not required for coordination and support actions or programme co-fund actions which:

   (a) are to be carried out by the Joint Research Centre or legal entities identified in the work programme and

   (b) do not fall within the scope of a call for proposals.

5. The work programme shall specify calls for which "Seals of Excellence" will be awarded. With prior authorisation from the applicant, information concerning the application and the evaluation may be shared with interested financing authorities, subject to the conclusion of confidentiality agreements.

Article 21

Joint calls

The Commission or funding body may issue a joint call for proposals with:

(a) third countries, including their scientific and technological organisations or agencies;

(b) international organisations;

(c) non-profit legal entities.

In the case of a joint call, joint procedures shall be established for selection and evaluation of proposals. The procedures shall involve a balanced group of experts appointed by each party.

Article 22

Pre-commercial procurement and procurement of innovative solutions

1. Actions may involve or have as their primary aim pre-commercial procurement or public procurement of innovative solutions that shall be carried out by beneficiaries which are contracting authorities or contracting entities as defined in Directives 2014/24/EU[31], 2014/25/EU[32] and 2009/81/EC[33].

2. The procurement procedures:

(a) shall comply with the principles of transparency, non- discrimination, equal treatment, sound financial management, proportionality and competition rules;

(b) for pre-commercial procurement, may provide for specific conditions such as the place of performance of the procured activities being limited to the territory of the Member States and of associated countries;

(c) may authorise the award of multiple contracts within the same procedure (multiple sourcing); and

(d) shall provide for the award of the contracts to the tender(s) offering best value for money while ensuring absence of conflict of interest.

3. The contractor generating results in pre-commercial procurement shall own at least the attached intellectual property rights. The contracting authorities shall enjoy at least royalty-free access rights to the results for their own use and the right to grant, or require the participating contractors to grant, non-exclusive licences to third parties to exploit the results for the contracting authority under fair and reasonable conditions without any right to sub-license. If a contractor fails to commercially exploit the results within a given period after the pre-commercial procurement as identified in the contract, the contracting authorities can require it to transfer any ownership of the results to the contracting authorities.

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31 Directive 2014/24/EU of the European Parliament and of the Council of 26 February 2014 on public procurement and repealing Directive 2004/18/EC. (OJ L 94, 28.03.2014, p. 65).

32 Directive 2014/25/EU of the European Parliament and of the Council of 26 February 2014 on procurement by entities operating in the water, energy, transport and postal services sectors and repealing Directive 2004/17/EC (OJ L 94, 28.03.2014, p. 243).

33 Directive 2009/81/EC of the European Parliament and of the Council of 13 July 2009 on the coordination of procedures for the award of certain works contracts, supply contracts and service contracts by contracting authorities or entities in the fields of defence and security, and amending Directives 2004/17/EC and 2004/18/EC (OJ L 216, 20.08.2009, p.76).

Article 23

Cumulative funding

An action that has received a contribution from another Union programme may also receive a contribution under the Programme, provided that the contributions do not cover the same costs. The rules of each contributing Union programme shall apply to its respective contribution to the action. The cumulative funding shall not exceed the total eligible costs of the action and the support from different Union programmes may be calculated on a pro-rata basis in accordance with the documents setting out the conditions for support.

Article 24

Selection criteria

1. By derogation from Article 198 of the Financial Regulation, the financial capacity shall be verified only for the coordinator and only if the requested funding from the Union for the action is equal to or greater than EUR 500 000.
2. However, if there are grounds to doubt the financial capacity or if there is a higher risk due to the participation in several ongoing actions funded by Union research and innovation programmes, the Commission or funding body shall verify also the financial capacity of other applicants or of coordinators below the threshold referred to in paragraph 1.
3. If the financial capacity is structurally guaranteed by another legal entity, the financial capacity of the latter shall be verified.
4. In case of weak financial capacity, the Commission or funding body may make participation of the applicant conditional on provision of a declaration on joint and several liability by an affiliated entity.
5. The contribution to the Mutual Insurance Mechanism set out in Article 33 shall be considered a sufficient guarantee under Article 152 of the Financial Regulation. No additional guarantee or security may be accepted from beneficiaries or imposed upon them.

Article 25

Award criteria

1. A proposal shall be evaluated on the basis of the following award criteria:
   (a) excellence;
   (b) impact;
   (c) quality and efficiency of the implementation.
2. Only the criterion referred to in point (a) of paragraph 1 shall apply to proposals for ERC frontier research actions.
3. The work programme shall lay down further details of the application of the award criteria laid down in paragraph 1, and may specify weightings and thresholds.

Article 26

Evaluation

1. Proposals shall be evaluated by the evaluation committee which may be :

   – fully or partially composed of external independent experts,

   – composed of representatives of Union Institutions or bodies as referred to in Article 150 of the Financial Regulation.

   The evaluation committee may be assisted by independent experts.

2. Where necessary, the evaluation committee shall rank the proposals having passed the applicable thresholds, according to:

   – the evaluation scores,

   – their contribution to the achievement of specific policy objectives, including the constitution of a consistent portfolio of projects.

   The evaluation committee may also propose any substantial adjustments to the proposals in as far as needed for the consistency of the portfolio.

Article 27

Evaluation review procedure

1. An applicant may request an evaluation review if it considers that the applicable evaluation procedure has not been correctly applied to its proposal.

2. An evaluation review applies only to the procedural aspects of the evaluation, not to the evaluation of the merits of the proposal.

3. An evaluation review shall not delay the selection process for proposals that are not the subject of review.

Article 28

Time to grant

1. By derogation from the first subparagraph of Article 194(2) of the Financial Regulation, the following periods shall apply:

   (a) for informing all applicants of the outcome of the evaluation of their application, a maximum period of five months from the final date for submission of complete proposals;

   (b) for signing grant agreements with applicants, a maximum period of eight months from the final date for submission of complete proposals.

2. The work programme for the EIC may establish shorter periods.

3. In addition to the exceptions laid down in the second subparagraph of Article 194(2) of the Financial Regulation, the periods referred to in paragraph 1 may be exceeded for actions of the ERC, for missions and when actions are submitted to an ethics or security assessment.

Article 29

Implementation of the grant

1. If a beneficiary fails to comply with its obligations regarding the technical implementation of the action, the other beneficiaries shall comply with those obligations without any additional Union funding, unless they are expressly relieved of that obligation. The financial responsibility of each beneficiary shall be limited to its own debt subject to the provisions relating to the Mutual Insurance Mechanism.

2. The grant agreement may establish milestones and related pre-financing installments. If milestones are not met, the action may be suspended, amended or terminated.

3. The action may also be terminated where expected results have lost their relevance for the Union due to scientific, technological or economic reasons, including in the case of EIC and missions, their relevance as part of a portfolio of actions.

Article 30

Funding rates

1. A single funding rate per action shall apply for all activities it funds. The maximum rate shall be fixed in the work programme.

2. The Programme may reimburse up to 100 % of total eligible costs of an action, except for:

   (a) innovation actions: up to 70 % of the total eligible costs, except for non-profit legal entities where the Programme may reimburse up to 100 % of the total eligible costs;

   (b) programme co-fund actions: at least 30 % of the total eligible costs, and in identified and duly justified cases up to 70 %.

3. The funding rates determined in this Article shall also apply for actions where flat rate, unit or lump sum financing is fixed for the whole or part of the action.

Article 31

Indirect costs

1. Indirect eligible costs shall be determined by applying a flat rate of 25 % of the total direct eligible costs, excluding direct eligible costs for subcontracting, financial support to third parties and any unit costs or lump sums which include indirect costs.

   Where appropriate, indirect costs included in unit costs or lump sums shall be calculated using the flat rate set out in paragraph 1, except for unit costs for internally invoiced goods and services which shall be calculated on the basis of actual costs, in accordance with the beneficiaries' usual costs accounting practices.

2. However, if provided for in the work programme, indirect costs may be declared in the form of a lump sum or unit costs.

Article 32

Eligible costs

1. In addition to the criteria set out in Article 197 of the Financial Regulation, for beneficiaries with project-based remuneration, costs of personnel are eligible up to

the remuneration that the person is paid for work in similar projects funded by national schemes.

Project-based remuneration means remuneration that is linked to the participation of a person in projects, is part of the beneficiary's usual remuneration practices and is paid in a consistent manner.

2. By derogation from Article 190(1) of the Financial Regulation, costs of resources made available by third parties by means of in-kind contributions shall be eligible, up to the direct eligible costs of the third party.

3. By derogation from Article 192 of the Financial Regulation, income generated by the exploitation of the results shall not be considered as receipts of the action.

4. By derogation from Article 203(4) of the Financial Regulation, a certificate on the financial statements shall be mandatory at payment of the balance, if the amount claimed as actual costs and unit costs calculated in accordance with usual cost accounting practices is equal to or greater than EUR 325 000.

Article 33

Mutual Insurance Mechanism

1. A Mutual Insurance Mechanism (the 'Mechanism') is hereby established which shall replace and succeed the fund set up in accordance with Article 38 of Regulation (EC) No 1290/2013. The Mechanism shall cover the risk associated with non-recovery of sums due by the beneficiaries:

   (a) to the Commission under Decision No 1982/2006/EC,

   (b) to the Commission and Union bodies under "Horizon 2020",

   (c) to the Commission and funding bodies under the Programme.

   The coverage of the risk regarding funding bodies referred to in point (c) of the first subparagraph may be implemented through an indirect coverage system set out in the applicable agreement and taking into account the nature of the funding body.

2. The Mechanism shall be managed by the Union, represented by the Commission acting as executive agent. The Commission shall set up specific rules for the operation of the Fund.

3. Beneficiaries shall make a contribution of 5 % of the Union funding for the action. On the basis of periodic evaluations, this contribution may be raised by the Commission up to 8% or may be reduced under 5%. The beneficiaries' contribution to the Mechanism may be offset from the initial pre-financing and be paid to the Fund on behalf of the beneficiaries.

4. The contribution of the beneficiaries shall be returned at the payment of the balance.

5. Any financial return generated by the Mechanism shall be added to the Mechanism. If the return is insufficient, the Mechanism shall not intervene and the Commission or funding body shall recover directly from beneficiaries or third parties any amount owed.

6. The amounts recovered shall constitute revenue assigned to the Mechanism within the meaning of Article 21(4) of the Financial Regulation. Once all grants whose risk is covered directly or indirectly by the Mechanism are completed, any sums

outstanding shall be recovered by the Commission and entered into the budget of the Union, subject to decisions of the legislative authority.

7. The Mechanism may be opened to beneficiaries of any other directly managed Union programme. The Commission shall adopt modalities for participation of beneficiaries of other programmes.

Article 34

Ownership and protection

1. Beneficiaries shall own the results they generate. They shall ensure that any rights of their employees or any other parties in relation to the results can be exercised in a manner compatible with the beneficiaries' obligations in accordance with the terms and conditions laid down in the grant agreement.

   Two or more beneficiaries shall own results jointly if:

   (a) they have jointly generated them; and

   (b) it is not possible to:

      (i) establish the respective contribution of each beneficiary,

      or

      (ii) separate them when applying for, obtaining or maintaining their protection.

   The joint owners shall agree in writing on the allocation and terms of exercise of their joint ownership. Unless otherwise agreed, each joint owner may grant non-exclusive licences to third parties to exploit the jointly-owned results (without any right to sub-license), if the other joint owners are given advance notice and fair and reasonable compensation. The joint owners may agree in writing to apply another regime than joint ownership.

2. Beneficiaries having received Union funding shall adequately protect their results if protection is possible and justified, taking into account all relevant considerations, including the prospects for commercial exploitation. When deciding on protection, beneficiaries shall also consider the legitimate interests of the other beneficiaries in the action.

Article 35

Exploitation and dissemination

1. Beneficiaries having received Union funding shall use their best efforts to exploit their results, in particular in the Union. Exploitation may be done directly by the beneficiaries or indirectly in particular through the transfer and licensing of results in accordance with Article 36.

   The work programme may provide for additional exploitation obligations.

   If despite a beneficiary's best efforts to exploit its results directly or indirectly no exploitation takes place within a given period as identified in the grant agreement, the beneficiary shall use an appropriate online platform as identified in the grant agreement to find interested parties to exploit those results. If justified on the basis of a request of the beneficiary, this obligation may be waived.

2. Subject to any restrictions due to the protection of intellectual property, security rules or legitimate interests, beneficiaries shall disseminate their results as soon as possible.

The work programme may provide for additional dissemination obligations.

3. Beneficiaries shall ensure that open access to scientific publications applies under the terms and conditions laid down in the grant agreement. In particular, the beneficiaries shall ensure that they or the authors retain sufficient intellectual property rights to comply with their open access requirements.

Open access to research data shall be the general rule under the terms and conditions laid down in the grant agreement, but exceptions shall apply if justified, taking into consideration the legitimate interests of the beneficiaries and any other constraints, such as data protection rules, security rules or intellectual property rights.

The work programme may provide for additional obligations to adhere to open science practices.

4. Beneficiaries shall manage all research data in accordance with the terms and conditions laid down in the grant agreement and shall establish a Data Management Plan.

The work programme may provide for additional obligations to use the European Open Science Cloud for storing and giving access to research data.

5. Beneficiaries that intend to disseminate their results shall give advance notice to the other beneficiaries in the action. Any other beneficiary may object if it can show that the intended dissemination would significantly harm its legitimate interests in relation to its results or background. In such cases, the dissemination may not take place unless appropriate steps are taken to safeguard these legitimate interests.

6. Unless the work programme provides otherwise, proposals shall include a plan for the exploitation and dissemination of the results. If the expected exploitation entails developing, creating, manufacturing and marketing a product or process, or in creating and providing a service, the plan shall include a strategy for such exploitation. If the plan provides for exploitation primarily in non-associated third countries, the legal entities shall explain how that exploitation is still in the Union interest.

The beneficiaries shall further develop the plan during and after the end of the action.

7. For the purposes of monitoring and dissemination by the Commission or funding body, the beneficiaries shall provide any requested information regarding the exploitation and dissemination of their results. Subject to the legitimate interests of the beneficiaries, such information shall be made publicly available.

Article 36

Transfer and licensing

1. Beneficiaries may transfer ownership of their results. They shall ensure that their obligations also apply to the new owner and that the latter has the obligation to pass them on in any subsequent transfer.

2. Unless agreed otherwise in writing for specifically-identified third parties or unless impossible under applicable law, beneficiaries that intend to transfer ownership of results shall give advance notice to any other beneficiary that still has access rights to

the results. The notification must include sufficient information on the new owner to enable a beneficiary to assess the effects on its access rights.

Unless agreed otherwise in writing for specifically-identified third parties, a beneficiary may object to the transfer if it can show that the transfer would adversely affect its access rights. In this case, the transfer may not take place until agreement has been reached between the beneficiaries concerned.

3. Beneficiaries may grant licences to their results or otherwise give the right to exploit them, if this does not affect compliance with their obligations.

4. Where this is justified, the grant agreement shall lay down the right to object to transfers of ownership of results, or to grants of an exclusive licence regarding results, if:

(a) the beneficiaries generating the results have received Union funding;

(b) the transfer or licence is to a legal entity established in a non-associated third country; and

(c) the transfer or licence is not in line with Union interests.

If the right to object applies, the beneficiary shall give advance notice. The right to object may be waived in writing regarding transfers or grants to specifically identified legal entities if measures safeguarding Union interests are in place.

Article 37

Access rights

1. The following access rights principles shall apply:

(a) a request to exercise access rights or any waiving of access rights shall be made in writing;

(b) unless otherwise agreed with the grantor, access rights do not include the right to sub-license;

(c) the beneficiaries shall inform each other before their accession to the grant agreement of any restrictions to granting access to their background;

(d) if a beneficiary is no longer involved in an action, it shall not affect its obligations to grant access;

(e) if a beneficiary defaults on its obligations, the beneficiaries may agree that it no longer has access rights.

2. Beneficiaries shall grant access to:

(a) their results on a royalty-free basis to any other beneficiary in the action that needs it to implement its own tasks;

(b) their background to any other beneficiary in the action that needs it to implement its own tasks, subject to any restrictions referred to in paragraph 1(c); that access shall be granted on a royalty-free basis, unless otherwise agreed by the beneficiaries before their accession to the grant agreement;

(c) their results and, subject to any restrictions referred to in paragraph 1(c), to their background to any other beneficiary in the action that needs it to exploit

its own results; that access shall be granted under fair and reasonable conditions to be agreed upon.

3. Unless otherwise agreed by the beneficiaries, they shall also grant access to their results and, subject to any restrictions referred to in paragraph 1(c), to their background to a legal entity that:

   (a) is established in a Member State or associated country;

   (b) is under the direct or indirect control of another beneficiary, or is under the same direct or indirect control as that beneficiary, or is directly or indirectly controlling that beneficiary; and

   (c) needs the access to exploit the results of that beneficiary.

   Access shall be granted under fair and reasonable conditions to be agreed upon.

4. A request for access for exploitation purposes may be made up to one year after the end of the action, unless the beneficiaries agree on a different time-limit.

5. Beneficiaries having received Union funding shall grant access to their results on a royalty-free basis to the Union institutions, bodies, offices or agencies for developing, implementing and monitoring Union policies or programmes. Access shall be limited to non-commercial and non-competitive use.

   In actions under the cluster 'Inclusive and secure Society', area of intervention 'Protection and Security', beneficiaries having received Union funding shall also grant access to their results on a royalty-free basis to Member States' national authorities, for developing, implementing and monitoring their policies or programmes in that area. Access shall be limited to non-commercial and non-competitive use and shall be granted upon bilateral agreement defining specific conditions aimed at ensuring that those rights will be used only for the intended purpose and that appropriate confidentiality obligations will be in place. The requesting Member State, Union institution, body, office or agency shall notify all Member States of such requests.

6. The work programme may provide for additional access rights.

Article 38

Specific provisions on exploitation and dissemination

Specific rules on ownership, exploitation and dissemination, transfer and licensing as well as access rights may apply for ERC actions, training and mobility actions, pre-commercial procurement actions, public procurement of innovative solutions actions, programme co-fund actions and coordination and support actions.

These specific rules shall not change the obligations on open access.

CHAPTER III

Prizes

Article 39

Prizes

1. Prizes under the Programme shall be awarded and managed in accordance with Title IX of the Financial Regulation, unless otherwise specified in this Chapter.
2. Any legal entity, regardless of its place of establishment, may participate in a contest, unless otherwise provided in the work programme or rules of contests.
3. The Commission or funding body may organise prizes with:
   (a) other Union bodies;
   (b) third countries, including their scientific and technological organisations or agencies;
   (c) international organisations; or
   (d) non-profit legal entities.
4. The work programme or rules of contest may include obligations regarding communication, exploitation and dissemination.

CHAPTER IV

Procurement

Article 40

Procurement

1. Procurement under the Programme shall be awarded and managed in accordance with Title VII of the Financial Regulation, unless otherwise specified in this Chapter.
2. Procurement may also take the form of pre-commercial procurement or procurement of innovative solutions carried out by the Commission or the funding body on its own behalf or jointly with contracting authorities from Member States and associated countries. In this case, the rules set out in Article 22 shall apply.

CHAPTER V

Blending operations and blended finance

Article 41

Blending operations

Blending operations decided under this Programme shall be implemented in accordance with the InvestEU Programme and Title X of the Financial Regulation.

Article 42

Horizon Europe and EIC Blended finance

1. The grant and reimbursable advance components of Horizon Europe or EIC blended finance shall be subject to Articles 30 to 33.

2. EIC blended finance shall be implemented in accordance with Article 43. The support under the EIC blended finance may be granted until the action can be financed as a blending operation or as a financing and investment operation fully covered by the EU guarantee under InvestEU. By derogation from Article 209 of the Financial Regulation, the conditions laid down in paragraph (2) and, in particular, paragraph (a) and (d), do not apply at the time of the award of EIC blended finance

3. Horizon Europe blended finance may be awarded to a programme co-fund where a joint programme of Member States and associated countries provides for the deployment of financial instruments in support of selected actions. The evaluation and selection of such actions shall be made in accordance with Articles 19, 20, 23, 24, 25 and 26. The implementation modalities of the Horizon Europe blended finance shall comply with Article 29, by analogy Article 43(9) and with additional conditions defined by the work programme.

4. Repayments including reimbursed advances and revenues of Horizon Europe and EIC blended finance shall be considered as internal assigned revenues in accordance with Articles 21(3)(f) and 21(4) of Financial Regulation.

5. Horizon Europe and EIC blended finance shall be provided in a manner that does not distort competition.

Article 43

EIC's Accelerator

1. The beneficiary of the EIC Accelerator shall be a legal entity qualifying as a start-up, an SME or as a mid-cap, established in a Member State or associated country. The proposal may be submitted by the beneficiary, or by one or more natural persons or legal entities intending to establish or support that beneficiary.

2. A single award decision shall cover and provide funding for all forms of Union contribution provided under EIC blended finance.

3. Proposals shall be evaluated on their individual merit by independent experts and selected in the context of an annual open call with cut-off dates, based on Articles 24 to 26, subject to paragraph 4.

4. Award criteria shall be:

   – excellence;

   – impact;

   – the level risk of the action and the need for Union support.

5. With the agreement of applicants concerned, the Commission or funding bodies implementing Horizon Europe may directly submit for evaluation under the last evaluation criterion a proposal for an innovation and market deployment action which already fulfils the first two criteria, subject to the following cumulative conditions:

– the proposal shall stem from any other action funded by Horizon 2020 or this Programme, or from a national programme similar to the EIC's Pathfinder and acknowledged as such by the Commission;

– be based on a previous project review assessing the excellence and the impact of the proposal and subject to conditions and processes further detailed in the work programme.

6. A Seal of Excellence may be awarded subject to the following cumulative conditions:

– the beneficiary is a start-up or an SME,

– the proposal was eligible and has passed applicable thresholds for the first two award criteria referred to in paragraph 4,

- for those activities that would be eligible under an innovation action.

7. For a proposal having passed the evaluation, independent experts shall propose a corresponding EIC blended finance, based on the risk incurred and the resources and time necessary to bring and deploy the innovation to the market.

The Commission may reject a proposal retained by independent experts for justified reasons, including compliance with the objectives of Union policies.

8. The grant or the reimbursable advance component of the blended finance shall not exceed 70% of the costs of the selected innovation action.

9. Implementation modalities of the equity and repayable support components of the EIC blended finance shall be detailed in Decision [Specific programme].

10. The contract for the selected action shall establish specific milestones and the corresponding pre-financing and payments by instalments of the EIC blended finance.

Activities corresponding to an innovation action may be launched and first pre-financing of the grant or the reimbursable advance paid, prior to the implementation of other components of the awarded EIC blended finance. The implementation of those components shall be subject to the achievement of specific milestones established in the contract.

11. In accordance with the contract, the action shall be suspended, amended or terminated if milestones are not met. It may also be terminated where the expected market deployment cannot be met.

The Commission may decide to increase the EIC blended finance subject to a project review by external independent experts.

Chapter VI

Experts

Article 44

Appointment of external experts

1. By derogation from Article 237(3) of the Financial Regulation, external experts may be selected without a call for expressions of interest, if justified and the selection is carried out in a transparent manner.

2. In accordance with Article 237(2) and 237(3) of the Financial Regulation, external experts shall be remunerated based on standard conditions. If justified, an appropriate level of remuneration beyond the standard conditions based on relevant market standards, especially for specific high level experts, may be granted.

3. In addition to paragraphs 2 and 3 of Article 38 of the Financial Regulation, the names of external experts evaluating grant applications, who are appointed in a personal capacity shall be published, together with their area of expertise, at least once a year on the internet site of the Commission or the funding body. Such information shall be collected, processed and published in accordance with the EU data protection rules.

TITLE III

PROGRAMME MONITORING, COMMUNICATION, EVALUATION AND CONTROL

Article 45

Monitoring and reporting

1. Indicators to report on progress of the Programme towards the achievement of the objectives established in Article 3 are set in Annex V along impact pathways.

2. The Commission is empowered to adopt delegated acts in accordance with Article 50 concerning amendments to Annex V to supplement or amend the impact pathway indicators, where considered necessary, and set baselines and targets.

3. The performance reporting system shall ensure that data for monitoring programme implementation and results are collected efficiently, effectively and in a timely manner. To that end, proportionate reporting requirements shall be imposed on recipients of Union funds and (where relevant) Member States.

Article 46

Information, communication, publicity and dissemination and exploitation

1. The recipients of Union funding shall acknowledge the origin and ensure the visibility of the Union funding (in particular when promoting the actions and their results) by providing coherent, effective and proportionate targeted information to multiple audiences, including the media and the public.

2. The Commission shall implement information and communication actions relating to the Programme, and its actions and results. Financial resources allocated to the

Programme shall also contribute to the corporate communication of the political priorities of the Union, as far as they are related to the objectives referred to in Article 3.

3. The Commission shall also establish a dissemination and exploitation strategy for increasing the availability and diffusion of the Programme's research and innovation results and knowledge to accelerate exploitation towards market uptake and boost the impact of the Programme. Financial resources allocated to the Programme shall also contribute to the corporate communication of the political priorities of the Union as well as information, communication, publicity, dissemination and exploitation activities as far as they are related to the objectives referred to in Article 3.

Article 47

Programme evaluation

1. Programme evaluations shall be carried out in a timely manner to feed into the decision-making process on the programme, its successor and other initiatives relevant to research and innovation.

2. The interim evaluation of the Programme shall be carried out once there is sufficient information available about the implementation of the Programme, but no later than four years after the start of the programme implementation. It shall include an assessment of the long-term impact of previous Framework Programmes and shall form the basis to adjust programme implementation, as appropriate.

3. At the end of the implementation of the Programme, but no later than four years after the end of the period specified in Article 1, a final evaluation of the Programme shall be completed by the Commission. It shall include an assessment of the long-term impact of previous Framework Programmes.

4. The Commission shall communicate the conclusions of the evaluations accompanied by its observations, to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions.

Article 48

Audits

1. The control system for the Programme shall ensure an appropriate balance between trust and control, taking into account administrative and other costs of controls at all levels, especially for beneficiaries.

2. The audit strategy for the Programme shall be based on the financial audit of a representative sample of expenditure across the Programme as a whole. The representative sample shall be complemented by a selection based on an assessment of the risks related to expenditure. Actions that receive joint funding from different Union programmes shall be audited only once, covering all involved programmes and their respective applicable rules.

3. In addition, the Commission or funding body may rely on combined systems reviews at beneficiary level. These combined reviews shall be optional for certain types of beneficiaries and shall consist in a systems and process audit, complemented by an audit of transactions, carried out by a competent independent auditor qualified to

carry out statutory audits of accounting documents in accordance with Directive 2006/43/EC[34]. They may be used by the Commission or funding body to determine overall assurance on the sound financial management of expenditure and for reconsideration of the level of ex-post audits and certificates on financial statements.

4. In accordance with Article 127 of the Financial Regulation, the Commission or funding body may rely on audits on the use of Union contributions carried out by other persons or entities, including by other than those mandated by the Union Institutions or bodies.

5. Audits may be carried out up to two years after the payment of the balance.

Article 49

Protection of financial interests of the Union

1. The Commission or its representatives, and the Court of Auditors, shall have the power of audit or, in the case of international organisations, the power of verification in accordance with agreements reached with them, on the basis of documents and on-the-spot, over all grant beneficiaries, contractors and subcontractors who have received Union funds under this Regulation.

2. The European Anti-Fraud Office (OLAF) may carry out administrative investigations, including on-the-spot checks and inspections, in accordance with the provisions and procedures laid down in Regulation (EU, Euratom) No 883/2013 of the European Parliament and of the Council and Council Regulation (Euratom, EC) No 2185/96, with a view to establishing whether there has been fraud, corruption or any other illegal activity affecting the financial interests of the Union in connection with Union funding or budgetary guarantees under this Regulation.

3. Competent authorities of third countries and international organisations may also be required to cooperate with the European Public Prosecutor's Office (EPPO), in accordance with Mutual Legal Assistance Agreements, when it carries out investigations into criminal offences falling within its competence in accordance with Regulation (EU) 2017/1939.

4. Without prejudice to paragraphs 1 and 2, cooperation agreements with third countries and with international organisations, contracts, grant agreements and other legal commitments, as well as agreements establishing a budgetary guarantee, resulting from the implementation of this Regulation shall contain provisions expressly empowering the Commission, the Court of Auditors and OLAF to conduct such audits, on-the-spot checks and inspections, according to their respective competences. This shall include provisions to ensure that any third parties involved in the implementation of Union funds or of a financing operation supported, in whole or in part, by a budgetary guarantee grant equivalent rights.

[34] Directive 2006/43/EC of the European Parliament and of the Council of 17 May 2006 on statutory audits of annual accounts and consolidated accounts, amending Council Directive 78/660/EEC and 83/349/EEC and repealing Council Directive 84/253/EEC (OJ L 157, 9.6.2006, p. 87)

Article 50

Exercise of the delegation

1. The power to adopt delegated acts is conferred on the Commission subject to the conditions laid down in this Article.

2. The power to adopt delegated acts referred to in Article 45(2) shall be conferred on the Commission until 31 December 2028.

3. The delegation of power referred to in Article 45(2) may be revoked at any time by the European Parliament or by the Council. A decision to revoke shall put an end to the delegation of power specified in that decision. It shall take effect the day following the publication of the decision in the *Official Journal* of the European Union or at a later date specified therein. It shall not affect the validity of any delegated acts already in force.

4. Before adopting a delegated act, the Commission shall consult experts designated by each Member State in accordance with the principles laid down in the Interinstitutional Agreement on Better Law-Making of 13 April 2016.

5. As soon as it adopts a delegated act, the Commission shall notify it simultaneously to the European Parliament and to the Council.

6. A delegated act adopted pursuant to Article 45(2) shall enter into force if no objection has been expressed either by the European Parliament or by the Council within a period of two months of notification of that act to the European Parliament and the Council or if, before the expiry of that period, the European Parliament and the Council have both informed the Commission that they will not object. That period shall be extended by two months at the initiative of the European Parliament or of the Council.

TITLE IV

TRANSITIONAL AND FINAL PROVISIONS

Article 51

Repeal

Regulation (EU) No 1291/2013 and Regulation (EU) No 1290/2013 are repealed with effect from 1 January 2021.

Article 52

Transitional provisions

1. This Regulation shall not affect the continuation or modification of the actions concerned, under Regulation (EU) No 1291/2013 and Regulation (EU) No 1290/2013, which shall continue to apply to those actions until their closure. Work plans and actions provided for in work plans adopted under Regulation (EU) No1290/2013 and under the corresponding funding bodies' basic acts shall also continue to be governed by Regulation (EU) No1290/2013 and those basic acts until their completion.

2. The financial envelope for the Programme may also cover technical and administrative assistance expenses necessary to ensure the transition between the

Programme and the measures adopted under its predecessor Regulation (EU) No 1291/2013.

Article 53

Entry into force

This Regulation shall enter into force on the twentieth day following that of its publication in the *Official Journal of the European Union*.

This Regulation shall be binding in its entirety and directly applicable in all Member States.

Done at Brussels,

For the European Parliament	*For the Council*
The President	*The President*

Annexes to the proposal

COM(2018) 435 final

EUROPEAN
COMMISSION

Brussels, 7.6.2018
COM(2018) 435 final

ANNEXES 1 to 5

ANNEXES

to the

Proposal for a

REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL

establishing Horizon Europe – the Framework Programme for Research and Innovation, laying down its rules for participation and dissemination

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ANNEX I

BROAD LINES OF ACTIVITIES

The general and specific objectives set out in Article 3 will be pursued across the Programme, through the areas of intervention and the broad lines of activity described in this Annex, as well as in Annex I to the Specific Programme.

(1) Pillar I 'Open Science'

Through the following activities, this pillar will, in line with Article 4, support the creation and diffusion of high-quality knowledge skills, technologies and solutions to global challenges. It will also contribute to the other Programme's specific objectives as described in Article 3.

(a) European Research Council: Providing attractive and flexible funding to enable talented and creative individual researchers and their teams to pursue the most promising avenues at the frontier of science, on the basis of Union-wide competition.

Area of intervention: Frontier science

(b) Marie Skłodowska-Curie Actions: Equipping researchers with new knowledge and skills through mobility and exposure across borders, sectors and disciplines, as well as structuring and improving institutional and national recruitment, training and career development systems; in so doing, the Marie Skłodowska-Curie Actions help to lay the foundations of Europe's excellent research landscape, contributing to boosting jobs, growth, and investment, and solving current and future societal challenges.

Areas of intervention: Nurturing excellence through mobility of researchers across borders, sectors and disciplines; fostering new skills through excellent training of researchers; strengthening human capital and skills development across the European Research Area; improving and facilitating synergies; promoting public outreach.

(c) Research Infrastructures: Endowing Europe with world-class sustainable research infrastructures which are open, and accessible to the best researchers from Europe and beyond. In so doing the potential of the infrastructure to support scientific advance and innovation, and to enable open science, will be enhanced, alongside activities in related Union policy and international cooperation.

Areas of intervention: Consolidating the landscape of European research infrastructures; Opening, integrating and interconnecting research infrastructures; Reinforcing European research infrastructure policy and international cooperation

(2) Pillar II 'Global Challenges and industrial competitiveness'

Through the following activities, this pillar will, in line with Article 4, strengthen the impact of research and innovation in developing, supporting and implementing Union policies, and support the uptake of innovative solutions in industry and society to address global challenges. It will also contribute to the other Programme's specific objectives as described in Article 3.

To maximise impact flexibility and synergies, research and innovation activities will be organised in five clusters, which individually and together will incentivise interdisciplinary, cross-sectoral, cross-policy, cross-border and international cooperation.

Each cluster contributes towards several SDGs; and many SDGs are supported by more than one cluster.

The R&I activities will be implemented in and across the following clusters:

(a) Cluster 'Health': Improving and protecting the health of citizens at all ages, by developing innovative solutions to prevent, diagnose, monitor, treat and cure diseases; mitigating health risks, protecting populations and promoting good health; making public health systems more cost-effective, equitable and sustainable; and supporting and enabling patients' participation and self-management.

Areas of intervention: Health throughout the life course; Environmental and social health determinants; Non-communicable and rare diseases; Infectious diseases; Tools, technologies and digital solutions for health and care; Health care systems

(b) Cluster 'Inclusive and secure society': Strengthening European democratic values, including rule of law and fundamental rights, safeguarding our cultural heritage, and promoting socio-economic transformations that contribute to inclusion and growth, while responding to the challenges arising from persistent security threats, including cybercrime, as well as natural and man-made disasters.

Areas of intervention: Democracy; Cultural heritage; Social and economic transformations; Disaster-resilient societies; Protection and Security; Cybersecurity

(c) Cluster 'Digital and Industry': Reinforcing capacities and securing Europe's sovereignty in key enabling technologies for digitisation and production, and in space technology, to build a competitive, digital, low-carbon and circular industry; ensure a sustainable supply of raw materials; and provide the basis for ~~a~~dvances and innovation in all global societal challenges.

Areas of intervention: Manufacturing technologies; Digital technologies; Advanced materials; Artificial intelligence and robotics; Next generation internet; High performance computing and Big Data; Circular industries; Low carbon and clean industry; Space

(d) Cluster 'Climate, Energy and Mobility': Fighting climate change by better understanding its causes, evolution, risks, impacts and opportunities, and by making the energy and transport sectors more climate and environment-friendly, more efficient and competitive, smarter, safer and more resilient.

Areas of intervention: Climate science and solutions; Energy supply; Energy systems and grids; Buildings and industrial facilities in energy transition; Communities and cities; Industrial competitiveness in transport; Clean transport and mobility; Smart mobility; Energy storage.

(e) Cluster 'Food and natural resources': Protecting, restoring, sustainably managing and using natural and biological resources from land and sea to address food and nutrition security and the transition to a low carbon, resource efficient circular economy.

Areas of intervention: Environmental observation; Biodiversity and natural capital; Agriculture, forestry and rural areas; Sea and oceans; Food systems; Bio-based innovation systems; Circular systems

(f) Non-nuclear direct actions of the Joint Research Centre: Generating high-quality scientific evidence for good public policies. New initiatives and proposals for EU legislation need transparent, comprehensive and balanced evidence, whereas implementation of policies needs evidence to measure and monitor progress. The JRC will provide Union policies with independent scientific evidence and technical support throughout the policy cycle. The JRC will focus its research on EU policy priorities.

Areas of intervention: Health; resilience and security; digital and industry; climate, energy and mobility; food and natural resources; support to the functioning of the internal market and the economic governance of the Union; support to Member States with implementation of legislation and development of smart specialisation strategies; analytical tools and methods for policy making; knowledge management; knowledge and technology transfer; support to science for policy platforms.

(3) Pillar III 'Open Innovation'

Through the following activities, this pillar will, in line with Article 4, foster all forms of innovation, including breakthrough innovation, and strengthen market deployment of innovative solutions. It will also contribute to the Programme's other specific objectives as described in Article 3.

(a) European Innovation Council: promoting breakthrough innovation with scale-up potential at global level

Areas of intervention: Pathfinder, supporting future and emerging breakthrough technologies; Accelerator, bridging the financing gap between late stages of innovation activities and market take-up, to effectively deploy breakthrough market-creating innovation and scale up companies where the market does not provide viable financing, and; additional activities such as prizes and fellowships, and business added-value services.

(b) European innovation ecosystems

Areas of intervention: Connecting with regional and national innovation actors and supporting the implementation of joint cross-border innovation programmes by Member States and associated countries, from the enhancement of soft skills for innovation to research and innovation actions, to boost the effectiveness of the European innovation system. This will complement the ERDF support for innovation eco-systems and interregional partnerships around smart specialisation topics.

(c) The European Institute of Innovation and Technology

Areas of intervention: Strengthen sustainable innovation ecosystems across Europe; Fostering the development of entrepreneurial and innovation skills in a lifelong learning perspective and support the entrepreneurial transformation of EU universities; Bring new solutions to global societal challenges to the market; Synergies and value added within Horizon Europe.

4) Part 'Strengthening the European Research Area'

Through the following activities, this part will, in line with Article 4, optimise the Programme's delivery for increased impact within a strengthened European Research Area. It will also support the Programme's other specific objectives as described in Article 3. While underpinning the entire Programme, this part will support activities that contribute to a more knowledge-based and innovative and gender-equal Europe, at the front edge of global competition, thereby optimising national strengths and potential across Europe in a well-performing European Research Area (ERA), where knowledge and a highly skilled workforce circulate freely, where the outcomes of R&I are understood and trusted by informed citizens and benefit society as a whole, and where EU policy, notably R&I policy, is based on high quality scientific evidence.

Areas of intervention: Sharing Excellence; Reforming and enhancing the European R&I system.

ANNEX II

TYPES OF ACTION

The programme will be implemented using a limited number of 'types of action', characterised by their distinct objectives or conditions.

The main types of action are as follows:

– Research and innovation action: action primarily consisting of activities aiming to establish new knowledge and/or to explore the feasibility of a new or improved technology, product, process, service or solution. This may include basic and applied research, technology development and integration, testing and validation on a small-scale prototype in a laboratory or simulated environment;

– Innovation action: action primarily consisting of activities directly aimed at producing plans and arrangements or designs for new, altered or improved products, processes or services, possibly including prototyping, testing, demonstrating, piloting, large-scale product validation and market replication;

– Innovation and market deployment actions: actions embedding an innovation action and other activities necessary to deploy an innovation in the market, including the scaling-up of companies, providing Horizon Europe blended finance (a mix of grant-type funding and private finance);

– ERC frontier research: principal investigator-led research actions, hosted by single or multiple beneficiaries (ERC only);

– Training and mobility action: action geared towards improvement of skills, knowledge and career prospects of researchers based on mobility between countries, and, if relevant, between sectors or disciplines;

– Programme co-fund action: action to provide co-funding to a programme of activities established and/or implemented by entities managing and/or funding research and innovation programmes, other than Union funding bodies. Such a programme of activities may support networking and coordination, research, innovation, pilot actions, and innovation and market deployment actions, training and mobility actions, awareness raising and communication, dissemination and exploitation, or a combination thereof, directly implemented by those entities or by third parties to whom they may provide any relevant financial support such as grants, prizes, procurement, as well as Horizon Europe blended finance;

– Pre-commercial procurement action: action with the primary aim of realising pre-commercial procurement implemented by beneficiaries that are contracting authorities or contracting entities;

– Public procurement of innovative solutions action: action with the primary aim of realising joint or coordinated public procurement of innovative solutions implemented by beneficiaries that are contracting authorities or contracting entities;

– Coordination and support action: action contributing towards the objectives of the Programme, excluding research and innovation activities, such as standardisation,

dissemination, awareness-raising and communication, networking, coordination or support services, policy dialogues and mutual learning exercises and studies;

– Inducement prize: prize to spur investment in a given direction, by specifying a target prior to the performance of the work;

– Recognition prize: prize to reward past achievements and outstanding work after it has been performed;

Public procurement: to implement parts of the programme related to strategic interests and autonomy of the Union and to organise, for the Commission's own purposes, public procurements for studies, products, services and capabilities; public procurement may also take the form of pre-commercial procurement or public procurement of innovative solutions carried out by the Commission or funding bodies on their own behalf or jointly with contracting authorities and contracting entities from Member States and associated countries.

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– Indirect actions: research and innovation activities to which the Union provides financial support and which are undertaken by participants;

– Direct actions: research and innovation activities undertaken by the Commission through its Joint Research Centre (JRC).

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ANNEX III

PARTNERSHIPS

European Partnerships will be selected, implemented, monitored, evaluated and phased-out on the basis of the following criteria:

1) Selection:

(a) Evidence that the European Partnership is more effective in achieving the related objectives of the Programme, in particular in delivering clear impacts for the EU and its citizens, notably in view of delivering on global challenges and research and innovation objectives, securing EU competitiveness and contributing to the strengthening of the European Research and Innovation Area and international commitments;

In the case of institutionalised European Partnerships established in accordance with Article 185 TFEU, the participation of at least 50% of the EU Member States is mandatory;

(b) Coherence and synergies of the European Partnership within the EU research and innovation landscape;

(c) Transparency and openness of the European Partnership as regards the identification of priorities and objectives, and the involvement of partners and stakeholders from different sectors, including international ones when relevant;

(d) Ex-ante demonstration of additionality and directionality of the European Partnership, including a common vision of the purpose of the European Partnership. This vision will include in particular:

- identification of measurable expected outcomes, deliverables and impacts within specific timeframes, including key economic value for Europe;
- demonstration of expected qualitative and quantitative leverage effects;
- approaches to ensure flexibility of implementation and to adjust to changing policy or market needs, or scientific advances;
- exit-strategy and phasing-out measures.

(e) Ex-ante demonstration of the partners' long term commitment, including a minimum share of public and/or private investments;

In the case of institutionalised European Partnerships, the financial and/or in-kind, contributions from partners other than the Union, will at least be equal to 50% and may reach up to 75% of the aggregated European Partnership budgetary commitments. For each institutionalised European Partnership, a share of the contributions from partners other than the Union will be in the form of financial contributions.

2) Implementation:

(a) Systemic approach ensuring achievement of the expected impacts of the European Partnership through the flexible implementation of joint actions going beyond joint calls for research and innovation activities, including those related to market, regulatory or policy uptake;

(b) Appropriate measures ensuring continuous openness of the initiative and transparency during implementation, notably for priority setting and for participation in calls for proposals, visibility of the Union, communication and outreach measures, dissemination and exploitation of results, including clear open access/user strategy along the value chain;

(c) Coordination and/or joint activities with other relevant research and innovation initiatives ensuring effective synergies;

(d) Legally binding commitments, in particular for financial contributions, from each partner throughout the lifetime of the initiative;

(e) In the case of institutionalised European Partnership access to the results and other action related information for the Commission for the purpose of developing, implementing and monitoring of Union policies or programmes.

3) Monitoring:

(a) A monitoring system in line with the requirements set out in Article 45 to track progress towards specific policy goals/objectives, deliverables and key performance indicators allowing for an assessment over time of achievements, impacts and potential needs for corrective measures;

(b) Dedicated reporting on quantitative and qualitative leverage effects, including on financial and in-kind contributions, visibility and positioning in the international context, impact on research and innovation related risks of private sector investments.

4) Evaluation, phasing-out and renewal:

(a) Evaluation of impacts achieved at Union and national level in relation to defined targets and key performance indicators, feeding into the Programme evaluation set out in Article 47, including an assessment of the most effective policy intervention mode for any future action; and the positioning of any possible renewal of a European Partnership in the overall European Partnerships landscape and its policy priorities;

(b) Appropriate measures ensuring phasing-out according to the agreed conditions and timeline, without prejudice to possible continued transnational funding by national or other Union programmes.

ANNEX IV

SYNERGIES WITH OTHER PROGRAMMES

1. Synergies with the European Agricultural Guarantee Fund and the European Agricultural Fund for Rural Development (Common Agricultural Policy-CAP) will ensure that:

   (a) research and innovation needs of the agricultural sector and rural areas within the EU are identified notably within the European Innovation Partnership "agricultural productivity and sustainability"[1] and taken into consideration in the Programme's strategic research and innovation planning process and the work programmes;

   (b) the CAP makes the best use of research and innovation results and promotes the use, implementation and deployment of innovative solutions, including those stemming from projects funded by the Framework Programmes for research and innovation and from the European Innovation Partnership "agricultural productivity and sustainability";

   (c) the EAFRD supports the uptake and dissemination of knowledge and solutions stemming from the Programme's results leading to a more dynamic farming sector and new openings for the development of rural areas.

2. Synergies with the European Maritime and Fisheries Fund (EMFF) will ensure that:

   (a) the Programme and the EMFF are largely interlinked as EU research and innovation needs in the field of marine and maritime policy will be translated through the Programme's strategic research and innovation planning process;

   (b) the EMFF supports the rolling out of novel technologies and innovative products, processes and services, in particular those resulting from the Programme in the fields of marine and maritime policy; the EMFF also promotes ground data collection and data processing and disseminates relevant actions supported under the Programme, which in turn contributes to the implementation of the Common Fisheries Policy, the EU Maritime Policy and International Ocean Governance.

3. Synergies with the European Regional Development Fund (ERDF) will ensure that:

   (a) arrangements for combined funding from ERDF and Programme are used to support activities providing a bridge between smart specialisations strategies and international excellence in research and innovation, including joint trans-regional/trans-national programmes and pan European Research Infrastructures, with the aim of strengthening the European Research Area;

[1] Communication from the Commission to the European Parliament and the Council on the European Innovation Partnership 'Agricultural Productivity and Sustainability' (COM(2012) 79 final).

(b) the ERDF focuses amongst others on the development and strengthening of regional and local research and innovation ecosystems and industrial transformation, including support to the take-up of results and the rolling out of novel technologies and innovative solutions from the Framework Programmes for research and innovation through the ERDF.

4. Synergies with the European Social Fund Plus (ESF+) will ensure that:

(a) the ESF+ can mainstream and scale up innovative curricula supported by the Programme, through national or regional programmes, in order to equip people with the skills and competences needed for the jobs of the future;

(b) arrangements for complementary funding from ESF+ can be used to support activities promoting human capital development in research and innovation with the aim of strengthening the European Research Area;

(c) the Health strand of the European Social Fund+ mainstreams innovative technologies and new business models and solutions, in particular those resulting from the Programmes, so to contribute to innovative, efficient and sustainable health systems of the Member States and facilitate access to better and safer healthcare for European citizens.

5. Synergies with the Connecting Europe Facility (CEF) will ensure that:

(a) research and innovation needs in the areas of transport, energy and in the digital sector within the EU are identified and established during the Programme's strategic research and innovation planning process;

(b) the CEF supports the large-scale roll-out and deployment of innovative new technologies and solutions in the fields of transport, energy and digital physical infrastructures, in particular those resulting from the Framework Programmes for research and innovation;

(c) the exchange of information and data between the Framework Programme and CEF projects will be facilitated, for example by highlighting technologies from the Framework Programme with a high market readiness that could be further deployed through the CEF.

6. Synergies with the Digital Europe Programme (DEP) will ensure that:

(a) whereas several thematic areas addressed by the Programme and DEP converge, the type of actions to be supported, their expected outputs and their intervention logic are different and complementary;

(b) research and innovation needs related to digital aspects are identified and established in the Programme's strategic research and innovation plans; this includes research and innovation for High Performance Computing, Artificial Intelligence, Cybersecurity, combining digital with other enabling technologies and non-technological innovations; support for the scale-up of companies introducing breakthrough innovations (many of which will combine digital and physical technologies; the integration of digital across all the pillar 'Global Challenges and Industrial Competitiveness'; and the support to digital research infrastructures;

(c) DEP focuses on large-scale digital capacity and infrastructure building in High Performance Computing, Artificial Intelligence, Cybersecurity and advanced digital skills aiming at wide uptake and deployment across Europe of critical existing or tested innovative digital solutions within an EU framework in areas of public interest (such as health, public administration, justice and education) or market failure (such as the digitisation of businesses, notably small and medium enterprises); DEP is mainly implemented through coordinated and strategic investments with Member States, notably through joint public procurement, in digital capacities to be shared across Europe and in EU-wide actions that support interoperability and standardisation as part of developing a Digital Single Market;

(d) DEP capacities and infrastructures are made available to the research and innovation community, including for activities supported through the Programme including testing, experimentation and demonstration across all sectors and disciplines;

(e) novel digital technologies developed through the Programme, are progressively be taken up and deployed by DEP;

(f) the Programme's initiatives for the development of skills and competencies curricula, including those delivered at the co-location centres of the European Institute of Innovation and Technology's KIC-Digital, are complemented by Digital Europe-supported capacity-building in advanced digital skills;

(g) strong coordination mechanisms for strategic programming and operating procedures for both programmes are aligned, and their governance structures involve the respective Commission services as well as others concerned by the different parts of the respective programmes.

7. Synergies with the Single Market Programme will ensure that:

(a) the Single Market Programme addresses the market failures which affect all SMEs, and will promote entrepreneurship and the creation and growth of companies. Full complementarity exists between the Single Market Programme and the actions of the future European Innovation Council for innovative companies, as well as in the area of support services for SMEs, in particular where the market does not provide viable financing;

(b) the Enterprise Europe Network may serve, as other existing SME support structures (e.g. National Contact Points, Innovation Agencies), to deliver support services under the European Innovation Council.

8. Synergies with the LIFE - Programme for Environment and Climate Action (LIFE) will ensure that:

Research and innovation needs to tackle environmental, climate and energy challenges within the EU are identified and established during the Programme’s strategic research and innovation planning process. LIFE will continue to act as a catalyst for implementing EU environment, climate and relevant energy policy and legislation, including by taking up and applying research and innovation results from the Programme and help deploying them at national and (inter-)regional scale where it can help address environmental, climate or clean energy transition issues. In particular LIFE will continue to incentivise synergies with the Programme through the award of a bonus during the evaluation for proposals which feature the uptake of results from the Programme. LIFE standard action projects will support the

development, testing or demonstration of suitable technologies or methodologies for implementation of EU environment and climate policy, which can subsequently be deployed at large scale, funded by other sources, including by the Programme. The Programme's European Innovation Council can provide support to scale up and commercialise new breakthrough ideas that may result from the implementation of LIFE projects.

9. Synergies with the Erasmus Programme will ensure that:

(a) combined resources from the Programme and the Erasmus Programme are used to support activities dedicated to strengthening and modernising European higher education institutions. The Programme will complement Erasmus programme support for the European Universities initiative, in particular its research dimension as part of developing new joint and integrated long term and sustainable strategies on education, research and innovation based on trans-disciplinary and cross-sectoral approaches to make the knowledge triangle a reality, providing impetus to economic growth;

(b) the Programme and the Erasmus Programme foster the integration of education and research through facilitating higher education institutions to formulate and set up common education, research and innovation strategies, to inform teaching with the latest findings and practices of research to offer active research experience to all students and higher education staff and in particular researchers, and to support other activities that integrate higher education, research and innovation.

10. Synergies with the European Space Programme will ensure that:

(a) research and innovation needs of the space upstream and downstream sector within the EU are identified and established as part of the Programme's strategic research and innovation planning process; space research actions implemented through Horizon Europe will be implemented with regard to procurement and eligibility of entities in line with the provisions of the Space Programme, where appropriate;

(b) space data and services made available as a public good by the European Space Programme are used to develop breakthrough solutions through research and innovation, including in the Framework Programme, in particular for sustainable food and natural resources, climate monitoring, smart cities, automated vehicles, security and disaster management;

(c) the Copernicus Data and Information Access Services contribute to the European Open Science Cloud and thus facilitate access to Copernicus data for researchers and scientists; research infrastructures, in particular in situ observing networks will constitute essential elements of the in situ observation infrastructure enabling the Copernicus services, and in turn, they benefit from information produced by Copernicus services.

11. Synergies with the Neighbourhood, Development and International Cooperation Instrument (the 'External Instrument') will ensure that the Programme's research and innovation activities with the participation of Third Countries and targeted international cooperation actions seek alignment and coherence with parallel market uptake and capacity-building actions strands under the External Instrument, based on

joint definition of needs and areas of intervention commonly defined during the Programme's strategic research and innovation planning process.

12. Synergies with the Internal Security Fund and the instrument for border management as part of the Integrated Border Management Fund will ensure that:

    (a) the research and innovation needs in the areas of security and integrated border management are identified and established during the Programme's strategic research and innovation planning process;

    (b) the Internal Security Fund and the Integrated Border Management Fund support the deployment of innovative new technologies and solutions, in particular those resulting from the Framework Programmes for research and innovation in the field of security research.

13. Synergies with the InvestEU Fund will ensure that:

    (a) the Programme provide out of its own budget Horizon Europe and EIC blended finance for innovators, characterised by a high level of risk and for which the market does not provide when relevant viable and sustainable financing, and at the same time will provide for appropriate coordination in support of the effective delivery and management of the private finance part of the blended finance through funds and intermediaries supported by InvestEU;

    (b) financial instruments for research and innovation and SMEs are grouped together under the InvestEU Fund, in particular through a dedicated R&I thematic window, and through products deployed under the SME window targeting innovative companies, in this way also helping to deliver the objectives of the Programme.

14. Synergies with the Innovation Fund under the Emission Trading Scheme (the 'Innovation Fund') will ensure that:

    (a) the Innovation Fund will specifically target innovation in low-carbon technologies and processes, including environmentally safe carbon capture and utilisation that contributes substantially to mitigate climate change, as well as products substituting carbon intensive ones, and to help stimulate the construction and operation of projects that aim at the environmentally safe capture and geological storage of CO2 as well as innovative renewable energy and energy storage technologies;

    (b) the Programme will fund the development and demonstration of technologies that can deliver on EU decarbonisation, energy and industrial transformation objectives, especially in its Pillar 2;

    (c) the Innovation Fund may, subject to fulfilment of its selection and award criteria, support the demonstration phase of eligible projects that may have received the support from the Framework Programmes for research and innovation .

15. Synergies with the Euratom Research and Training Programme will ensure that:

    (a) the Programme and the Euratom Research and Training Programme develop comprehensive actions supporting education and training (including Marie Skłodowska-Curie Actions) with the aim of maintaining and developing relevant skills in Europe;

(b) the Programme and the Euratom Research and Training Programme develop joint research actions focussing on cross-cutting aspects of the safe and secure use of non-power applications of ionising radiation in sectors such as medicine, industry, agriculture, space, climate change, security and emergency preparedness and contribution of nuclear science.

16. Synergies with the European Defence Fund will benefit civil and defence research. Unnecessary duplication will be excluded.

ANNEX V

KEY IMPACT PATHWAY INDICATORS

Impact pathways, and related key impact pathway indicators, shall structure the monitoring of the Framework Programme's (FP) performance towards its objectives. The impact pathways are time-sensitive: they distinguish between the short, medium and long term. Impact pathway indicators serve as proxies to report on the progress made towards each type of Research and Innovation (R&I) impact at the FP-level. Individual Programme parts will contribute to these indicators to a different degree and through different mechanisms. Additional indicators may be used to monitor individual programme parts, where relevant.

The micro-data behind the key impact pathway indicators will be collected for all parts of the Programme and all delivery mechanisms in a centrally managed and harmonised way and at the appropriate level of granularity with minimal reporting burden on the beneficiaries.

Scientific impact pathway indicators

The Programme is expected to have scientific impact by creating high-quality new knowledge, strengthening human capital in research and innovation, and fostering diffusion of knowledge and Open Science. Progress towards this impact will be monitored through proxy indicators set along the following three key impact pathways.

Towards scientific impact	Short-term	Medium-term	Longer-term
Creating high-quality new knowledge	Publications - Number of FP peer reviewed scientific publications	Citations - Field-Weighted Citation Index of FP peer reviewed publications	World-class science - Number and share of peer reviewed publications from FP projects that are core contribution to scientific fields
Strengthening human capital in R&I	Skills - Number of researchers having benefitted from upskilling activities in FP projects (through training, mentoring/coaching, mobility and access to R&I infrastructures)	Careers - Number and share of upskilled FP researchers with more influence in their R&I field	Working conditions - Number and share of upskilled FP researchers with improved working conditions
Fostering diffusion of knowledge and Open Science	Shared knowledge - Share of FP research outputs (open data/ publication/ software etc.) shared through open knowledge infrastructures	Knowledge diffusion - Share of open access FP research outputs actively used/cited	New collaborations - Share of FP beneficiaries having developed new transdisciplinary/ trans-sectoral collaborations with users of their open FP R&I outputs

Societal impact pathway indicators

The Programme is expected to have societal impact by addressing EU policy priorities through R&I, delivering benefits and impact through R&I missions and strengthening the uptake of innovation in society. Progress towards this impact will be monitored through proxy indicators set along the following four key impact pathways.

Towards societal impact	Short-term	Medium-term	Longer-term
Addressing EU policy priorities through R&I	Outputs - Number and share of outputs aimed at addressing specific EU policy priorities	Solutions - Number and share of innovations and scientific results addressing specific EU policy priorities	Benefits - Aggregated estimated effects from use of FP-funded results, on tackling specific EU policy priorities, including contribution to the policy and law-making cycle
Delivering benefits and impact through R&I missions	R&I mission outputs - Outputs in specific R&I missions	R&I mission results - Results in specific R&I missions	R&I mission targets met - Targets achieved in specific R&I missions
Strengthening the uptake of innovation in society	Co-creation - Number and share of FP projects where EU citizens and end-users contribute to the co-creation of R&I content	Engagement - Number and share of FP beneficiary entities with citizen and end-users engagement mechanisms after FP project	Societal R&I uptake Uptake and outreach of FP co-created scientific results and innovative solutions

Economic/innovation impact pathway indicators

The Programme is expected to have economic/innovation impact by influencing the creation and growth of companies, creating direct and indirect jobs, and by leveraging investments for research and innovation. Progress towards this impact will be monitored through proxy indicators set along the following three key impact pathways.

Towards economic / innovation impact	Short-term	Medium-term	Longer-term
Generating innovation-based growth	Innovative outputs - Number of innovative products, processes or methods from FP (by type of innovation) & Intellectual Property Rights (IPR) applications	Innovations - Number of innovations from FP projects (by type of innovation) including from awarded IPRs	Economic growth - Creation, growth & market shares of companies having developed FP innovations
Creating more and better jobs	Supported employment - Number of FTE jobs created, and jobs maintained in beneficiary entities for the FP project (by type of job)	Sustained employment - Increase of FTE jobs in beneficiary entities following FP project (by type of job)	Total employment Number of direct & indirect jobs created or maintained due to diffusion of FP results (by type of job)
Leveraging investments in R&I	Co-investment - Amount of public & private investment mobilised with the initial FP investment	Scaling-up - Amount of public & private investment mobilised to exploit or scale-up FP results	Contribution to '3% target' - EU progress towards 3% GDP target due to FP

Proposal for a Decision of the European Parliament and of the Council on establishing the specific programme implementing Horizon Europe – the Framework Programme for Research and Innovation

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Proposal for a

DECISION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL

on establishing the specific programme implementing Horizon Europe – the Framework Programme for Research and Innovation

(Text with EEA relevance)

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EXPLANATORY MEMORANDUM

1. CONTEXT OF THE PROPOSAL

• Reasons and objectives

The 'Horizon Europe' proposal is fully in line with the Commission's proposal on the next long-term Union budget for 2021 to 2027, as well as the Commission's priorities, as set out in its Agenda for Jobs, Growth, Fairness and Democratic Change and global policy priorities (the Sustainable Development Goals). It supports the agenda of the Union post-2020 as agreed in the Rome Declaration of 25 March 2017.

The proposal is framed by the premise that research and innovation (R&I) delivers on citizens' priorities, boosts the Union's productivity and competitiveness, and is crucial for sustaining our socio-economic model and values, and enabling solutions that address challenges in a more systemic way.

As per Article 182 of the Treaty on the Functioning of the European Union ('TFEU') the framework programme shall be implemented through specific programmes that set out detailed rules for implementing it, fix its duration and provide for the means deemed necessary. The programme Horizon Europe will be implemented through the specific programme established by this Decision and the specific programme on defence research.

The specific programme established by this Decision is based both on Article 182 TFEU and, due to its strong support for innovation, on Article 173 TFEU.

For more on the overall Horizon Europe proposal, see the explanatory memorandum for the underlying act (proposal for a regulation establishing 'Horizon Europe – the Framework Programme for Research and Innovation and laying down its rules for participation and dissemination').

This proposal provides for a date of application as of 1 January 2021 and is presented for a Union of 27 Member States, in line with the notification by the United Kingdom of its intention to withdraw from the European Union and Euratom based on Article 50 of the Treaty on European Union received by the European Council on 29 March 2017.The following section details the specific points in this proposal.

2. OTHER ELEMENTS

• Detailed explanation of the specific provisions of the proposal

The proposal for the Framework Programme (a Framework Programme for Research and Innovation entitled 'Horizon Europe', including laying down its rules for participation and dissemination), sets out the general and specific objective of Horizon Europe, the structure and the broad lines activities to be carried out, while this Decision should define the operational objectives and the activities which are specific to parts of Horizon Europe.

This legal act sets out specific implementation and programming provisions for the framework programme, especially for

- Missions (under the Global Challenges and Industrial Competitiveness pillar);
- the European Research Council (ERC);

- the European Innovation Council (EIC);
- work programmes;
- committee procedure.

Strategic planning

The implementation of Horizon Europe will be steered by an inclusive and transparent **strategic planning** process of the research and innovation activities the programme will fund. This will follow extensive consultations and exchanges with Member States, the European Parliament as appropriate, and with various stakeholders, including civil society organisations, about priorities (including missions, under the Global Challenges and Industrial Competitiveness pillar), and the suitable types of action and forms of implementation, in particular European partnerships.

The **strategic planning** exercise will lay out a multiannual strategy for the development of **work programme** content (as set out in Article 11), though it will remain sufficiently flexible to respond rapidly to unexpected needs and crises, as well as the policy priorities set out in the Commission's Work Programme cycle. It will take the second pillar – Global Challenges and Industrial Competitiveness - as the centre of gravity for this planning.

The priorities of Horizon Europe will be very closely aligned with the Union's general strategic priorities and its policies. The strategic planning will be based on foresight activities, studies and other scientific evidence and take account of relevant existing initiatives at Union and national level. It will incorporate inter-disciplinary and cross-sectoral perspectives and ensure that all activities under Horizon Europe are coordinated in an effective manner.

It will also be aligned tightly with other Union programmes, not least to promote faster dissemination and uptake of results from investments in research and innovation.

The Commission proposal for the 2021-2027 Multiannual Financial Framework set a more ambitious goal for climate mainstreaming across all EU programmes, with an overall target of 25% of EU expenditure contributing to climate objectives. The contribution of this programme to the achievement of this overall target will be tracked through an EU climate marker system at an appropriate level of disaggregation, including the use of more precise methodologies where these are available. The Commission will continue to present the information annually in terms of commitment appropriations in the context of the annual draft budget.

To support the full utilisation of the potential of the programme to contribute to climate objectives, the Commission will seek to identify relevant actions throughout the programme preparation, implementation, review and evaluation processes.

Pillars

Horizon Europe will consist of 3 strands, or 'pillars':

I. 'Open Science';

II. 'Global Challenges and Industrial Competiveness';

III. 'Open Innovation'.

Pillar I – 'Open Science'

This pillar builds on the success of the European Research Council, the Marie Skłodowska-Curie Actions and the Research Infrastructures component in the current framework programme. For the specific rules on the European Research Council see Articles 6 to 8.

Pillar II – 'Global Challenges and Industrial Competiveness'

This pillar includes five thematic clusters that address the full spectrum of global challenges through top-down collaborative R&I activities.

- ' Health';
- 'Inclusive and Secure Society';
- 'Digital and Industry';
- 'Climate, Energy and Mobility';
- 'Food and Natural Resources'..

The clusters – supported by areas of intervention – cut across typical boundaries between disciplines, sectors and policy areas and will lead to more collaboration and increased impact in what concerns Union and global policy priorities.

The entire pillar is designed to be more impact-oriented.

Missions

A small number of **missions** with specific goals will be launched from within the pillar, establishing a comprehensive portfolio of projects, but also drawing on relevant activities and outputs from other parts of the programme. The specific provisions on missions are set out in Article 5.

Missions will be decided and co-designed as part of the Horizon Europe strategic planning process, which will include a collaborative effort by relevant Commission departments, Member States, the European Parliament and relevant stakeholders.

There will not be a separate budget for missions, though missions will have a budget assigned through the work programme. Missions are normally expected to be cross-cutting in nature and so receive their budget from more than one cluster.

The first few missions will be introduced in the first strategic planning exercise. Based on the first two years' experience, the number and scale of missions could be increased in subsequent work programmes. Whilst the duration of the Union support to missions would not be expected to exceed 10 years and will be subject to regular review (through the work programme cycle), the timeframe for expected impact of missions could spread out beyond this timeframe.

For co-designing the missions and steering their implementation, the Commission may set up *mission boards*. They will advise on potential high-impact missions and rely in doing so on a design process that involves stakeholders and includes public outreach. The mission boards will be composed of stakeholders, including end-users to ensure their engagement, and Commission departments to ensure links to Union policies. The members of the mission boards will normally be appointed by the Commission, following an open call for expression of interests, and taking into account the need for balance in expertise, gender, age and geographical distribution. However, if appropriate, existing governance structures could also be used as mission boards.

Mission managers may be recruited by the Commission to ensure that the best available expertise is used to implement and achieve the stated objectives.

The implementation provisions will allow a 'portfolio approach', whereby proposals will be evaluated and selected, and projects managed within a portfolio of actions, rather than individually.

The evaluation of proposals will be done with the help of independent evaluators who will be responsible for proposing a portfolio of projects that collectively address a given mission.

The applicable evaluation and selection criteria, along with the evaluation method for missions (e.g. ensuring a portfolio approach), will be set out in the work programme. The aim is will be to assess excellence and impact at the collective level.

Other relevant projects which may contribute to the success of the missions may be incorporated in the portfolio approach, and a broad range of actors, such as foundations, may also be able to contribute.

The Future and Emerging Technologies (FET) flagships of Horizon 2020 have similar features to the mission's concept. For this reason, and also to simplify the funding landscape, any FET flagships planned under Horizon Europe will be set up as missions, in accordance with the mission criteria and implemented using the same modalities.

Pillar III – 'Open Innovation'

This pillar will essentially focus on:

– scaling up breakthrough and market-creating innovation through a new **European Innovation Council** (EIC – see articles 9 to 10); and

– activities aiming at enhancing and developing the overall European innovation landscape, including support to the **European Institute of Innovation and Technology** (EIT).

To implement the EIC, the Commission will establish a high level board (the EIC Board) that will advise, inter alia, on the overall strategy, objectives, activities, evaluation criteria and selection of experts. The work programme for the implementation of the EIC actions will be prepared by the Commission on the basis of the advice of the EIC Board.

The European Innovation Council will be the sole channel for the Union support to breakthrough market-creating innovation. It will govern relevant activities previously carried out in Horizon 2020, such as Innovation in SMEs and Future and Emerging Technologies (FET Open and FET Proactive), and Access to Risk Finance (now aligned with the InvestEU Fund Regulation).

The Commission may recruit programme managers, following an open and transparent selection procedure, for the implementation of the EIC.

The EIC will provide direct tailor-made support to innovators through two main funding instruments – the *Pathfinder* and the *Accelerator* – which will both focus through a mainly bottom-up, high-risk approach on breakthrough innovation; on innovator needs and be pro-actively managed.

The *Pathfinder for Advanced Research* will provide grants from the early technology stage (including proof-of-concept, technology validation) to the early commercial stage (early demonstration, developing a business case and strategy).

The *Accelerator* will support the further development and market deployment of breakthrough and market-creating innovations, to a stage where it can be financed under normal commercial terms by investors (e.g. from demonstration, user testing, pre-commercial production, including scale-up). It will provide EIC blended finance (i.e. grants combining direct equity and access to financial guarantees).

The Accelerator will place a particular emphasis on innovation generated within the Pathfinder, though it will also fund projects from other parts of Horizon Europe such as the European Research Council or the European Institute of Innovation and Technology's *Knowledge and Innovation Communities*.

Another feature of the Open Innovation pillar is an increased cooperation with innovation ecosystems aimed at improving the environment within which innovation can flourish, in particular but not exclusively via the EIT, which will promote sustainable innovation ecosystems and develop entrepreneurial and innovation skills in priority areas through its Knowledge and Innovation Communities.

Part '**Strengthening the European Research Area**'

The main components of this particular part are: 'sharing excellence'; and 'reforming and enhancing the European R&I system', covering the next generation Policy Support Facility.

This part will also include activities on: foresight activities; monitoring and evaluating the Framework Programme and disseminating and exploiting results; modernising European universities; supporting enhanced international cooperation; and science, society and citizens.

Implementation

In implementing Horizon Europe, the Commission will be assisted by a **Committee** (see Article 12) within the meaning of Regulation (EU) No 182/2011. It would meet in different configurations (see Annex II of this Decision), depending on the subject matter to be discussed.

Programme Activities

See Annex I of this proposal for more detail on the areas funded under each of the pillars and on programme activities. This includes implementation arrangements and general principles with a specific focus on strategic planning, dissemination and communication, exploitation and market uptake, support for policy-making and international cooperation.

2018/0225 (COD)

Proposal for a

DECISION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL

on establishing the specific programme implementing Horizon Europe – the Framework Programme for Research and Innovation

(Text with EEA relevance)

THE EUROPEAN PARLIAMENT AND THE COUNCIL OF THE EUROPEAN UNION,

Having regard to the Treaty on the Functioning of the European Union, and in particular Articles 173(3) and 182(4) thereof,

Having regard to the proposal from the European Commission,

After transmission of the draft legislative act to the national parliaments,

Having regard to the opinion of the European Economic and Social Committee[1],

Having regard to the opinion of the Committee of the Regions[2],

Acting in accordance with the ordinary legislative procedure

Whereas:

(1) In accordance with Article 182(3) of the Treaty on the Functioning of the European Union (TFEU), the Horizon Europe - Framework Programme for Research and Innovation ("Horizon Europe"), established by *FP/RfP* Regulation (EU) No … of the European Parliament and of the Council of…[3] , is to be implemented through specific programmes, which define the detailed rules for their implementation, fix their duration and provide for the means deemed necessary.

(2) *FP/RfP* Regulation (EU) No … sets out the general and specific objectives of Horizon Europe, the structure and the broad lines of activities to be carried out, while this specific programme implementing Horizon Europe - the Framework Programme for Research and Innovation (the 'Specific Programme') should define the operational objectives and the activities which are specific to parts of Horizon Europe. The provisions on implementation set out in *FP/RfP Regulation* (EU) No … apply fully to the Specific Programme, including those relating to ethical principles.

(3) In order to ensure uniform conditions for the implementation of the Specific Programme, implementing powers should be conferred on the Commission to adopt work programmes for the implementation of the Specific Programme. Those powers should be exercised in accordance with Regulation (EU) No 182/2011 of the European Parliament and of the Council[4].

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1 OJ C , , p. .

2 OJ C , , p. .

3 OJ C , , p. .

4 Regulation (EU) No 182/2011 of the European Parliament and of the Council of 16 February 2011 laying down the rules and general principles concerning mechanisms for control by the Member States of the Commission's exercise of implementing powers (OJ L 55, 28.2.2011, p. 13)

(4) The Board of Governors of the Joint Research Centre (JRC), set up by Commission Decision 96/282/Euratom[5] has been consulted on the scientific and technological content of the Specific Programme on the non-nuclear direct actions of the JRC;

(5) Reflecting the importance of tackling climate change in line with the Union's commitments to implement the Paris Agreement and the United Nations Sustainable Development Goals, this Specific Programme will contribute to mainstream climate actions and to the achievement of an overall target of 25 % of the EU budget expenditures supporting climate objectives. Actions under this Specific Programme are expected to contribute 35% of the overall financial envelope of the Specific Programme to climate objectives. Relevant actions will be identified during the Specific Programme's preparation and implementation, and reassessed in the context of the relevant evaluations and review processes.

(6) The Specific Programme's actions should be used to address market failures or sub-optimal investment situations, in a proportionate manner, without duplicating or crowding out private financing and have a clear European added value.

(7) Reflecting the important contribution that research and innovation should make to address challenges in food, agriculture, rural development and the bioeconomy, and to seize the corresponding research and innovation opportunities in close synergy with Common Agricultural Policy, relevant actions under the Specific Programme will be supported with EUR 10 billion for the cluster 'Food and Natural Resources' for the period 2021-2027.

(8) The completion of the Digital Single Market and the growing opportunities from the convergence of digital and physical technologies requires a stepping up of investments. Horizon Europe will contribute to these efforts with a substantial increase of spending in main digital research and innovation activities compared to the Research and Innovation Framework Programme Horizon 2020[6]. This should ensure that Europe remains at the forefront of global research and innovation in the digital field.

(9) The types of financing and the methods of implementation under this Decision shall be chosen on the basis of their ability to achieve the specific objectives of the actions and to deliver results, taking into account, in particular, the costs of controls, the administrative burden, and the expected risk of non-compliance. For grants, this shall include consideration of the use of lump sums, flat rates and scales of unit costs.

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5 Commission Decision 96/282/Euratom of 10 April 1996 on the reorganization of the Joint Research Centre (OJ L 107, 30.4.1996, p. 12).

6 The Communication from the Commission "A new, modern Multiannual Financial Framework for a European Union that deliver efficiently on its priorities post-2020" identifies EUR 13 billion spent in main digital activities under the Research and Innovation Framework Programme Horizon 2020 (https://eur-lex.europa.eu/legal-content/en/ALL/?uri=CELEX%3A52018DC0098).

HAVE ADOPTED THIS DECISION:

CHAPTER I

GENERAL PROVISIONS

Article 1

Subject matter

This Decision establishes the specific programme implementing Horizon Europe - the Framework Programme for Research and Innovation (the 'Specific Programme'), as set out in Article 1(3)(a) of the *FP/RfP* Regulation…/…/EU.

It lays down the operational objectives of the Specific Programme, the budget for the period 2021 – 2027, the rules for implementation of the Specific Programme and activities to be carried out under the Specific Programme .

Article 2

Operational objectives

1. The Specific Programme shall contribute to the general and specific objectives set out in Article 3 of Regulation … *FP/RfP Regulation*

2. The Specific Programme has the following operational objectives:

   (a) reinforcing and spreading excellence;

   (b) increasing collaboration across sectors and disciplines;

   (c) connecting and developing research infrastructures across the European research area;

   (d) strengthening international cooperation;

   (e) attracting, training and retaining researchers and innovators in the European Research Area, including through mobility of researchers;

   (f) fostering open science and ensuring visibility to the public and open access to results;

   (g) actively disseminating and exploiting results, in particular for policy development;

   (h) supporting the implementation of Union policy priorities;

   (i) reinforcing the link between research and innovation and other policies, including Sustainable Development Goals;

   (j) delivering, through R&I missions, on ambitious goals within a set timeframe;

   (k) involving citizens and end-users in co-design and co-creation processes;

   (l) improving science communication.

   (m) accelerating industrial transformation;

   (n) improving skills for innovation;

   (o) stimulating the creation and scale-up of innovative companies, in particular SMEs;

   (p) improving access to risk finance, in particular where the market does not provide viable financing.

3. Within the objectives referred to in paragraph 2, account may be taken of new and unforeseen needs that arise during the period of implementation of the Specific Programme. That may, if duly justified, include responses to emerging opportunities, crises and threats, as well as responses to needs relating to the development of new Union policies.

Article 3

Structure

1. In accordance with Article 4(1) of Regulation … *FP/RfP Regulation*, the Specific Programme shall consist of the following parts:

(1) Pillar I 'Open Science' with the following components:

(a) the European Research Council (ERC), as described in Annex I, Pillar I, section 1;

(b) Marie Skłodowska-Curie actions (MSCA), as described in Annex I, Pillar I, section 2;

(c) research infrastructures, as described in Annex I, Pillar I, section 3;

(2) Pillar II 'Global Challenges and Industrial Competitiveness' with the following components:

(a) cluster 'Health', as described in Annex I, Pillar II, section 1;

(b) cluster 'Inclusive and Secure Society', as described in Annex I, Pillar II, section 2;

(c) cluster 'Digital and Industry', as described in Annex I, Pillar II, section 3;

(d) cluster 'Climate, Energy and Mobility', as described in Annex I, Pillar II, section 4;

(e) cluster Food and Natural Resources', as described in Annex I, Pillar II, section 5;

(f) non-nuclear direct actions of the Joint Research Centre (JRC), as described in Annex I, Pillar II, section 6;

(3) Pillar III 'Open Innovation' with the following components:

(a) the European Innovation Council (EIC), as described in Annex I, Pillar III, section 1;

(b) European innovation ecosystems, as described in Annex I, Pillar III, section 2;

(c) the European Institute of Innovation and Technology (EIT), as described in Annex I, Pillar III, section 3.

(4) Part 'Strengthening the European Research Area' with the following components:

(a) sharing excellence, as described in Annex I, Part 'Strengthening the European Research Area', section 1;

(b) reforming and enhancing the European R&I system, as described in Annex I, Part 'Strengthening the European Research Area', section 2.

2. The activities to be carried out under the parts referred to in paragraph 1 are set out in Annex I.

Article 4

Budget

1. In accordance with Article 9(1)of Regulation … *FP/RfP Regulation*, the financial envelope for the implementation of the Specific Programme for the period 2021 to 2027 shall be EUR 94 100 000 000 in current prices.

2. The amount referred to in paragraph 1 of this Article shall be distributed among the components set out in Article 3(1) of this Decision in accordance with Article 9(2) of Regulation … *FP/RfP Regulation*. The arrangements of Article 9(3) to (8) of Regulation … FP/RfP Regulation shall apply.

CHAPTER II

IMPLEMENTATION AND PROGRAMMING

Article 5

Missions

1. For each mission, a mission board may be established. It shall be composed of around 15 high level individuals including relevant end-users' representatives. The mission board shall advise upon the following:
   (a) content of work programmes and their revision as needed for achieving the mission objectives, in co-design with stakeholders and the public where relevant;
   (b) adjustment actions, or termination if appropriate, based on implementation assessments of the mission;
   (c) selection of expert evaluators, briefing of expert evaluators and evaluation criteria and their weighting;
   (d) framework conditions which help achieve the objectives of the mission;
   (e) communication.
2. Specific provisions to enable an efficient and flexible portfolio approach may be set out in the work programme provided for in Article 11.

Article 6

European Research Council

1. The Commission shall establish a European Research Council ("ERC"), for implementing the actions under Pillar I 'Open Science' which relate to the ERC. The ERC shall succeed the ERC set up by Decision C(2013) 1895[7].
2. The ERC shall be composed of the independent Scientific Council provided for in Article 7 and the dedicated implementation structure provided for in Article 8.

[7] OJ C 373, 20.12.2013, p. 23

3. The ERC shall have a President who shall be chosen from among senior and internationally respected scientists.

The President shall be appointed by the Commission following a transparent recruitment process involving an independent dedicated search committee, for a term of office limited to four years, renewable once. The recruitment process and the candidate selected shall have the approval of the Scientific Council.

The President shall chair the Scientific Council and shall ensure its leadership and liaison with the dedicated implementation structure, and represent it in the world of science.

4. The ERC shall operate according to the principles of scientific excellence, autonomy, efficiency, effectiveness, transparency and accountability. It shall ensure continuity with ERC actions conducted under Decision …/EC.

5. The activities of the ERC shall support research carried out across all fields by individual and transnational teams in competition at the European level.

6. The Commission shall act as the guarantor of the autonomy and integrity of the ERC and shall ensure the proper execution of the tasks entrusted to it.

The Commission shall ensure that the implementation of the ERC actions is in accordance with the principles set out in paragraph 4 of this Article as well as with the overall strategy for the ERC, referred to in point (a) of Article 7(2), established by the Scientific Council.

Article 7

ERC Scientific Council

1. The Scientific Council shall be composed of scientists, engineers and scholars of the highest repute and appropriate expertise, of both women and men in different age groups, ensuring a diversity of research areas and acting in their personal capacity, independent of extraneous interests.

The members of the Scientific Council shall be appointed by the Commission, following an independent and transparent procedure for their identification agreed with the Scientific Council, including a consultation of the scientific community and a report to the European Parliament and the Council.

Their term of office shall be limited to four years, renewable once, on the basis of a rotating system which shall ensure the continuity of the work of the Scientific Council.

2. The Scientific Council shall establish:

(a) the overall strategy for the ERC;

(b) the work programme for the implementation of the ERC activities;

(c) the methods and procedures for peer review and proposal evaluation on the basis of which the proposals to be funded are determined;

(d) its position on any matter which from a scientific perspective may enhance achievements and impact of the ERC and the quality of the research carried out;

(e) a code of conduct addressing, inter alia, the avoidance of conflict of interests.

The Commission shall depart from the positions established by the Scientific Council in accordance with points (a), (c), (d), and (e) of the first subparagraph only when it considers that the provisions of this Decision have not been respected. In that case, the Commission shall adopt measures to maintain continuity in the implementation of the specific programme

and the achievements of its objectives, setting out the points of departure from the Scientific Council positions and duly motivating them.

3. The Scientific Council shall act in accordance with the mandate set out in Pillar I of Annex I, section 1.

4. The Scientific Council shall act exclusively in the interest of achieving the ERC, according to the principles set out in Article 6. It shall act with integrity and probity and carry out its work efficiently and with the greatest possible transparency.

Article 8

Dedicated ERC implementation structure

1. The dedicated implementation structure shall be responsible for the administrative implementation and programme execution, as described in Pillar I of Annex I, section 1. It shall support the Scientific Council in the conduct of all of its tasks.

2. The Commission shall ensure that the dedicated implementation structure follows strictly, efficiently and with the necessary flexibility the objectives and requirements of the ERC alone.

Article 9

The European Innovation Council

1. The Commission shall establish a European Innovation Council (EIC) for implementing actions under Pillar III 'Open Innovation' which relate to the EIC. The EIC shall operate according to the following principles: focus on breakthrough and disruptive innovation, autonomy, ability to take risk, efficiency, effectiveness, transparency and accountability.

2. The EIC shall include the High Level Board ("EIC Board") provided for in Article 10. .

3. The Commission shall ensure that the implementation of the EIC is:

   (a) in accordance with the principles set out in paragraph 1 of this Article, taking due account of the opinion of the EIC Board on the overall strategy for the EIC, referred to Article 10(1)(a); and

   (b) does not lead to distortions of competition contrary to the common interest.

4. For the purpose of managing EIC blended finance, the Commission shall make use of indirect management, or where this is not possible, may establish a special purpose vehicle. The Commission shall seek to ensure the participation of other public and private investors. Where this is not possible at the initial set up, the special purpose vehicle will be structured in such a way that it can attract other public or private investors in order to increase the leverage effect of the Union contribution.

Article 10

The EIC Board

1. The EIC Board shall advise the Commission upon:

   (a) the overall strategy for the EIC component under Pillar III 'Open Innovation';

   (b) the work programme for the implementation of the EIC actions;

(c) the criteria for assessment of the innovativeness and risk profile of the proposals and the appropriate balance of grants, equity and other forms of financing for the EIC accelerator;

(d) the identification of strategic portfolio of projects;

(e) the profile of programme managers.

2. The EIC Board may upon request address recommendations to the Commission on:

(a) any matter which from an innovation perspective may enhance and foster innovation eco-systems across Europe, the achievements and impact of the objectives of the EIC component and the capacity of innovative firms to roll out their solutions;

(b) identify in cooperation with relevant Commission services possible regulatory barriers faced by entrepreneurs, in particular those awarded support under the EIC component;

(c) emerging technology trends from EIC's portfolio, to inform the programming in other parts of the Specific Programme;

(d) identifying specific issues where advice from the EIC Board is needed.

The EIC Board shall act in the interest of achieving the objectives of the EIC component. It shall act with integrity and probity and carry out its work efficiently and with transparency.

The EIC Board shall act in accordance with its mandate set out in Pillar III of Annex I, section 1.

3. The EIC Board shall be composed of 15 to 20 high level individuals drawn from various parts of Europe's innovation ecosystem, including entrepreneurs, corporate leaders, investors and researchers. It shall contribute to outreach actions, with EIC Board members striving to enhance the prestige of the EIC brand.

The members of the EIC Board shall be appointed by the Commission, following an open call for nominations or for expression of interests or both, whichever the Commission will find more appropriate,, and taking into account the need for balance in expertise, gender, age and geographical distribution.

Their term of office shall be limited to two years, renewable twice, with a rolling appointments system (members appointed every two years).

4. The EIC Board shall have a President who shall be appointed by the Commission following a transparent recruitment process. The President shall be a high profile public figure linked to the innovation world.

The President shall be appointed for a term of office limited to four years, renewable once.

The President shall chair the EIC Board, prepare its meetings, assign tasks to members, and may establish dedicated sub-groups, in particular to identify emerging technology trends from EIC's portfolio. He or she shall promote the EIC, act as interlocutor with the Commission and represent the EIC in the world of innovation. The Commission may provide for administrative support for the President to undertake his or her duties.

5. A code of conduct addressing, inter alia, the avoidance of conflict of interests shall be established by the Commission. Members of the EIC Board are expected to accept the code of conduct upon assuming office.

Article 11

Work programmes

1. The Programme shall be implemented by work programmes referred to in Article 110 of Financial Regulation. They shall be prepared following a strategic planning process as described in Annex I to this Decision.

   Work programmes shall set out, where applicable, the overall amount reserved for blending operations.

2. The Commission shall adopt separate work programmes, by means of implementing acts, for the implementation of actions under the following components, as set out in Article 3(1) of this Decision :

   (a) the ERC, where the work programme shall be established by the Scientific Council under point (b) of Article 7(2), in accordance with the advisory procedure referred to in Article 12(3). The Commission shall depart from the work programme established by the Scientific Council only when it considers that it is not in accordance with the provisions of this Decision. In that case, the Commission shall adopt the work programme by means of an implementing act in in accordance with the examination procedure referred to in Article 12(4). The Commission shall duly motivate this measure;

   (b) all clusters under the pillar 'Global Challenges and Industrial Competitiveness', MSCA, research infrastructures, support to innovation ecosystems, sharing excellence and reforming and enhancing the European R&I System, in accordance with the examination procedure referred to in Article 12(4);

   (c) the EIC, where the work programme shall be prepared following the advice of the EIC Board under point (b) of Article 10(1), in accordance with the examination procedure referred to in Article 12(4);

   (d) the JRC, where the multi-annual work programme shall take into account the opinion provided by the Board of Governors of the JRC referred to in Decision 96/282/Euratom.

3. In addition to requirement in Article 110 of the Financial Regulation, the work programmes referred to in paragraph 2 of this Article shall, as appropriate, contain:

   (a) an indication of the amount allocated to each action and mission and an indicative implementation timetable;

   (b) for grants the priorities, the selection and award criteria and the relative weight of the different award criteria and the maximum rate of funding of the total eligible costs;

   (c) the amount allocated to blended finance in accordance with Articles 41 to 43 of Regulation … *FP/RfP Regulation*:

   (d) any additional obligations for beneficiaries, in accordance with Articles 35 and 37 of the *FP/RfP Regulation*.

Article 12

Committee procedure

1. The Commission shall be assisted by a committee[8]. That committee shall be a committee within the meaning of Regulation (EU) No 182/2011.
2. The committee shall meet in different configurations as set out in Annex II, having regard to the subject matter to be discussed.
3. Where reference is made to this paragraph, Article 4 of Regulation (EU) No 182/2011 shall apply.
4. Where reference is made to this paragraph, Article 5 of Regulation (EU) No 182/2011 shall apply.
5. Where the opinion of the committee is to be obtained by written procedure, that procedure shall be terminated without result when, within the time-limit for delivery of the opinion, the chair of the committee so decides or a simple majority of committee members so request.
6. The Commission shall regularly inform the Committee of the overall progress of the implementation of the specific programme and shall provide it with timely information on all actions proposed or funded under Horizon Europe, as specified in Annex III.

CHAPTER III

TRANSITIONAL AND FINAL PROVISIONS

Article 13

Repeal

Decision 2013/743/EU is repealed with effect from 1 January 2021.

Article 14

Transitional provisions

1. This Decision shall not affect the continuation or modification of the actions concerned, until their closure, under Decision 2013/743/EU, which shall continue to apply to the actions concerned until their closure.

   Where necessary, any remaining tasks of the Committee established by Decision 2013/743/EU shall be undertaken by the Committee referred to in Article 12 of this Decision.
2. The financial envelope for the Specific Programme may also cover technical and administrative assistance expenses necessary to ensure the transition between the Specific Programme and the measures adopted under its predecessor Decision 2013/743/EU.

[8] With a view to facilitating the implementation of the programme, for each meeting of the Programme Committee as defined in the agenda, the Commission will reimburse, in accordance with its established guidelines, the expenses of one representative per Member State, as well as one expert/adviser per Member State for those agenda items where a Member State requires specific expertise.

Article 15

Entry into force

This Decision shall enter into force on the twentieth day following that of its publication in the *Official Journal of the European Union*.

This Decision is addressed to the Member States.

Done at Brussels,

For the European Parliament	*For the Council*
The President	*The President*

Working document for the preparation of the post 2020 basic acts

Legislative financial statement

annexed to the Specific programme implementing Horizon Europe

1. FRAMEWORK OF THE PROPOSAL/INITIATIVE

1.1. Title of the proposal/initiative

1.2. Policy area(s) concerned *(programme cluster)*

1.3. Nature of the proposal/initiative

1.4. Grounds for the proposal/initiative

1.5. Duration and financial impact

1.6. Management mode(s) planned

2. MANAGEMENT MEASURES

2.1. Monitoring and reporting rules

2.2. Management and control system

2.3. Measures to prevent fraud and irregularities

3. ESTIMATED FINANCIAL IMPACT OF THE PROPOSAL/INITIATIVE

3.1. Heading(s) of the multiannual financial framework and expenditure budget line(s) affected

3.2. Estimated impact on expenditure

3.2.1. Summary of estimated impact on expenditure

3.2.2. Estimated impact on appropriations of an administrative nature

3.2.3. Third-party contributions

3.3. Estimated impact on revenue

LEGISLATIVE FINANCIAL STATEMENT

1. FRAMEWORK OF THE PROPOSAL/INITIATIVE

1.1. Title of the proposal/initiative

Specific programme implementing Horizon Europe

1.2. Policy area(s) concerned *(Programme cluster)*

01 – Research and Innovation

1.3. The proposal/initiative relates to:

☑ **a new action**

☐ **a new action following a pilot project/preparatory action**[9]

☐ **the extension of an existing action**

☐ **a merger or redirection of one or more actions towards another/a new action**

1.4. Grounds for the proposal/initiative

1.4.1. Requirement(s) to be met in the short or long term including a detailed timeline for roll-out of the implementation of the initiative

– support the creation and diffusion of high-quality new knowledge, technologies and solutions to global challenges; – strengthen the impact of research and innovation in developing, supporting and implementing EU policies, and the uptake of innovative solutions in industry and society to address global challenges; – foster all forms of innovation, including breakthrough innovation, and strengthen market deployment of innovative solutions; – optimise the Programme's delivery for impact.

1.4.2. Added value of Union involvement (it may result from different factors, e.g. coordination gains, legal certainty, greater effectiveness or complementarities). For the purposes of this point 'added value of Union involvement' is the value resulting from Union intervention which is additional to the value that would have been otherwise created by Member States alone.

Research & Innovation (R&I) is a crucial part of the knowledge-based society and one where a strong European dimension leverage additional funds at national level, without evidence of substitution. Typically, R&I projects chosen for EU funding harness a higher level of EU or international cooperation and have a scale, scope and level of sophistication that would prevent them from going ahead with national funding alone (83 % of EU R&I projects would not have gone ahead without the EU-support). In a world of heightened technological competition, not investing in R&I on an EU scale would result in a decline of the EU's global competitiveness with foreseeable economic social and environmental impacts.

[9] As referred to in Article 58(2)(a) or (b) of the Financial Regulation.

The specific benefits of EU investments in the area of R&I are:

- boosting EU competitiveness through the creation of trans-national and multidisciplinary networks and new markets, with positive knowledge dissemination and technology transfers across the Union to prepare deployment of new products and services (EU-funded R&I teams are 40 % more likely than non-EU funded teams to be granted patents, which are also of higher quality and commercial value);
- pooling public and private resources and knowledge to achieve critical mass for tackling global challenges and for taking leadership in EU and global markets (e.g. only EU-level action can overcome the thin distribution of patients affected by rare disease and the lack of standardisation and data);
- strengthening scientific excellence through EU-wide competition and cooperation (EU-funded peer-reviewed publications are cited more than twice the world average);
- strengthening support for the emergence and scale-up of breakthrough market creating innovations (SMEs supported through EU R&I funding grow faster than comparable non-EU funded SMEs);
- increasing the EU's attractiveness as a place for education, research, innovation and business (EU-funded teams grow faster and attract twice as many collaborations from outside the EU);
- having a positive structuring effect on national R&I ecosystems (the European Research Council has become a global beacon of excellence, inducing national and institutional changes to support and attract its grantees);
- providing a sound knowledge base for policy-making (e.g. the work of the UN's IPCC on climate change relied extensively on EU-funded research).

1.4.3. Lessons learned from similar experiences in the past

EU Framework Programmes have generated significant and long-lasting impacts , as shown by successive evaluations since the EU started investing in R&I in 1984. While European research and innovation programmes have been successful, there are important lessons to be learned from the past, from stakeholder feedback, and from analytical studies. Research, innovation and education should be addressed in a more coordinated manner and coherent with other policies and research results better disseminated and valorised into new products, processes and services. The intervention logic of EU support programmes should be developed in a more focused, concrete, detailed, inclusive and transparent manner. Programme access should be improved and start-up, SME, industrial, EU13 and extra-EU participation increased. Monitoring and evaluation need to be strengthened.

The Communication on the interim evaluation of Horizon 2020 identified several areas for improvement. Findings of the interim evaluation of Horizon 2020 were based on extensive stakeholder feedback and the strategic recommendations of the independent High Level Group on maximising the impact of EU R&I Programmes (Lamy High Level Group).

They could be summarised as follows:

a. Continue simplification.

b. Support breakthrough innovation.

c. Create more impact through mission-orientation and citizen involvement.

d. Increase synergies with other EU funding programmes and EU Policies.

e. Strengthen international cooperation.

f. Reinforce openness.

g. Rationalise the funding landscape.

1.4.4. Compatibility and possible synergy with other appropriate instruments

Horizon Europe is designed to be implemented enabling synergies with other Union funding programmes, in particular through arrangements for complementary funding from EU programmes where management modalities permit; either in sequence, in an alternating way, or through the combination of funds including for the joint funding of actions.

A non-exhaustive list of such arrangements and funding programmes include synergies with the following programmes:

- Common Agricultural Policy (CAP)
- European Regional Development Fund (ERDF)
- European Social Fund (ESF)
- Single Market Programme
- European Space Programme
- Connecting Europe Facility (CEF)
- Digital Europe Programme (DEP)
- Erasmus Programme
- External Instrument
- InvestEU Fund
- Research and Training Programme of the European Atomic Energy Community

1.5. Duration and financial impact

☑ **limited duration**

– ☑ in effect from 01/01/2021 to 31/12/2027

– ☑ Financial impact from 01/01/2021 to 31/12/2027 for commitment appropriations and from 01/01/2021 to 31/12/2033 for payment appropriations.

☐ **unlimited duration**

– Implementation with a start-up period from YYYY to YYYY, followed by full-scale operation.

1.6. Management mode(s) planned[10]

☑ **Direct management** by the Commission

– ☑ by its departments, including by its staff in the Union delegations;

– ☑ by the executive agencies

☐ **Shared management** with the Member States

☑ **Indirect management** by entrusting budget implementation tasks to:

– ☐ third countries or the bodies they have designated;

– ☑ international organisations and their agencies (to be specified);

– ☐the EIB and the European Investment Fund;

– ☑ bodies referred to in Articles 70 and 71 of the Financial Regulation;

– ☑ public law bodies;

– ☑ bodies governed by private law with a public service mission to the extent that they provide adequate financial guarantees;

– ☑ bodies governed by the private law of a Member State that are entrusted with the implementation of a European Partnership and that provide adequate financial guarantees;

– ☐ persons entrusted with the implementation of specific actions in the CFSP pursuant to Title V of the TEU, and identified in the relevant basic act.

– *If more than one management mode is indicated, please provide details in the 'Comments' section.*

Comments

The implementation of Horizon Europe activities will be following the main principles established for Horizon 2020, with a substantial part of the global Horizon Europe budget expected to be implemented through specially-designed management modes.

It is expected that the Commission will continue channelling most of the funds through the Executive Agencies, with additional actions delivered by Union bodies or other bodies entrusted with budget implementation under indirect management established under articles 185 and 187 of the TFEU and targeted at specific priorities.

[10] Details of management modes and references to the Financial Regulation may be found on the BudgWeb site: https://myintracomm.ec.europa.eu/budgweb/EN/man/budgmanag/Pages/budgmanag.aspx

The types of implementing bodies expected to be established/renewed for Horizon Europe are:

- Executive Agencies;
- Joint Undertakings (Art. 187 TFEU);
- Public-public partnerships (Art. 185 TFEU);
- European Institute of Innovation and Technology

Some rationalisation will be done at the level of the partnerships (which will be presented under a new common term 'European Partnerships'), with the main focus on streamlining the current structure and number of existing entities and to make the partnership landscape more coherent both internally (within the FP) and externally (better co-ordination with other Union programmes and external partners). However, this rationalisation will not have impact on the actual legal forms used.

2. MANAGEMENT MEASURES

2.1. Monitoring and reporting rules

Specify frequency and conditions.

Short, medium and long term indicators have been set on the basis of a number of impact pathways. Reporting rules for participants have been designed with these indicators in mind, but also with a conscious intention to limit the administrative burden for participants. Wherever possible data will be collected from open sources.

All data on the management processes (applications, success rates, time to grant, type of beneficiaries, etc.) will be collected and stored, and made available in real time via a dedicated data storage. Today, the reference system (CORDA) works well , and is available for Member States and other interested bodies.

Report will be produced giving information on management processes (from year one) and, progressively, information on outputs and results. An interim evaluation and a final evaluation are planned.

In addition, the JRC's direct actions are assessed internally by means of an annual internal evaluation and externally through peer review by a number of top-level experts selected in consultation with the JRC's Board of Governors.

2.2. Management and control system(s)

2.2.1. Justification of the management mode(s), the funding implementation mechanism(s), the payment modalities and the control strategy proposed

The Framework Progamme for Research & Innovation will be implemented through direct and Indirect Management. There are no fundamental changes from the Horizon 2020 Framework Programme. However, further simplification measures will be implemented whenever it is possible.

Under Horizon 2020, to end February 2018, 154 000 proposals have been received (with 537 000 individual applications), 18 000 contracts signed (with 79 000 individual participations). Despite the dramatic increase in the number of proposals compared to Seventh Framework Programme, 95 % of contracts have been signed within the 8 month limit set by the legislation. The common IT systems and business processes have ensured efficiency at all levels. A Common Support Centre provides cost effective services to all Commission services responsible for the implementation of the previous Framework Programmes, with running costs of around 0.7 % of expenditure in 2017. Validation of Legal Entities and organisation of project evaluations has been centralised in the Research Executive Agency, giving economies of scale, and ensuring efficient organisation of evaluations.

The narrower estimate of the costs of the control system (evaluation, selection, project management, ex-ante and ex-post control) are in the range of 3-4 % across the Commission services responsible for the implementation of the previous Framework Programmes for 2017 (including costs for the management of Seventh Framework Programme and Horizon 2020). This is considered to be a reasonable cost in the light of the efforts needed to ensure that objectives are achieved and the number of transactions.

This control strategy is based on:

-procedures for selecting the best projects and translating them into legal instruments;

- project and contract management throughout the lifetime of every project;

-ex-ante checks on 100 % of claims,

- certificates on the financial statements above a certain threshold, and certification on methodologies to calculate unit costs or ex-ante assessment on Large Research Infrastructure on a voluntary basis;

- ex post audits (representative and risk-based) on a sample of paid claims;

- and scientific evaluation of project results.

The first indications from Horizon 2020 audits are that error rates have been maintained well within the expected range (see section 2.2.2). This demonstrates that, even if it can still be further developed, simplification measures already introduced have been effective.

In indirect management, the Commission will make use of the following bodies to implement the budget where this is appropriate and cost-effective and provides strong leverage effect:

- Institutionalised European Partnerships (Article 185 or Article 187 TFEU).

These bodies are subject to regular evaluations to ensure that they remain pertinent to achieving the objectives of the Programme. Control strategies for the supervision of bodies operating under indirect management have been, or will be, developed.

In direct management, the Commission will continue to rely to a large extent on Executive Agencies, established in accordance with the Council Regulation 58/2003. The delegation of activities to the Executive Agencies is subject to a mandatory independent ex-ante Cost-Benefit Analysis and the Executive Agencies undergo regular evaluations performed by external experts. The above mentioned Cost-Benefit Analysis will also consider the costs of control and supervision. Interim evaluations conducted in 2012 and in 2015 confirm the high efficiency and added value of the Executive Agencies in programme implementation.

2.2.2. Information concerning the risks identified and the internal control system(s) set up to mitigate them

The basic funding model to date has been the reimbursement of eligible costs. As the European Court of Auditors has consistently pointed out, most recently in its 2016 Annual Report, 'the principal risk to the regularity of transactions is that beneficiaries declare ineligible costs which are neither detected nor corrected before [reimbursement]. This risk is particularly high for the Seventh Framework Programme, which has complex eligibility rules that are often misinterpreted by beneficiaries (especially those less familiar with the rules, such as SMEs, first-time participants and non-EU entities)'.

The Court recognised the value of the simplifications introduced in Horizon 2020. It did however recommend, in its 2016 Annual Report, the wider use of Simplified Cost Options (SCOs). Such SCOs are already in use in parts of the programme, or for specific types of expenditure.

For grants, the estimated representative rate of error for Seventh Framework Programme was 5 %, with a 'residual' error rate of around 3 %, after taking account

of all recoveries and corrections that have been or will be implemented. However, the error rates were lower in those parts of the programme where it was possible to use Simplified Cost Options (SCOs) more widely and/or where a small and stable group of beneficiaries were involved. This included the European Research Council grants and Marie Curie Actions.

The first results of Horizon 2020 suggest a representative error rate of around 3 %, with a residual error rate less than 2.5 %. Note, however, that this is an early estimate which should be used with care, it is likely to rise, perhaps to the 3-4 % level (the level or error anticipated by the Commission for its Horizon 2020 proposal was 3.5 %, although this did not take account of various additional complexities added during the legislative process). The residual error rate should remain some way below 3 %, it is too early to say whether a rate of 2 % will be attained. The Commission still considers that the error rates for European Research Council grants and Marie Sklodowska-Curie Actions will remain below 2 %.

Some errors arise because beneficiaries have not understood the rules. These errors can be addressed by simplification, although some complexity will always remain. Other errors arise because beneficiaries have not followed the rules. Although this is a minority of cases, simplification of the current rules will not resolve them.

An analysis of error rates[11] has been carried out for the Horizon 2020 audits so far performed shows that:

-Around 63 % of the error relates to errors in the charging of personnel costs. Regular problems identified are incorrect calculation of productive hours; incorrect rates or incorrect number of hours charged.

-Around 22 % of the error relates to other direct costs (not personnel). The most regular error identified is the lack of direct measurement of costs.

-Around 6 % of the error relates to sub-contracting costs, 4 % to travel costs and 5 % to other categories. Note that errors relating to indirect costs, that constitute 28 % of the error in Seventh Framework Programme, have been reduced to almost zero thanks to the introduction of the flat rate to cover the indirect costs.

The errors identified during audits of Horizon 2020 show that some could be avoided by simplifications and the avoidance of unnecessary formalism in rules. Some changes have already been made in Horizon 2020 (new rules for internal invoicing and additional remuneration for example), and others will be be made where possible in Horizon Europe. However, such changes will now be limited in their effect on the error rate, generally only avoiding small errors.

The wider use of SCOs such as flat rates and unit costs, as well as continuing simplification of the rules, will assist in lowering the Horizon 2020 error rate, estimated at 3-4 % on a representative basis in Horizon Europe. However, the underlying problem of errors in a funding method based on the reimbursement of eligible costs remains. In such a system the representative error rate might be reduced to 2.5-3.5 %, with the residual error rate, after corrections, expected to be around (but not necessarily below) 2 %.

Horizon 2020 saw the introduction of lump sum funding for the SME stage 1 scheme (a payment of EUR 50 000 on delivery of a satisfactory scientific deliverable) and,

[11] % of the value in EUR vs all adjustments in direct costs in favour of the EU Budget

by EIT KICs, for the funding of institutional costs related to delivery of EIT Labelled masters programmes. No additional justification for these payments, such as invoices, timesheets, proofs of payment, etc, is required. There are no financial errors.

Lump sum funding was proposed for Horizon 2020 but was considered to be unsuitable or premature. Nevertheless, the Commission is, in the Work Programme 2018, implementing pilot schemes based on lump sum funding. At the same time it has undertaken a number of communication actions to allay the concerns of stakeholders about this form of funding.

The pilot scheme has to be evaluated, especially to see if it achieves all the objectives of the Programme (not just lowering the error rate). But, clearly, wider use of flat rate funding would reduce the error rate. However, it would move the risks to other stages of the internal control system – evaluation will become more important, as will the assessment of the deliverable.

The Horizon Europe proposal allows the Commission to use the lump sum funding model and the Commission intends to use this funding model more widely. However, it is too early to say how widely it can be used. This will depend on the results of the pilots currently under way.

The number of transactions involved means that a high level of systematic ex-ante control would be very expensive. The current control strategy therefore relies on risk-based ex ante controls and ex-post controls to assess the level of error and to detect and recover ineligible amounts. As the error rates have remained within the range established this control strategy is considered to be effective. Further development of some aspects is included, for example the inclusion of systems and processes audit, but radical change is not proposed.

2.2.3. Estimation and justification of the cost-effectiveness of the controls (ratio of "control costs ÷ value of the related funds managed"), and assessment of the expected levels of risk of error (at payment & at closure)

The narrower estimate of the costs of the control system (evaluation, selection, project management, ex-ante and ex-post control) are in the range of 3-4 % across the Commission services responsible for the implementation of the previous Framework Programmes for 2017 (including costs for the management of the Seventh Framework Programme and Horizon 2020). This is considered to be a reasonable cost in the light of the efforts needed to ensure that objectives are achieved and the number of transactions.

The expected risk of error at payment for grants with a funding model based on the reimbursement of ineligible costs is 2.5-3.5 %. The risk of error at closure (after the effect of controls and corrections) is around (but not necessarily below) 2 %.

The expected risk of error for grants with a funding model based on lump sum funding is close to 0 % (at payment and at closure).

The overall expectation for error rates will depend on the balance between the two methods of funding (reimbursement of eligible costs and lump sums). The Commission aims to apply the lump sum funding model where appropriate. However, the main driver to adopt lump sum funding will not be reduction of the error rate, but the achievement of all the objectives of the programme.

This scenario is based on the assumption that the measures of simplification are not subject to substantial modifications in the decision making process.

Note: this section only concerns the process of grant management (in the different management modes), for administrative and operational expenditure implemented through public procurement processes the risk of error at payment and closure should be below 2 %.

2.3. Measures to prevent fraud and irregularities

Specify existing or envisaged prevention and protection measures, e.g. from the Anti-Fraud Strategy.

The services charged with the implementation of the research and innovation budget are determined to fight against fraud at all stages of the grant management process. They have developed, and are implementing, anti-fraud strategies, including an enhanced use of intelligence, especially using advanced IT tools, and training and information for staff. These efforts will continue. Overall the measures proposed should have a positive impact on the fight against fraud, especially the greater emphasis on risk based audit and reinforced scientific evaluation and control.

The current Anti-Fraud Strategy of the Commission services responsible for the implementation of the previous Framework Programmes, covering grants, as well as the anti-fraud strategies relating to other expenditure, will be updated after the revision of the Commission's Anti-Fraud Strategy in 2018. This will also cover risks related to lump sum funding, which has different risks that need to be taken into account.

It should be underlined that detected fraud has been very low in proportion to total expenditure, nevertheless the Directorates General charged with the implementation of the research budget remain committed to combat it.

The legislation will ensure that audits and on-the-spot checks can be carried out by the Commission services, including OLAF, using the standard provisions recommended by OLAF.

3. ESTIMATED FINANCIAL IMPACT OF THE PROPOSAL/INITIATIVE

3.1. Heading of the multiannual financial framework and new expenditure budget line(s) proposed

Heading of multiannual financial framework	Budget line[12]	Type of expenditure	Contribution			
	Heading 1. Single Market, Innovation and Digital	Diff./Non-diff.[13]	from EFTA countries[14]	from candidate countries[15]	from third countries	within the meaning of Article [21(2)(b)] of the Financial Regulation
H1	01.010101 Expenditure related to officials and temporary staff implementing research and innovation programmes – Horizon Europe 01.010102 External personnel implementing research and innovation programmes – Horizon Europe 01.010103 Other management expenditure for research and innovation programmes – Horizon Europe 01.0201 Open Science 01.0202 Global Challenges and Industrial Competitiveness 01.0203 Open Innovation 01.0204 Strengthening the European Research Area	Non-diff. Diff.	YES	YES	YES	NO

[12] The estimated financial impact for operational expenditure is presented at the level of budget articles for the four programme parts. A further breakdown of the budget, based on the strategic planning, might be submitted as part of the annual budgetary procedures.

[13] Diff. = Differentiated appropriations / Non-diff. = Non-differentiated appropriations.

[14] EFTA: European Free Trade Association.

[15] Candidate countries and, where applicable, potential candidates from the Western Balkans.

3.2. Estimated impact on expenditure

3.2.1. Summary of estimated impact on expenditure

EUR million (to three decimal places)

Heading of multiannual financial framework	**1**	Single Market, Innovation and Digital

			2021	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	***Post 2027***	**TOTAL**
Operational appropriations	Commitments	(1)	**11 825.394**	**12 064.784**	**12 307.891**	**12 556.625**	**12 812.890**	**13 070.006**	**13 336.556**		**87 974.145**
	Payments	(2)	**2 787.096**	**6 858.177**	**8 316.885**	**10 284.251**	**11 653.515**	**12 675.793**	**13 334.400**	**22 064.028**	**87 974.145**
01 02 01 Open Science	Commitments	(1a)	3 308.230	3 375.270	3 443.480	3 513.155	3 584.895	3 656.900	3 731.270		**24 613.200**
	Payments	(2a)	779.708	1 918.658	2 326.884	2 877.379	3 260.516	3 546.602	3 730.666	6 172.787	**24 613.200**
01 02 02 Global Challenges and Industrial Competitivenes	Commitments	(1b)	6 516.841	6 648.652	6 782.307	6 919.237	7 060.382	7 201.957	7 349.169		**48 478.545**
	Payments	(2b)	1 535.937	3 779.399	4 583.050	5 667.062	6 421.523	6 984.734	7 347.981	12 158.860	**48 478.545**
01 02 03 Open Innovation	Commitments	(1c)	1 731.049	1 766.131	1 801.820	1 838.279	1 875.818	1 913.494	1 952.410		**12 879.000**
	Payments	(2c)	407.986	1 003.950	1 217.555	1 505.605	1 706.084	1 855.780	1 952.094	3 229.946	**12 879.000**
01 02 04 Strengthening the European Research Area	Commitments	(1d)	269.274	274.731	280.283	285.955	291.794	297.655	303.708		**2 003.400**
	Payments	(2d)	63.465	156.170	189.398	234.206	265.391	288.677	303.659	502.436	**2 003.400**
Appropriations of an administrative nature financed from the envelope of the programme[16]	Commitments = Payments	(3)	**823.606**	**840.216**	**857.109**	**874.375**	**892.110**	**909.994**	**928.444**		**6 125.855**
01 01 01 01 Expenditure related to officials and temporary staff implementing research and innovation programmes - Horizon Europe	Commitments = Payments	(3)	332.455	341.797	351.421	361.335	371.548	382.070	392.912		**2 533.539**

16 Technical and/or administrative assistance and expenditure in support of the implementation of EU programmes and/or actions (former 'BA' lines), indirect research, direct research.

01 01 01 02 External personnel implementing research and innovation programmes - Horizon Europe	Commitments = Payments	(3)	68.862	70.239	71.643	73.076	74.538	76.029	77.549		**511.937**
01 01 01 03 Other management expenditure for research and innovation programmes - Horizon Europe	Commitments = Payments	(3)	422.289	428.181	434.044	439.964	446.024	451.895	457.982		**3 080.380**
TOTAL appropriations for the envelop of the programme	Commitments	=1+3	**12 649.000**	**12 905.000**	**13 165.000**	**13 431.000**	**13 705.000**	**13 980.000**	**14 265.000**		**94 100.000**
	Payments	=2+3	**3 610.702**	**7 698.393**	**9 173.995**	**11 158.626**	**12 545.625**	**13 585.787**	**14 262.844**	**22 064.028**	**94 100.000**

Heading of multiannual financial framework	**7**	'Administrative expenditure'

EUR million (to three decimal places)

		2021	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	***Post 2027***	**TOTAL**
Human resources										
Other administrative expenditure										
TOTAL appropriations under HEADING 7 of the multiannual financial framework	(Total commitments = Total payments)									

EUR million (to three decimal places)

		2021	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	***Post 2027***	**TOTAL**
TOTAL appropriations across HEADINGS of the multiannual financial framework	Commitments	**12 649.000**	**12 905.000**	**13 165.000**	**13 431.000**	**13 705.000**	**13 980.000**	**14 265.000**		**94 100.000**
	Payments	**3 610.702**	**7 698.393**	**9 173.995**	**11 158.626**	**12 545.625**	**13 585.787**	**14 262.844**	**22 064.028**	**94 100.000**

3.2.2. Summary of estimated impact on appropriations of an administrative nature

– ☐ The proposal/initiative does not require the use of appropriations of an administrative nature

– ☑ The proposal/initiative requires the use of appropriations of an administrative nature, as explained below:

EUR million (to three decimal places)

Years	2021	2022	2023	2024	2025	2026	2027	TOTAL
HEADING 7 of the multiannual financial framework								
Human resources								
Other administrative expenditure								
Subtotal HEADING 7 of the multiannual financial framework								
Outside HEADING 7[17] of the multiannual financial framework								
Human resources[18]	401.317	412.035	423.065	434.411	446.086	458.099	470.462	**3 045.475**
Other expenditure of an administrative nature[19]	422.289	428.181	434.044	439.964	446.024	451.895	457.982	**3 080.380**
Subtotal outside HEADING 7 of the multiannual financial framework	823.606	840.216	857.109	874.375	892.110	909.994	928.444	**6 125.855**
TOTAL	**823.606**	**840.216**	**857.109**	**874.375**	**892.110**	**909.994**	**928.444**	**6 125.855**

The administrative appropriations required will be met by the appropriations which are already assigned to management of the action and/or which have been redeployed, together if necessary with any additional

[17] Technical and/or administrative assistance and expenditure in support of the implementation of EU programmes and/or actions (former 'BA' lines), indirect research, direct research.

[18] These figures include only the authorised staff in place in 2020 in Directorates General and do not include the necessary staff that will be needed for executive agencies, Joint Undertakings, and other decentralised bodies, as well as the additional staff paid from the contributions of the future associated countries.

[19] These figures represent the estimated maximum administrative expenditures needed for the implementation of the legal base. These figures include also the subsidies needed by the executive agencies (including staff expenditure) that will implement part of Horizon Europe. In this context, these amounts will be adjusted as a result of the envisaged externalisation procedure.

allocation which may be granted to the managing DG under the annual allocation procedure and in the light of existing budgetary constraints.

3.2.2.1. Estimated requirements of human resources

– ☐ The proposal/initiative does not require the use of human resources.

– ☑ The proposal/initiative requires the use of human resources, as explained below:

Estimate to be expressed in full time equivalent units

Years		2021	2022	2023	2024	2025	2026	2027
• Establishment plan posts (officials and temporary staff)[20]								
Headquarters and Commission's Representation Offices								
Delegations								
Research		2620	2620	2620	2620	2620	2620	2620
• External staff (in Full Time Equivalent unit: FTE) - AC, AL, END, INT and JED[20] [21]								
Financed from HEADING 7 of the multiannual financial framework	- at Headquarters							
	- in Delegations							
Financed from the envelope of the programme[22]	- at Headquarters							
	- in Delegations							
Research		1184	1184	1184	1184	1184	1184	1184
Other (specify)								
TOTAL		**3804**	**3804**	**3804**	**3804**	**3804**	**3804**	**3804**

Description of tasks to be carried out:

Officials and temporary staff	The total number of officials and temporary agents will be used to contribute to the objectives of Horizon Europe during all the process, from the preparation of the Work Programme to the final dissemination of results during 2021-2027.
External staff	The total number of external personnel will assist officials and temporary agents to contribute to the objectives of Horizon Europe during all the process, from the preparation of the Work Programme to the final dissemination of results during 2021-2027.

The human resources required will be met by staff from the DG who are already assigned to management of the action and/or have been redeployed within the DG, together if necessary with any additional allocation which may be granted to the managing DG under the annual allocation procedure and in the light of budgetary constraints.

[20] These figures include only the authorised staff in place in 2020 in Directorates General and do not include the necessary staff that will be needed for executive agencies, Joint Undertakings, and other decentralised bodies, as well as the additional staff paid from the contributions of the future associated countries.

[21] AC= Contract Staff; AL = Local Staff; END = Seconded National Expert; INT = agency staff; JPD= Junior Professionals in Delegations.

[22] Sub-ceiling for external staff covered by operational appropriations (former 'BA' lines).

3.2.3. Third-party contributions

The proposal/initiative:

– ☐ does not provide for co-financing by third parties

– ☑ provides for the co-financing by third parties estimated below:

Appropriations in EUR million (to three decimal places)

Years	2021	2022	2023	2024	2025	2026	2027	TOTAL
Specify the co-financing body								
TOTAL appropriations co-financed[23]	p.m.	p.m.	p.m.	p.m.	p.m.	p.m.	p.m.	p.m.

3.3. Estimated impact on revenue

– ☐ The proposal/initiative has no financial impact on revenue.

– ☑ The proposal/initiative has the following financial impact:

– ☐ on own resources

– ☑ on other revenue

please indicate, if the revenue is assigned to expenditure lines ☑

EUR million (to three decimal places)

Budget revenue line:	Impact of the proposal/initiative						
	2021	2022	2023	2024	2025	2026	2027
Item 6011 Item 6012 Item 6013 Item 6031	p.m.	p.m.	p.m.	p.m.	p.m.	p.m.	p.m.

For assigned revenue, specify the budget expenditure line(s) affected.

01.02XX Appropriations accruing from contributions from third parties

Other remarks (e.g. method/formula used for calculating the impact on revenue or any other information).

Third countries may contribute to the Programme through association agreements. The conditions determining the level of financial contribution will be laid down in association agreements with each country and shall ensure an automatic correction of any significant imbalance compared to the amount that entities established in the associated country receive through participation in the programme, taking into account the costs in managing the programme.

[23] Bilateral Association Agreements are not fixed yet. Contributions from associated countries will come on top of the amounts presented in this Legislative Financial Statement.

Annexes to the proposal

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EUROPEAN
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ANNEXES 1 to 3

ANNEXES

to the

Proposal for a

DECISION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL

on establishing the specific programme implementing Horizon Europe – the Framework Programme for Research and Innovation

ANNEX I

PROGRAMME ACTIVITIES

The following will be applied in the implementation of the Programme.

STRATEGIC PLANNING

The implementation of Horizon Europe's programme-level objectives in an integrated manner will be ensured by multiannual Strategic Planning. Such planning will provide the focus on impact for the Programme overall and coherence between its different pillars, as well as synergy with other EU programmes and support to and from other EU policies.

The Strategic Planning will promote strong engagement with citizens and civil society organisations at all stages of research and innovation, the co-creation of knowledge, effective promotion of gender equality, including the integration of the gender dimension in research and innovation content, and will ensure and promote the adherence to the highest ethics and integrity standards.

It will include extensive consultations and exchanges with Member States, the European Parliament as appropriate, and with various stakeholders about priorities, including missions, under the 'Global Challenges and Industrial Competitiveness' pillar, and the suitable types of action to use, in particular European partnerships.

Based on such extensive consultations, the Strategic Planning will identify common objectives and common areas for activities such as partnership areas (the proposed legal basis sets out only the instruments and criteria that will guide their use) and mission areas.

The Strategic Planning will help to develop and realise the implementation of policy for the relevant areas covered, at EU level as well as complementing policy and policy approaches in the Member States. EU policy priorities will be taken into consideration during the Strategic Planning process to increase the contribution of research and innovation to the realisation of policy. It will also take into account foresight activities, studies and other scientific evidence and take account of relevant existing initiatives at EU and national level.

The Strategic Planning will promote synergies between Horizon Europe and other Union Programmes, including the Euratom programme, thus becoming a point of reference for research and innovation in all related programmes across the EU budget and non-funding instruments. This will also promote faster dissemination and uptake of research and innovation results and avoid duplication and overlaps between funding possibilities. It will provide the frame for linking the direct research actions of the Joint Research Centre and other actions supported under the Programme, including the use of results for support to policy.

A Strategic Plan will lay out a multiannual strategy for realising content in the work programme (as set out in Article 11), while retaining sufficient flexibility to respond rapidly

to unexpected opportunities and crises. As Horizon Europe is a programme for 7 years, the economic, societal and policy context in which it will operate may change significantly during its life-time. Horizon Europe needs to be able to swiftly adapt to these changes. There will therefore be the possibility to include support for activities beyond the descriptions set out below, where this is duly justified, to address major developments or unforeseen events, policy needs, or crisis situations, for example in response to serious threats to health arising for example from epidemics.

In the implementation of Horizon Europe, particular attention will be paid to ensuring a balanced and broad approach to research and innovation, which is not only limited to the development of new products processes and services on the basis of scientific and technological knowledge and breakthroughs, but also incorporates the use of existing technologies in novel applications and continuous improvement and non-technological and social innovation. A systemic, cross-disciplinary, cross-sectoral and cross-policy approach to research innovation will ensure that challenges can be tackled while also giving rise to new competitive businesses and industries, fostering competition, stimulating private investments and preserving the level playing field in the internal market.

In the 'Global Challenges and Industrial Competitiveness' and the 'Open Innovation' Pillars, research and innovation will be complemented with activities which operate close to the end-users and the market, such as demonstration, piloting or proof-of-concept, excluding however commercialisation activities going beyond the research and innovation phase. This will also include support to demand-side activities that help accelerate the deployment and diffusion of a broad range of innovations. Emphasis will be put on non-prescriptive calls for proposals.

Under the 'Global Challenges and Industrial Competitiveness' pillar, building on experience in Horizon 2020, the social sciences and the humanities will be fully integrated across all clusters, including specific and dedicated activities. Likewise, activities involving marine and maritime research and innovation will be implemented in a strategic and integrated manner in line with the EU Integrated Maritime Policy, the Common Fisheries Policy Policies and international commitments.

'FET Flagships' supported under Horizon 2020 will continue to be supported under this Programme. As they present substantial analogies with missions, other 'FET flagships', if any, will be supported under this Framework Programme as missions geared towards future and emerging technologies.

Science and Technology Cooperation dialogues with the EU's international partners and policy dialogues with the main world regions will make important contributions to the systematic identification of opportunities for cooperation which, when combined with differentiation by country/region, will support priority setting.

While the European Institute of Innovation and Technology's (EIT) focus on innovation ecosystems makes it naturally fit within the Open Innovation pillar of Horizon Europe, the planning of the EIT Knowledge and Innovation Communities (KICs) will be aligned through the Strategic Planning process with the Global Challenges and Industrial Competitiveness pillar.

DISSEMINATION AND COMMUNICATION

Horizon Europe will provide dedicated support for open access to scientific publications, to knowledge repositories and other data sources. Dissemination and knowledge diffusion actions will be supported, also from cooperation with other EU programmes, including clustering and packaging results and data in languages and formats for target audiences and networks for citizens, industry, public administrations, academia, civil society organisations, and policy makers. For this purpose, Horizon Europe may make use of advanced technologies and intelligence tools.

There will be appropriate support for mechanisms to communicate the programme to potential applicants (e.g. National Contact Points).

The Commission will also implement information and communication activities relating to Horizon Europe, to promote the fact that results were obtained with the support of EU funding. They will also seek to raise public awareness on the importance of research and innovation and the broader impact and relevance of EU funded research and innovation, by means of e.g. publications, media relations, events, knowledge repositories, databases, multi-channel platforms, websites or a targeted use of social media. Horizon Europe will also provide support to the beneficiaries to communicate their work and its impact to society at large.

EXPLOITATION AND MARKET UPTAKE

The Commission will establish comprehensive measures for exploitation of Horizon Europe results and the knowledge produced. This will accelerate exploitation towards market uptake and boost the impact of the Programme.

The Commission will systematically identify and record the results of the research and innovation activities under the Programme and transfer or disseminate these results and knowledge produced in a non-discriminatory fashion to industry and enterprises of all sizes, public administrations, academia, civil society organisations and policy-makers, in order to maximise the European added value of the Programme.

INTERNATIONAL COOPERATION

Greater impact will be obtained through aligning actions with other nations and regions of the world within an international cooperation effort of unprecedented scale. Based on mutual benefit, partners from across the world will be invited to join EU efforts as an integral part of initiatives in support of EU action for sustainability, reinforced research and innovation excellence, and competitiveness.

International joint action will ensure effective tackling of global societal challenges and Sustainable Development Goals, access to the world's best talents, expertise and resources, and enhanced supply and demand of innovative solutions.

WORKING METHODOLOGIES FOR EVALUATION

The use of high quality independent expertise in the evaluation process underpins the engagement of the programme across all stakeholders, communities and interests, and is a prerequisite for maintaining the excellence and relevance of the funded activities.

The Commission or funding body will ensure the impartiality of the process, and avoid conflicts of interest in line with Article 61 of the Financial Regulation.

Exceptionally, when justified by the requirement to appoint the best available experts and/or by the limited size of the pool of qualified experts, independent experts assisting or being members of the evaluation committee may evaluate specific proposals for which they declare a potential interest. In this case, the Commission or funding body shall take all necessary remedial measures to ensure the integrity of the evaluation process. The evaluation process will be managed accordingly, including a stage involving an interaction between diverse experts. The evaluation committee will take into account the particular circumstances when identifying proposals for funding.

PILLAR I

OPEN SCIENCE

The search for breakthroughs in understanding and the acquisition of knowledge; the world class facilities needed to achieve this including physical and knowledge infrastructures for research and innovation as well as the means to openly disseminate and share knowledge; and an adequate supply of excellent researchers; are at the very heart of economic, social and cultural progress in all its forms.

Open and excellent science is inextricably linked to the achievement of world leading innovation. Scientific and technological paradigm shifts have been identified as key drivers for productivity growth, competitiveness, wealth, sustainable development and social progress. Such paradigm shifts have historically tended to originate from the public-sector science base before going on to lay the foundations for whole new industries and sectors.

Public investment in research, especially through universities and public research institutions (PRIs) and research facilities, often undertakes the longer-term, higher-risk research and complements the activities of the private sector. Besides this it creates skills, knowhow and experience, new scientific instruments and methodologies, as well creating the networks which transmit the latest knowledge.

European science and researchers have been and continue to be at the forefront in many areas. But this is not a position we can take for granted. There is ample evidence to show that as the pace of research continues to grow, so the number of countries competing to be the best is increasing as well. The traditional challenge from countries such as the United States is now being joined by economic giants such as China and India, from the newly industrialising parts of the world in particular, and from all countries where governments recognise the manifold and abundant returns which derive from investing in research.

1. EUROPEAN RESEARCH COUNCIL (ERC)

1.1. Rationale

Although the EU remains the largest producer of scientific publications in the world, it is essentially a 'mass producer' of knowledge with, relative to its size, comparatively few centres of excellence that standout at the world level and with large areas of average and poor performance. Compared with the US and now China to some degree, the EU still tends to follow a 'distributed excellence model' in which resources are spread across a larger number of researchers and research institutions Another challenge is that in many EU countries the public sector still does not offer sufficiently attractive conditions for the best researchers. These factors compound Europe's relative unattractiveness in the global competition for scientific talent.

The global research landscape is evolving dramatically and becoming increasingly multipolar as a result of a growing number of emerging countries, in particular China, expanding their scientific production. So whereas the EU and the United States accounted for nearly two-thirds of world expenditure on research and development in 2000, this share had fallen to less than half by 2013.

The ERC supports the best researchers with flexible, long-term funding to pursue ground breaking, high-gain/high-risk research. It operates autonomously led by an independent Scientific Council made up of scientists, engineers and scholars of the highest repute and appropriate expertise and diversity. The ERC is able to draw on a wider pool of talents and ideas than would be possible for any national scheme, reinforcing excellence through the way in which the best researchers and the best ideas compete against each other.

Frontier research funded by the ERC has a substantial direct impact in the form of advances at the frontiers of knowledge, opening the way to new and often unexpected scientific and technological results and new areas for research. In turn, this generates radically new ideas which drive innovation and business inventiveness and tackle societal challenges. The ERC also has a significant structural impact, driving up the quality of the European research system over and above the researchers and actions it funds directly. ERC-funded actions and researchers set an inspirational target for frontier research in Europe, raising its profile and making it more attractive for the best researchers worldwide as a place to work, and work with. The prestige of hosting ERC grant- holders creates competition between Europe's universities and research organisations to offer the most attractive conditions for top researchers and can indirectly help them to assess their relative strengths and weaknesses and bring about reforms.

The gap between the research performance of the US and the EU countries has narrowed over the 10 years since the ERC was established. The ERC funds a relatively small percentage of all European research, but from this achieves a disproportionally high scientific impact. The average citation impact of the research supported by the ERC is comparable to that of the world's top elite research universities. The ERC's research performance is extremely high when compared with the world's largest research funders. The ERC funds a great deal of frontier research in many of the research areas that have received the highest numbers of

citations, including those areas that are rapidly emerging. Although ERC funding is targeted to frontier research it has resulted in a substantial number of patents.

So there is clear evidence that the ERC attracts and funds excellent researchers through its calls and ERC actions are producing a substantial number of the most significant and high impact research findings worldwide in emerging areas leading to breakthroughs and major advances. The work of ERC grantees is also highly interdisciplinary and ERC grantees collaborate internationally and publish their results openly across all fields of research including the social sciences and humanities.

There is also already evidence of the longer term impacts of ERC grants on careers, on training highly skilled postdocs and PhDs, on raising the global visibility and prestige of European research and on national research systems through its strong benchmarking effect. This effect is particularly valuable in the EU's distributed excellence model because ERC funded status can replace and serve as a more accurate indicator of research quality than recognition based on the status of institutions. This allows ambitious individuals, institutions, regions and countries to seize the initiative and scale up the research profiles in which they are particularly strong.

1.2. Areas of intervention

1.2.1. Frontier Science

Research funded by the ERC is expected to lead to advances at the frontier of knowledge, with scientific publications of the highest quality, to research results with high societal and economic potential impact and with the ERC setting a clear and inspirational target for frontier research across the EU, Europe and internationally. Aiming to make the EU a more attractive environment for the world's best scientists, the ERC will target a measurable improvement in the EU's share of the world's top 1 % most highly cited publications, and aim at a substantial increase in the number of excellent researchers from outside Europe which it funds. ERC funding shall be awarded in accordance with the following well-established principles. Scientific excellence shall be the sole criterion on which ERC grants are awarded. The ERC shall operate on a 'bottom-up' basis without predetermined priorities.

Broad Lines

- Long-term funding to support excellent investigators and their research teams to pursue ground-breaking, high-gain/high-risk research;
- Starting researchers with excellent ideas to make the transition to independence while consolidating their own research team or programme;
- New ways of working in the scientific world with the potential to create breakthrough results and facilitate commercial and social innovation potential of funded research;
- Sharing experience and best practices with regional and national research funding agencies to promote the support of excellent researchers;
- Raising the visibility of ERC programmes.

1.3. Implementation

1.3.1. The Scientific Council

The Scientific Council is the guarantor of the quality of the activity from the scientific perspective and has full authority over decisions on the type of research to be funded.

In the context of the implementation of the framework programme and in order to carry out its tasks, as set out in Article 7, the Scientific Council will:

(1) Scientific strategy:

- establish the overall scientific strategy for the ERC, in the light of scientific opportunities and European scientific needs;
- establish the work programme and develop the ERC's mix of support measures in line with its scientific strategy;
- establish the necessary international cooperation initiatives including outreach activities, to increase the visibility of the ERC for the best researchers from the rest of the world, in line with its scientific strategy.

(2) Scientific management, monitoring and quality control:

- ensure a world-class peer review system based on fully transparent, fair and impartial treatment of proposals by establishing positions on implementation and management of calls for proposals, evaluation criteria, peer review processes including the selection of experts, the methods for peer review and proposal evaluation and the necessary implementing rules and guidelines, on the basis of which the proposals to be funded will be determined under the supervision of the Scientific Council;
- experts shall be appointed on the basis of a proposal from the ERC Scientific Council in the case of ERC frontier research actions;
- ensure that ERC grants are implemented according to simple, transparent procedures that maintain the focus on excellence, encourage initiative and combine flexibility with accountability by continuously monitoring the quality of the operations and implementation;
- review and assess the ERC's achievements and the quality and impact of the research funded by the ERC and make recommendations for corrective or future actions;
- establish positions on any other matter affecting the achievements and impact of the ERC's activities and the quality of the research carried out.

(3) Communication and dissemination:

- raise the global profile and visibility of the ERC by conducting communication and outreach activities including scientific conferences to promote the ERC's activities and achievements and the results of the projects funded by the ERC with the scientific community, key stakeholders and the general public;

- where appropriate, consult with the scientific, engineering and scholarly community, regional and national research funding agencies and other stakeholders.
- regularly report to the Commission on its own activities.

The members of the Scientific Council shall be compensated for the tasks they perform by means of an honorarium and, where appropriate, reimbursement of travel and subsistence expenses.

The President of the ERC will reside in Brussels for the duration of the appointment and devote most of his/her working time[1] to ERC business. He/she will be remunerated at a level commensurate with the Commission's top management and will be provided by the Dedicated Implementation Structure with the necessary support to carry out his or her functions.

The Scientific Council shall elect from amongst its members three Vice-Chairs who shall assist the President in its representation and the organisation of its work. They may also hold the title of Vice-President of the ERC.

Support will be provided to the three Vice-Chairs to ensure adequate local administrative assistance at their home institutes.

1.3.2. Dedicated Implementation Structure

The dedicated implementation structure will be responsible for all aspects of administrative implementation and programme execution, as provided for in the ERC work programme. It will, in particular, implement the evaluation procedures, peer review and selection process in accordance with the strategy established by the Scientific Council and will ensure the financial and scientific management of the grants. The dedicated implementation structure will support the Scientific Council in the conduct of all of its tasks as set out above including the development of its scientific strategy, its monitoring of the operations and its review and assessment of the ERC's achievements as well as its outreach and communications activities, provide access to the necessary documents and data in its possession, and keep the Scientific Council informed of its activities.

In order to ensure an effective liaison with the dedicated implementation structure on strategy and operational matters, the leadership of the Scientific Council and the Director of the dedicated implementation structure will hold regular coordination meetings.

The management of the ERC will be carried out by staff recruited for that purpose, including, where necessary, officials from the EU institutions, and will cover only the real administrative needs in order to assure the stability and continuity necessary for an effective administration.

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[1] In principle at least 80 %.

1.3.3. Role of the Commission

In order to fulfil its responsibilities as set out in Articles 6, 7 and 8 and in the context of its own responsibilities for budget execution, the Commission will:

- ensure the continuity and renewal of the Scientific Council and provide support for a standing Identification Committee for the identification of future Scientific Council members;
- ensure the continuity of the dedicated implementation structure and the delegation of tasks and responsibilities to it taking into account the views of the Scientific Council;
- ensure that the dedicated implementation structure carries out the full range of its tasks and responsibilities;
- appoint the Director and the members of the management of the dedicated implementation structure taking into account the views of the Scientific Council;
- ensure the timely adoption of the work programme, the positions regarding implementing methodology and the necessary implementing rules including the ERC Rules of Submission and the ERC Model Grant Agreement, taking into account the positions of the Scientific Council;
- regularly inform and consult the Programme Committee on the implementation of the ERC activities;
- as responsible for the overall implementation of the Research Framework Programme, monitor the dedicated implementation structure.

2. MARIE SKŁODOWSKA-CURIE ACTIONS (MSCA)

2.1. Rationale

Europe needs a highly-skilled and resilient human capital base in research and innovation that can easily adapt to and find sustainable solutions for future challenges, such as major demographic changes in Europe. To ensure excellence, researchers need to be mobile, collaborate and diffuse knowledge across countries, sectors and disciplines, with the right combination of knowledge and skills to tackle societal challenges and support innovation.

Europe is a scientific powerhouse with around 1.8 million researchers working in thousands of universities, research centres and world-leading companies. However, it is estimated that the EU will need to train and employ at least one million new researchers by 2027 in order to achieve the targets beings set for increased investment in research and innovation. This need is particularly acute in the non-academic sector. The EU must reinforce its efforts to entice more young women and men to a career in research, to attract researchers from third countries, retain its own researchers and reintegrate European researchers working elsewhere back to Europe. In addition, in order to more widely spread excellence, the conditions under which researchers perform must be further improved throughout the European Research Area (ERA). In this respect, stronger links are needed notably with the European Education Area (EEdA), the European Regional Development Fund (ERDF), and European Social Fund (ESF+).

These challenges can best be addressed at EU level due to their systemic nature and to the cross-country effort needed to solve them.

The Marie Skłodowska-Curie Actions (MSCA) focus on excellent research that is fully bottom-up, open to any field of research and innovation from basic research up to market take-up and innovation services. This includes research fields covered under the Treaty on the Functioning of the European Union and the Treaty establishing the European Atomic Energy Community (Euratom). If specific needs arise and additional funding sources become available, the MSCA may target certain activities in specific challenges (incl. identified missions), types of research and innovation institutions, or geographical locations in order to respond to the evolution of Europe's requirements in terms of skills, research training, career development and knowledge sharing.

The MSCA are the main instrument at EU-level for attracting researchers from third countries to Europe, thus making a major contribution to global cooperation in research and innovation. Evidence shows that the MSCA not only have a positive impact on individuals, organisations, and at system level, but also yield high-impact and breakthrough research results while at the same time contributing significantly to societal as well as strategic challenges. Long-term investment in people pays off, as indicated by the number of Nobel Prize winners who have been either former MSCA fellows or supervisors.

Through global research competition between scientists and between host organisations from both the academic and non-academic sector, and through the creation and sharing of high-

quality knowledge across countries, sectors and disciplines, the MSCA contribute notably to the goals of the 'Jobs, growth and investment' agenda, the EU Global Strategy and to the United Nations Sustainable Development Goals.

The MSCA contribute to making the ERA more effective, competitive and attractive on a global scale. This can be achieved by focusing on a new generation of highly-skilled researchers and providing support for emerging talent from across the EU and beyond; by fostering the diffusion and application of new knowledge and ideas to European policies, the economy and society, *inter alia* through improved science communication and public outreach measures; by facilitating cooperation between research-performing organisations; and by having a pronounced structuring impact on the ERA, advocating an open labour market and setting standards for quality training, attractive employment conditions and open recruitment for all researchers.

2.2. Areas of Intervention

2.2.1. Nurturing Excellence through Mobility of Researchers across Borders, Sectors and Disciplines

The EU must remain a reference for excellent research and thus attractive for the most promising researchers, European and non-European alike, at all stages of their careers. This can be achieved by enabling researchers and research-related staff to move and collaborate between countries, sectors and disciplines and thus benefit from high-quality training and career opportunities. This will facilitate career moves between the academic and non-academic sector as well as stimulate entrepreneurial activity.

Broad Lines

– Mobility experiences within or outside Europe for the best or most promising researchers regardless of nationality to undertake excellent research and develop their skills as well as career in both the academic and non-academic sector.

2.2.2. Fostering new Skills through Excellent Training of Researchers

The EU needs a strong, resilient and creative human resource base, with the right combination of skills to match the future needs of the labour market, to innovate and to convert knowledge and ideas into products and services for economic and social benefit. This can be achieved through training researchers to further develop their core research competences as well as enhance their transferable skills such as a creative and entrepreneurial mindset. This will allow them to face current and future global challenges, and improve their career prospects and innovation potential.

Broad Lines

– Training programmes to equip researchers with a diversity of skills relevant to current and future global challenges.

2.2.3. Strengthening Human Capital and Skills Development across the European Research Area

In order to foster excellence, promote cooperation between research-performing organisations and create a positive structuring effect, high-quality training standards, good working conditions and effective career development of researchers need to be more widely spread across the ERA. This will help modernise or enhance research training programmes and systems as well as increasing institutions' worldwide attractiveness.

Broad Lines

- Training programmes to foster excellence and spread best practices across institutions and research and innovation systems;
- Cooperation, production and diffusion of knowledge within the EU and with third countries.

2.2.4. Improving and Facilitating Synergies

Synergies between research and innovation systems and programmes at EU, regional and national level need to be significantly strengthened. This can be achieved in particular through synergies and complementarities with other parts of Horizon Europe such as the European Institute of Innovation and Technology (EIT) and other EU programmes, notably the ESF+, including via a Seal of Excellence.

Broad Lines

- Training programmes and similar research career development initiatives supported through complementary public or private funding sources at regional, national or EU level.

2.2.5. Promoting Public Outreach

The awareness of the programme's activities and the public recognition of researchers need to be enhanced across the EU and beyond, to raise the global profile of the MSCA and to develop a better understanding of the impact of researchers' work on citizens' daily lives, and to encourage young people to embark on research careers. This can be achieved through better dissemination, exploitation and diffusion of knowledge and practices.

Broad Lines

- Public outreach initiatives to stimulate interest in research careers, especially amongst young people;
- Promotion activities to raise the global profile, visibility and awareness of the MSCA;
- Diffusion and clustering of knowledge through cross-project collaboration and other networking activities such as an alumni service.

3. RESEARCH INFRASTRUCTURES

3.1. Rationale

State of the art research infrastructures provide key services to research and innovation communities, playing an essential role in extending the frontiers of knowledge. Supporting research infrastructures at the EU level helps to mitigate what in many cases is the reality of scattered national research infrastructures and pockets of scientific excellence, as well as tackling the low circulation of knowledge across silos.

The overall aim is to endow Europe with world-class sustainable research infrastructures open and accessible to all researchers in Europe and beyond, which fully exploit their potential for scientific advance and innovation. Key objectives are to reduce the fragmentation of the research and innovation ecosystem, avoiding duplication of effort, and better coordinate the development and use of research infrastructures. It is crucial to support open access to research infrastructures for all European researchers as well as, through the European Open Science Cloud (hereafter 'EOSC'), increased access to digital research resources, specifically tackling the currently sub-optimal embracement of open science and open data practises. Equally, the EU needs to tackle the rapid increase of global competition for talent by attracting third country researchers to work with European world-class research infrastructures. Increasing the competitiveness of European industry is also a major objective, supporting key technologies and services relevant for research infrastructures and their users, thus improving the conditions for supply of innovative solutions.

Past framework programmes have made a significant contribution towards the more efficient and effective use of national infrastructures as well as developed with the European Strategy Forum on Research Infrastructures (ESFRI) a coherent and strategy-led approach to policy making on pan-European research infrastructures. This strategic approach has generated clear advantages, including reducing duplication of effort with more efficient overall use of resources, as well as standardising processes and procedures.

EU supported activity will provide added value through: consolidating and optimised existing research infrastructures alongside efforts to develop new infrastructures; establishing the European Open Science Cloud (EOSC) as an effective scalable and sustainable environment for data-driven research; the interconnection of national and regional research and education networks, enhancing and securing high-capacity network infrastructure for massive amounts of data and access to digital resources across borders and domain boundaries; overcoming barriers preventing the best research teams from accessing the best research infrastructures services in the EU; fostering the innovation potential of research infrastructures, focused on technology development and co-innovation as well as increased use of research infrastructures by industry.

And the international dimension of EU research infrastructures must be reinforced, fostering stronger cooperation with international counterparts and international participation in European research infrastructures for mutual benefit.

Activities will contribute to different Sustainable Development Goals (SDGs) such as: SDG 3 – Good Health and Well-Being for People; SDG 7 – Affordable and Clean Energy; SDG 9 – Industry Innovation and Infrastructure; SDG 13 – Climate Action.

3.2. Areas of intervention

3.2.1. Consolidating the Landscape of European Research Infrastructures

The establishment, operation and long-term sustainability of research infrastructures identified by ESFRI is essential for the EU to ensure a leading position in frontier research, the creation and use of knowledge and the competitiveness of its industries.

The European Open Science Cloud (EOSC) should become an effective and comprehensive delivery channel for research infrastructures services and should provide Europe's research communities with the next generation of data services for harvesting, storing, processing (e.g. analytics, simulation, visualisation services) and sharing big science data. The EOSC should also provide researchers in Europe with access to the majority of data generated and collected by research infrastructures as well as to HPC and exascale resources deployed under the European Data Infrastructure (EDI)[2].

The pan-European research and education network will link together and enable remote access to research infrastructures and research resources, by providing interconnectivity between universities, research institutes and research and innovation communities at EU level as well as international connections to other partner networks worldwide.

Broad Lines

- The life-cycle of pan European research infrastructures through the design of new research infrastructures; their preparatory and implementation phase, their early-phase operation in complementarity with other funding sources, as well as the consolidation and optimisation of the research infrastructure ecosystem by monitoring the ESFRI landmarks and facilitating service agreements, evolutions, mergers or decommissioning of pan-European research infrastructures;
- The European Open Science Cloud, including: scalability and sustainability of the access channel; effective federation of European, national, regional and institutional resources; its technical and policy evolution to cope with new research needs and requirements (e.g. usage of sensitive data sets, privacy by design); data inter-operability and compliance with the FAIR principles; and a wide user base;
- The pan-European research and education network underpinning the EOSC and EDI as well as enabling the delivery of HPC/data services in a cloud based environment capable of coping with extreme large data sets and computational processes.

[2] The European Data Infrastructure will underpin the European Open Science cloud by providing world-class High Performance Computing capability, high speed connectivity and leading-edge data and software services.

3.2.2. Opening, Integrating and Interconnecting Research Infrastructures

The research landscape will be significantly enhanced through ensuring openness to key international, national and regional research infrastructures for all EU researchers and integrating their services when necessary so as to harmonise access conditions, improve and enlarge service provision and encourage common development strategy of high tech components and advanced services through innovation actions.

Broad Lines

- Networks that bring together national and regional funders of research infrastructures for the co-funding of trans-national access of researchers;
- Networks of pan EU, national and regional research infrastructures addressing global challenges for the provision of access to researchers as well as for the harmonisation and improvement of the infrastructures' services;
- Integrated networks of research infrastructures for development and implementation of a common strategy/roadmap for technological development required to improve their services through partnership with industry; as well as high-tech components in areas such as scientific instrumentation; and for fostering the use of research infrastructures by industry, e.g. as experimental test facilities.

3.2.3. Reinforcing European Research Infrastructure policy and International Cooperation

Support is needed so that policy makers, funding bodies or advisory groups such as ESFRI are well-aligned towards developing and implementing a coherent and long-term EU strategy on research infrastructures.

Similarly, support to strategic international cooperation will strengthen of the position of European research infrastructures at international level, ensuring their global networking and interoperability and reach.

Broad Lines

- Survey, monitoring and assessment of research infrastructures at EU level, as well as policy studies, communication and training actions, international cooperation actions for research infrastructures, and specific activities of relevant policy and advisory bodies.

PILLAR II

GLOBAL CHALLENGES AND INDUSTRIAL COMPETITIVENESS

Many of the challenges which confront the EU are also global challenges. The scale and complexity of the problems are vast, and need to be matched by the appropriate money, resources and effort in order to find solutions. These are precisely the areas where the EU must work together; smart, flexible and joined-up for the benefit and well-being of our citizens.

Greater impact can be obtained through aligning actions with other nations and regions of the world within an unprecedented international cooperation along the lines indicated by the Sustainable Development Goals and the Paris climate agreement. Based on mutual benefit, partners from across the world will be invited to join EU efforts as an integral part of research and innovation for sustainability.

Research and innovation are key drivers of sustainable growth and industrial competitiveness, and they will contribute to finding solutions to today's problems, to reverse as quickly as possible, the negative and dangerous trend that currently links economic development, the use of natural resources and social issues, and turn it into new business opportunities.

The EU will benefit as user and producer of technologies and industries showcasing how modern industrialised, sustainable inclusive, open and democratic society and economy can function and develop. The growing economic-environmental-social examples of the sustainable industrial economy of the future will be fostered and boosted, be they for: health and well-being for all; or resilient inclusive and secure societies; or available clean energy and mobility; or a digitised economy and society; or a transdisciplinary and creative industry; or space marine or land-based solutions; or food and nutrition solutions; sustainable use of natural resources climate protection and adaptation, all generating wealth in Europe and offering higher quality jobs. Industrial transformation will be crucial.

Research and innovation under this pillar of Horizon Europe is grouped into integrated clusters of activities. Rather than addressing sectors, the investments aim at systemic changes for our society and economy along a sustainability vector. These will only be achieved if all actors, both private and public, engage in co-designing and co-creating research and innovation; bringing together end-users, scientists, technologists, producers, innovators, businesses, educators, citizens and civil society organisations. Therefore, none of the thematic clusters is intended for only one set of actors.

Clusters will develop and apply digital, key enabling and emerging technologies as part of a common strategy to promote the EU's industrial leadership. Where appropriate this will use EU space-enabled data and services.

There will be support to bring technology from lab to market and to develop applications including pilot lines and demonstrators, measures to stimulate market uptake and to boost private sector commitment. Synergies with other programmes will be maximised.

The clusters will boost the quick introduction of first-of-its-kind innovation in the EU through a broad range of embedded activities, including communication, dissemination and exploitation, standardisation as well as support to non-technological innovation and

innovative delivery mechanisms, helping create innovation friendly societal, regulatory and market conditions such as the innovation deals. Pipelines of innovative solutions originating from research and innovation actions will be established and targeted to public and private investors as well as other relevant EU and national programmes.

1. CLUSTER 'HEALTH'

1.1. Rationale

The EU Pillar of Social Rights asserts that everyone has the right to timely access to affordable, preventive and curative health care of good quality. This underlines the EU's commitment to the UN's Sustainable Development Goals calling for universal health coverage for all at all ages by 2030, leaving no one behind, and ending preventable deaths.

A healthy population is vital for a stable, sustainable and inclusive society, and improvements in health are crucial in reducing poverty, in fostering social progress and prosperity, and in increasing economic growth. According to the OECD a 10% improvement in life expectancy is also associated with a rise in economic growth of 0.3-0.4% a year. Life expectancy in the EU increased by 12 years since its establishment as a result of tremendous improvements achieved in the quality of life, education, health and care of its people. In 2015, overall life expectancy at birth was 80.6 years in the EU compared to 71.4 years globally. In the past years, it increased in the EU on average by 3 months annually.

Health research and innovation research and innovation have played a significant part in this achievement but also in improving productivity and quality in the health and care industry. However, the EU continues to face novel, newly emerging or persisting challenges that are threatening its citizens and public health, the sustainability of its health care and social protection systems, as well as the competitiveness of its health and care industry. Major health challenges in the EU include: the lack of effective health promotion and disease prevention; the rise of non-communicable diseases; the spread of antimicrobial drug resistance and the emergence of infectious epidemics; increased environmental pollution; the persistence of health inequalities among and within countries affecting disproportionally people that are disadvantaged or in vulnerable stages of life; the detection, understanding, control, prevention and mitigation of health risks in a rapidly changing social, urban and natural environment; the increasing costs for European health care systems and the progressive introduction of personalised medicine approaches and digitalisation in health and care; and the increasing pressure on the European health and care industry to remain competitive in and by developing health innovation vis-a-vis new and emerging global players.

These health challenges are complex, interlinked and global in nature and require multidisciplinary, cross-sectorial and transnational collaborations. Research and innovation activities will build close linkages between discovery, clinical, epidemiological, environmental and socio-economic research as well as with regulatory sciences. They will harness the combined skills of academia and industry and foster their collaboration with health services, patients, policy-makers and citizens in order to leverage on public funding and ensure the uptake of results in clinical practice as well as in health care systems. They will foster strategic collaboration at EU and international level in order to pool the expertise, capacities and resources needed to create economies of scale, scope and speed as well as to share the expected benefits and financial risks involved.

The research and innovation activities of this global challenge will develop the knowledge base, build the research and innovation capacity and develop the solutions needed for a more effective promotion of health and the prevention, treatment and cure of diseases. Improving

health outcomes will in turn result in increased life expectancy, healthy active lives and productivity of working age people, and sustainability of health and care systems.

Addressing major health challenges will contribute to the EU's policy goals and strategies, notably to the EU Pillar of Social Rights, the EU Digital Single Market, the EU Directive on cross-border healthcare, and the European One Health Action Plan against antimicrobial resistance (AMR), and to the implementation of the relevant EU regulatory frameworks. It will also support the EU's commitment to the United Nation's 2030 Agenda for Sustainable Development and those in the context of other UN organisations and international initiatives, including the global strategies and plans of action of the World Health Organization (WHO).

Activities will contribute directly to the following Sustainable Development Goal (SDGs) in particular: SDG 3 – Good Health and Well-Being for People; SDG13 – Climate Action.

1.2. Areas of Intervention

1.2.1. Health throughout the Life Course

People in vulnerable stages of life (birth, infancy, childhood, adolescence, pregnancy, mature and late adulthood), including people with disabilities or injuries, have specific health needs that require better understanding and tailored solutions. This will allow reducing related health inequalities and improving health outcomes to the benefit of active and healthy ageing throughout the life course, in particular through a healthy start of life reducing the risk of mental and physical diseases later in life.

Broad Lines

- Early development and the aging process throughout the life course;
- Maternal, paternal, infant and child health as well as the role of parents;
- Health needs of adolescents;
- Health consequences of disabilities and injuries;
- Independent and active life for the elderly and/or disabled people;
- Health education and digital health literacy.

1.2.2. Environmental and Social Health Determinants

Improved understanding of health drivers and risk factors determined by the social, economic and physical environment in people's everyday life and at the workplace, including the health impact of digitalisation, pollution, climate change and other environmental issues, will contribute to identify and mitigate health risks and threats; to reducing death and illness from exposure to chemicals and environmental pollution; to supporting environmental-friendly, healthy, resilient and sustainable living and working environments; to promoting healthy lifestyles and consumption behaviour; and to developing an equitable, inclusive and trusted society.

Broad Lines

- Technologies for assessing hazards, exposures and health impact of chemicals, pollutants and other stressors, including climate-related and environmental stressors, and combined effects of several stressors;
- Environmental, occupational, social and behavioural factors impacting physical and mental health and well-being of people and their interaction, with special attention to vulnerable and disadvantaged people;
- Risk assessment, management and communication, supported by improved tools for evidence-based decision-making, including alternatives to animal testing;
- Capacity and infrastructures to collect, share and combine data on all health determinants, including exposure, health and diseases at EU and international level;
- Health promotion and primary prevention interventions.

1.2.3. Non-Communicable and Rare Diseases

Non-communicable diseases (NCDs), including rare diseases, pose a major health and societal challenge and call for more effective approaches in prevention, treatment and cure, including personalised medicine approaches.

Broad Lines

- Diagnostics for earlier and more accurate diagnosis and for patient-adapted treatment;
- Prevention and screening programmes;
- Integrated solutions for self-monitoring, health promotion, disease prevention, and management of chronic conditions and multi-morbidities;
- Treatments or cures, including both pharmacological and nonpharmacological treatments;
- Palliative care;
- Assessment of comparative effectiveness of interventions and solutions;
- Implementation research to scale up health interventions and support their uptake in health policies and systems.

1.2.4. Infectious Diseases

Protecting people against cross-border health threats is a major challenge for public health, calling for effective international cooperation at EU and global level. This will involve prevention, preparedness, early detection, treatment and cure of infectious diseases, and also tackling antimicrobial resistance (AMR) following a 'One Health approach'.

Broad Lines

- Drivers for the emergence or re-emergence of infectious diseases and their spread, including transmission from animals to humans (zoonosis), or from other parts of the environment (water, soil, plants, food) to humans;
- Prediction, early detection and surveillance of infectious diseases, including antimicrobial resistant pathogens, healthcare-associated infections and environmental related factors;
- Vaccines, diagnostics, treatments and cures for infectious diseases, including co-morbidities and co-infections;
- Effective health emergency preparedness, response and recovery measures and strategies, involving communities;
- Barriers to the implementation and uptake of medical interventions in clinical practice as well as in the health system;
- Trans-border aspects of infectious diseases and specific challenges in low- and middle-income countries (LMICs), such as tropical diseases.

1.2.5. Tools, Technologies and Digital Solutions for Health and Care

Health technologies and tools are vital for public health and contributed to a large extent to the important improvements achieved in the quality of life, health and care of people, in the EU. It is thus a key strategic challenge to design, develop, deliver and implement suitable, trustable, safe, and cost-effective tools and technologies for health and care, taking due account of the needs of people with disabilities and the aging society. These include artificial intelligence and other digital technologies, offering significant improvements over existing ones, as well as stimulating a competitive and sustainable health-related industry that creates high-value jobs. The European health-related industry is one of the critical economic sectors in the EU, accounting for 3% of GDP and 1.5 million employees.

Broad Lines

- Tools and technologies for applications across the health spectrum and any relevant medical indication, including functional impairment;
- Integrated tools, technologies and digital solutions for human health, including mobile and telehealth;
- Piloting, large-scale deployment, optimisation, and innovation procurement of health and care technologies and tools in real-life settings including clinical trials and implementation research;
- Innovative processes and services for the development, manufacturing and rapid delivery of tools and technologies for health and care;
- The safety, efficacy and quality of tools and technologies for health and care as well as their ethical legal and social impact;
- Regulatory science for health technologies and tools.

1.2.6. Health Care Systems

Health systems are a key asset of the EU social systems, accounting for 24 million employees in the health and social work sector in 2017. It is a main priority to render health systems accessible, cost-effective, resilient, sustainable and trusted as well as to reduce inequalities, including by unleashing the potential of data-driven and digital innovation for better health and person-centred care building on open European data infrastructures. This will advance the digital transformation of health and care.

Broad Lines

- Reforms in public health systems and policies in Europe and beyond;
- New models and approaches for health and care and their transferability or adaptation from one country/region to another;
- Improving health technology assessment;
- Evolution of health inequality and effective policy response;
- Future health workforce and its needs;
- Improving timely health information and use of health data, including electronic health records, with due attention to security, privacy, interoperability, standards, comparability and integrity;
- Health systems resilience in absorbing the impact of crises and to accommodate disruptive innovation;
- Solutions for citizen and patient empowerment, self-monitoring, and interaction with health and social care professionals, for more integrated care and a user-centred approach;
- Data, information, knowledge and best practice from health systems research at EU-level and globally.

2. CLUSTER 'INCLUSIVE AND SECURE SOCIETY'

2.1. Rationale

The EU stands for a unique way of combining economic growth with social policies, with high levels of social inclusion, shared values embracing democracy, human rights, gender equality and the richness of diversity. This model is constantly evolving and needs to deal with the challenges from amongst other things, globalisation and technological change. Europe also has to respond to the challenges arising from persistent security threats. Terrorist attacks and radicalisation, as well as cyber-attacks and hybrid threats, raise major security concerns and put particular strain on societies.

The EU must promote a model of inclusive and sustainable growth while reaping the benefits of technological advancements, enhancing trust in and promoting innovation of democratic governance, combatting inequalities, unemployment, marginalisation, discrimination and radicalisation, guaranteeing human rights, fostering cultural diversity and European cultural heritage and empowering citizens through social innovation. The management of migration and the integration of migrants will also continue to be priority issues. The role of research and innovation in the social sciences and the humanities in responding to these challenges and achieving the EU's goals is fundamental.

European citizens, state institutions and the economy need to be protected from the continued threats of organised crime, including firearms trafficking, drug trafficking and trafficking in human beings. Strengthening protection and security through better border management is also key. Cybercrime is on the increase and related risks are diversifying as the economy and society digitalise. Europe needs to continue its effots to improve cybersecurity, digital privacy, personal data protection and combat the spread of false and harmful information in order to safeguard democratic and economic stability. Lastly, further efforts are required to limit the effects on lives and livelihoods of extreme weather events which are intensifying due to climate change, such as floods, storms or droughts leading to forest fires, land degradation and other natural disasters, e.g. earthquakes. Disasters, whether natural or man-made, can put at risk important societal functions, such as health, energy supply and government.

The magnitude, complexity and trans-national character of the challenges call multi-layered EU action. Addressing such critical social, political, cultural and economic issues, as well as security challenges, only at national level would carry the danger of inefficient use of resources, fragmented approaches and dissimilar standards of knowledge and capacity.

Security research is part of the wider comprehensive EU response to security threats. It contributes to the capability development process by enabling the future availability of technologies and applications to fill capability gaps identified by policy-makers and practitioners. Already, funding to research through the EU's framework programme has represented around 50% of total public funding for security research in the EU. Full use will be made of available instruments, including the European space programme (Galileo and EGNOS, Copernicus, Space Situational Awareness and Governmental Satellite Communications). Synergies are sought with the activities supported by EU-funded defence research and duplication of funding is avoided. Cross-border collaboration contributes to

developing a European single security market and improving industrial performance, underpinning the EU's autonomy.

Research and Innovation activities in this Global Challenge will be overall aligned with the Commission's priorities on Democratic Change; Jobs, Growth and Investment; Justice and Fundamental Rights; Migration; A Deeper and Fairer European Monetary Union; Digital Single Market. It will respond to the commitment of the Rome Agenda to work towards: "a social Europe" and "a Union which preserves our cultural heritage and promotes cultural diversity". It will also support the European Pillar of Social Rights, and the Global Compact for safe, orderly and regular migration. Security research responds to the commitment of the Rome Agenda to work towards "a safe and secure Europe", contributing to a genuine and effective Security Union. Synergies with the Justice Programme and with the Rights and Values Programme, which support activities in the area of access to justice, victims' rights, gender equality, non-discrimination, data protection and promotion of the European citizenship will be exploited.

Activities will contribute directly to the following Sustainable Development Goals (SDGs) in particular: SDG 1 - No Poverty; SDG 4 - Quality Education; SDG – Decent Work and Economic Growth; SDG 9 – Industry, Innovation and Infrastructure; SDG 10 - Reducing Inequalities; SDG 11- Sustainable Cities and Communities; SDG 16 – Peace, Justice and Strong Institutions.

2.2. Areas of Intervention

2.2.1. Democracy

Trust in democracy and political institutions seems to be receding. Disenchantment with politics is increasingly articulated by anti-establishment and populist parties and a resurgent nativism. This is compounded by socio-economic inequalities, high migration flows and security concerns. Responding to present and future challenges requires new thinking on how democratic institutions at all levels must adapt in a context of greater diversity, global economic competition, rapid technological advancements and digitisation, with citizens' experience of democratic discourses and institutions being crucial.

Broad Lines

- The history, evolution and efficacy of democracies, at different levels and in different forms; digitisation aspects and the effects of social network communication and the role of education and youth policies as cornerstones of democratic citizenship;
- Innovative approaches to support the transparency, responsiveness, accountability effectiveness and legitimacy of democratic governance in full respect of fundamental rights and of the rule of law;
- Strategies to address populism, extremism, radicalisation, terrorism and to include and engage disaffected and marginalised citizens;
- Better understand the role of journalistic standards and user-generated content in a hyper-connected society and develop tools to combat disinformation;

- The role of multi-cultural citizenship and identities in relation to democratic citizenship and political engagement;
- The impact of technological and scientific advancements, including big data, online social networks and artificial intelligence on democracy;
- Deliberative and participatory democracy and active and inclusive citizenship, including the digital dimension;
- The impact of economic and social inequalities on political participation and democracies, demonstrating how reversing inequalities and combatting all forms of discrimination including gender, can sustain democracy.

2.2.2. Cultural Heritage

Cultural heritage is the fabric of our lives, meaningful to communities, groups and societies, giving a sense of belonging. It is the bridge between the past and the future of our societies. It is a driving force of local economies and a powerful source of inspiration for creative and cultural industries. Accessing, conserving, safeguarding and restoring, interpreting and harnessing the full potential of our cultural heritage are crucial challenges now and for future generations. Cultural heritage is the major input and inspiration for the arts, traditional craftsmanship, the cultural, entrepreneurial and creative sectors that are drivers of sustainable economic growth, new job creation and external trade.

Broad Lines

- Heritage studies and sciences, with cutting edge technologies including digital ones;
- Access to and sharing of cultural heritage, with innovative patterns and uses and participatory management models;
- Connect cultural heritage with emerging creative sectors;
- The contribution of cultural heritage to sustainable development through conservation, safeguarding and regeneration of cultural landscapes, with the EU as a laboratory for heritage-based innovation and cultural tourism;
- Conservation, safeguarding, enhancement and restoration of cultural heritage and languages with the use of cutting edge technologies including digital;
- Influence of traditions, behavioural patterns, perceptions and beliefs on values and sense of belonging.

2.2.3. Social and Economic Transformations

European societies are undergoing profound socio-economic transformations, especially as a result of globalisation and technological innovations. At the same time there has been an increase in income inequality in most European countries[3]. Forward-looking policies are needed, with a view to promoting inclusive growth and reversing inequalities, boosting

[3] OECD Understanding The Socio-Economic Divide in Europe, 26 January 2017.

productivity (including advancements in its measurement) and human capital, responding to migration and integration challenges and supporting intergenerational solidarity and social mobility. Education and training systems are needed for a more equitable and prosperous future.

Broad Lines

- Knowledge base for advice on investments and policies especially education and training, for high value added skills, productivity, social mobility, growth, social innovation and job creation. The role of education and training to tackle inequalities;
- Social sustainability beyond GDP only indicators especially new economic and business models and new financial technologies;
- Statistical and other economic tools for a better understanding of growth and innovation in a context of sluggish productivity gains;
- New types of work, the role of work, trends and changes in labour markets and income in contemporary societies, and their impacts on income distribution, non-discrimination including gender equality and social inclusion;
- Tax and benefits systems together with social security and social investment policies with a view to reversing inequalities and addressing the negative impacts of technology, demographics and diversity;
- Human mobility in the global and local contexts for better migration governance, integration of migrants including refugees; respect of international commitments and human rights; greater, improved access to quality education, training, support services, active and inclusive citizenship especially for the vulnerable;
- Education and training systems to foster and make the best use of the EU's digital transformation, also to manage the risks from global interconnectedness and technological innovations, especially emerging online risks, ethical concerns, socio-economic inequalities and radical changes in markets;
- Modernisation of public authorities to meet citizens' expectation regarding service provision, transparency, accessibility, openness, accountability and user centricity.
- Efficiency of justice systems and improved access to justice based on judiciary independence and rule of law principles, with fair, efficient and transparent procedural methods both in civil and criminal matters.

2.2.4. Disaster-Resilient Societies

Disasters arise from multiple sources, whether natural or man-made, including those from terrorist attacks, climate-related and other extreme events (including from sea level rises), from forest fires, heat waves, floods, earthquakes, tsunamis and volcanic events, from water crises, from space weather events, from industrial and transport disasters, from CBRN events, as well as those from resulting cascading risks. The aim is to prevent and reduce the loss of life, harm to health and the environment, economic and material damage from disasters,

ensure food security as well as to improve the understanding and reduction of disaster risks and post-disaster lesson learning.

Broad Lines

- Technologies and capabilities for first responders for emergency operations in crisis and disaster situations;
- The capacities of society to better manage and reduce disaster risk, including through nature-based solutions, by enhancing prevention, preparedness and response to existing and new risks
- Interoperability of equipment and procedures to facilitate cross-border operational cooperation and an integrated EU market.

2.2.5. Protection and Security

There is a need to protect citizens from and to respond to security threats from criminal including terrorist activities and hybrid threats; to protect people, public spaces and critical infrastructure, from both physical (including CBRN-E) attacks and cyber-attacks; to fight terrorism and radicalisation, including understanding and tackling terrorist ideas and beliefs; to prevent and fight serious crime, including cybercrime, and organised crime; to support victims; to trace criminal financial flows; to support the use of data for law enforcement and to ensure the protection of personal data in law enforcement activities; to support air, land and sea EU border management, for flows of people and goods. It is essential to maintain flexibility rapidly to address new security challenges that may arise.

Broad Lines

- Innovative approaches and technologies for security practitioners (such as police forces, border and coast guards, customs offices), public health practitioners, operators of infrastructure and those managing open spaces;
- Human and social dimensions of criminality and violent radicalisation, in relation to those engaged or potentially engaged in such behaviour as well as to those affected or potentially affected;
- The mind-set of citizens, public authorities and industry to prevent the creation of new security risks and to reduce existing risks, including those from new technologies such as Artificial Intelligence;
- Combatting disinformation and fake news with implications for security;
- Interoperability of equipment and procedures to facilitate cross-border and inter-agency operational cooperation and develop an integrated EU market.
- Ensuring the protection of personal data in law enforcement activities, in particular in view of rapid technological developments.

2.2.6. Cybersecurity

Malicious cyber activities not only threaten our economies but also the very functioning of our democracies, our freedoms and our values. Cyber threats are often criminal, motivated by profit, but they can also be political and strategic. Our future security and prosperity depend

on improving our ability to protect the EU against cyber threats. The digital transformation requires improving cybersecurity substantially, to ensure the protection of the huge number of IoT devices expected to be connected to the internet, including those controlling power grids, cars and transport networks, hospitals, finances, public institutions, factories, homes. Europe must build resilience to cyber-attacks and create effective cyber deterrence.

Broad Lines

- Technologies across the digital value chain (from secure components to cryptography and self-healing software and networks);
- Technologies to address current cybersecurity threats, anticipating future needs, and sustaining a competitive industry;
- A European cybersecurity competence network and competence centre.

3. CLUSTER 'DIGITAL AND INDUSTRY'

3.1. Rationale

To ensure industrial competitiveness and the capacity to address the global challenges ahead, the EU must reinforce and maintain its technological and industrial capacities in the key areas that underpin the transformation of our economy and society.

EU industry provides one out of five jobs and two thirds of private sector R&D investments and generates 80% of EU exports. A new wave of innovation, involving a merging of physical and digital technologies, will trigger huge opportunities for EU industry and improve the quality of life for EU citizens.

Digitisation is a major driver. As it continues at a rapid pace across all sectors, investment in priority areas ranging from artificial intelligence to next generation internet, high performance computing, photonics and nano-electronics, becomes essential for the strength of our economy and the sustainability of our society. Investing, producing and using ICT provides a major boost to EU economic growth, amounting to an increase of 30% between 2001 and 2011 alone.

Key enabling technologies[4] underpin the blending of the digital and the physical worlds, central to this new global wave of innovation. Investing in the development, demonstration and deployment of key enabling technologies, and ensuring a secure, sustainable and affordable supply of raw and advanced materials, will secure EU strategic autonomy and help EU industry to significantly reduce its carbon and environmental footprints.

Specific future and emerging technologies may also be pursued as appropriate.

Space is of strategic importance; around 10% of the EU's GDP depends on the use of space services. The EU has a world-class space sector, with a strong satellite manufacturing industry and a dynamic downstream services sector. Space provides important tools for communication, navigation, and surveillance and opens up many business opportunities especially in combination with digital technologies and other sources of data. The EU must make the most of these opportunities by fully exploiting the potential of its space programmes Copernicus, EGNOS and Galileo, and by protecting space and ground infrastructures against threats from space.

The EU has the unique chance of being a global leader and increase its share of world markets, by showcasing how digital transformation, leadership in key enabling and space technologies, the transition to a low-carbon, circular economy and competitiveness can reinforce each other through scientific and technological excellence.

To make the digitised, circular, low-carbon and low-emission economy a reality, action is needed at EU level because of the complexity of value chains, the systemic and multi-disciplinary nature of the technologies and their high development costs, and the cross-sectoral nature of the problems to be addressed. The EU must ensure that all industrial

[4] The Key Enabling Technologies of the future include advanced materials and nanotechnology, photonics and micro- and nano-electronics, life science technologies, advanced manufacturing and processing, artificial intelligence and digital security and connectivity

players, and society at large, can benefit from advanced and clean technologies and digitisation. Developing technologies alone will not suffice. Industrially-oriented infrastructures, including pilot lines, will help set up EU businesses and in particular SMEs deploy these technologies and improve their innovation performance.

A strong engagement of industry is essential in setting priorities and developing research and innovation agendas, increasing the leverage of public funding, and ensuring the uptake of results. Societal understanding and acceptance are key ingredients for success, as well as a new agenda for industry-relevant skills and standardisation.

Bringing together activities on digital, key enabling and space technologies, as well as a sustainable supply of raw materials, will allow for a more systemic approach, and a faster and more profound digital and industrial transformation. It will ensure that research and innovation in these areas feed into, and contribute to the implementation of, the EU's policies for industry, digitisation, environment, energy and climate, circular economy, raw and advanced materials and space.

Complementarity will be ensured with activities under the Digital Europe Programme, to respect the delineation between both Programmes and avoid any overlaps.

Activities will contribute directly to the following Sustainable Development Goals (SDGs) in particular: SDG 8 - Decent Work and Economic Growth; SDG 9 - Industry, Innovation and Infrastructure; SDG 12 - Responsible Consumption and Production; SDG-13 Climate Action.

3.2. Areas of Intervention

3.2.1. Manufacturing Technologies

Manufacturing is a key driver of employment and prosperity in the EU, producing over three quarters of the EU's global exports and providing over a 100 million direct and indirect jobs. The key challenge for EU manufacturing is to remain competitive at a global level with smarter and more customised products of high added value, produced at much lower energy costs. Creative and cultural inputs will be vital to help generate added value.

Broad Lines

- Breakthrough manufacturing technologies such as additive manufacturing, industrial robotics, human integrated manufacturing systems, also promoted via an EU network of industrially-oriented infrastructures;
- Breakthrough innovations using different enabling technologies (e.g. converging technologies, artificial intelligence, data analytics, industrial robotics, bio-manufacturing, advanced batteries technologies) across the value chain;
- Skills and workspaces fully adapted to the new technologies, in line with European social values;
- Flexible, high-precision, zero-defect and zero-waste cognitive plants and smart manufacturing systems meeting customer needs;
- Breakthrough innovations in techniques for exploring construction sites, for full automation for on-site assembly and prefabricated components.

3.2.2. Key Digital Technologies

Maintaining and autonomously developing strong design and production capacities in essential digital technologies such as micro- and nano-electronics, photonics, software and systems, and their integration as well as advanced materials for these applications will be essential for a competitive EU.

Broad Lines

- Nano-electronics design and processing concepts responding to the specific requirements of digital transformation and global challenges, in terms of functionality, energy consumption and integration;
- Sensing technologies and their co-integration with computational units as the enabler of the Internet of Things, including innovative solutions on flexible and conformable materials for human-friendly interacting objects;
- Technologies as complements or alternatives to nano-electronics, such as neuromorphic computing powering artificial intelligence applications, or integrated quantum computing;
- Computing architectures and low-power processors for a wide range of applications including edge computing, digitisation of industry, big data and cloud, smart energy and connected and automated driving;
- Computing hardware designs delivering strong guarantees of trusted execution, with built-in privacy and security protection measures for input/output data as well as processing instructions;
- Photonics technologies enabling applications with breakthrough advances in functionality and performance;
- System engineering technologies to support fully autonomous systems for trustworthy applications interacting with the physical world, including in industrial and safety critical domains;
- Software technologies enhancing software quality, security and reliability with improved service life, increasing development productivity, and introducing built-in artificial intelligence and resilience in software;
- Emerging technologies expanding digital technologies and bridging the gap from proofs of concept in research to industrial feasibility for relevant markets.

3.2.3. Advanced Materials

The EU is a global leader in advanced materials and associated processes, which make up 20% of its industry base and form the root of nearly all value chains through the transformation of raw materials. To remain competitive and meet citizens' needs for sustainable, safe and advanced materials, the EU must improve the recyclability of materials, reduce the carbon and environmental footprint, and drive cross-sectoral industrial innovation by supporting new applications in all industry sectors.

Broad Lines

- Materials (including plastic, bio-, nano-, two-dimensional, smart and multi-materials) designed with new properties and functionalisation and meeting regulatory requirements (while not leading to increased environmental pressures during their production, use or end-of-life);
- Integrated materials processes and production following a customer-oriented and ethical approach, including pre-normative activities and life-cycle assessment, sourcing and management of raw materials, durability, reusability and recyclability, safety, risk assessment and management;
- Materials enablers like characterisation (e.g. for quality assurance), modelling, piloting and upscaling;
- An EU innovation ecosystem of technology infrastructures[5], identified and prioritised in agreement with Member States, which provide services to accelerate technological transformation and uptake by EU industry, notably by SMEs; this will cover all key technologies necessary to enable innovations in the field of materials;
- Analysis of future and emerging trends in advanced materials and other key enabling technologies;
- Solutions based on design, architecture and general creativity, with a strong user orientation, for adding value to industrial sectors and the creative industries.

3.2.4. Artificial Intelligence and Robotics

Making any object and device intelligent is one of the megatrends. Researchers and innovators developing Artificial Intelligence (AI) and offering applications in Robotics and other areas will be key drivers of future economic and productivity growth. Many sectors including health, manufacturing, construction, and farming will use and further develop this key enabling technology, in other parts of the Framework Programme. Developments must ensure the safety of AI-based applications, assess the risks and mitigate its potential for malicious use and unintended discrimination such as gender or racial bias. It must also be ensured that AI is developed within a framework which respects the EU's values and the Charter of Fundamental Rights of the European Union.

Broad Lines

- Enabling AI technologies such as explainable AI, unsupervised machine learning and data efficiency and advanced human-machine interactions;
- Safe, smart and efficient robotics and complex embodied systems;
- User-driven AI technologies for AI-based solutions;

[5] These are public or private facilities that provide resources and services primarily for the European industry to test and validate key enabling technologies and products. Such infrastructures may be single sited, virtual or distributed, and must be registered in a Member State or a third country associated to the Programme.

– Developing and networking the research competences of AI competence centres across Europe;

– Technologies for open AI platforms including software algorithms, data repositories, robotics and autonomous systems platforms.

3.2.5. Next Generation Internet

The Internet has become a key enabler of the digital transformation of all sectors of our economy and society. The EU needs to take the lead in driving the next generation Internet towards a human-centric ecosystem in line with our social and ethical values. Investing in technologies and software for the Next Generation Internet will improve EU industrial competitiveness in the global economy. Optimising EU wide take up will require large-scale cooperation across stakeholders.

Broad Lines

– Technologies and systems for trusted and energy-efficient smart network and service infrastructures (connectivity beyond 5G, software defined infrastructures, Internet of things, cloud infrastructures, cognitive clouds), enabling real-time capabilities, virtualisation and decentralised management (ultrafast and flexible radio, edge computing, blockchains, shared contexts and knowledge);

– Next Generation Internet applications and services for consumers, industry and society building on trust, interoperability, better user control of data, transparent language access, new multi modal interaction concepts, inclusive and highly personalised access to objects, information and content, including immersive and trustworthy media, social media and social networking;

– Software-based middleware, including distributed ledger technologies, working in highly distributed environments, facilitating data mapping and data transfer across hybrid infrastructures with inherent data protection, embedding artificial intelligence, data analytics, security and control in Internet applications and services predicated on the free flow of data and knowledge.

3.2.6. Advanced Computing and Big Data

High Performance Computing and Big Data have become indispensable in the new global data economy, where to out-compute is to out-compete. High Performance Computing and Big Data analytics are critical to support policy making, scientific leadership, innovation and industrial competitiveness, and to maintain national sovereignty.

Broad Lines

– High Performance Computing (HPC): next generation of key exascale and post-exascale technologies and systems (e.g. low-power microprocessors, software, system integration); algorithms, codes and applications, and analytic tools and test-beds; industrial pilot test-beds and services; supporting research and innovation for a world-class HPC infrastructure, including the first hybrid HPC / Quantum computing infrastructure in the EU;

– Big Data: Extreme-performance data analytics; "Privacy by design" in the analysis of personal and confidential Big Data; technologies for full-scale data platforms for re-use of industrial, personal and open data; data management, interoperability and linking tools; data applications for global challenges;

– Reduced carbon footprint of ICT processes, covering hardware, software, sensors, networks, storage and data centres, and including standardised assessments.

3.2.7. Circular Industries

Europe is at the forefront of the global transition towards a circular economy. Europe's industry should become a circular industry: the value of resources, materials and products should be maintained much longer compared to today, even opening up new value chains.

Primary raw materials will continue to play an important role in the circular economy and attention must be paid to their sustainable production. In addition, entirely new materials, products and processes should be designed for circularity. Building a circular industry will have several advantages for Europe: It will lead to a secure, sustainable and affordable supply of raw materials, which will in turn protect the industry against scarcity of resources and price volatility. It will also create new business opportunities and innovative, more efficient ways of producing.

The objective is to develop affordable breakthrough innovations and deploy a combination of advanced technologies and processes so as to extract maximum value from all resources.

Broad Lines

– Industrial symbiosis with resource flows between plants across sectors and urban communities; processes and materials, to transport, transform, re-use and store resources, combining the valorisation of by-products, waste and CO2;

– Valorisation and life-cycle assessment of materials and product streams with use of new alternative feedstocks, resource control, material tracking and sorting;

– Products for enhanced life-cycle performance, durability, upgradeability and ease of repair, dismantling and recycling;

– Recycling industry, maximising potential and safety of secondary materials and minimising pollution, quality downgrading, and quantity dropouts after treatment;

– Elimination of substances of concern in the production and end-of-life phases; safe substitutes, and safe and cost-efficient production technologies;

– Sustainable supply or substitution of raw materials, including critical raw materials, covering the whole value chain.

3.2.8. Low-Carbon and Clean Industries

Industrial sectors, including energy-intensive industries, contribute millions of jobs and their competitiveness is key for the prosperity of our societies. However, they account for 20% of

the global greenhouse gas emissions and have a high environmental impact (particularly in terms of air, water and soil pollutants).

Breakthrough technologies to achieve significant reductions in greenhouse gases and pollutants, often combined with the technologies for circular industry above, will lead to strong industrial value chains, revolutionise manufacturing capacities and improve the global competitiveness of industry; and at the same time make key contributions to our targets for climate action and environmental quality.

Broad Lines

- Process technologies, including heating and cooling, digital tools and large-scale demonstrations for process performance and efficiency; substantial reductions or avoidance of industrial emissions of greenhouse gases and pollutants, including particulate matter;
- Industrial CO2 valorisation;
- Electrification and use of unconventional energy sources within industrial plants, and energy and resource exchanges between industrial plants (for instance via industrial symbiosis);
- Industrial products that require low or zero carbon emissions production processes through the life cycle.

3.2.9. Space

EU space systems and services reduce costs and improve efficiency, offer solutions to societal challenges, increase societal resilience and foster a competitive and sustainable economy. EU support has been instrumental in helping to realise these benefits and impacts. EU space programmes must evolve to remain at the forefront.

The EU will support synergies between space and key enabling technologies (big data, advanced manufacturing, robotics and artificial intelligence); foster a thriving and entrepreneurial and competitive space sector; and help secure non-dependence in accessing and using space in a safe and secure manner. Activities will be roadmap-based, taking account of the ESA harmonisation process and relevant Member States initiatives, and will be implemented with ESA, as appropriate.

Broad Lines

- European Global Navigation Satellite Systems (Galileo and EGNOS): innovative applications, global uptake including international partners, solutions improving robustness, authentication, integrity of services, development of fundamental elements such as chipsets, receivers and antennas, sustainability of supply chains, new technologies (e.g. quantum technologies, optical links, reprogrammable payloads), towards sustained exploitation of services for impact on societal challenges. Next generation systems development for new challenges such as security or autonomous driving;
- Copernicus: innovative applications, global uptake and international partners, robustness and evolution of services, sustainability of supply chains, sensors, systems and mission concepts (e.g. High Altitude Platforms, drones, light

satellites); calibration and validation; sustained exploitation of services and impact on societal challenges; Earth observation data techniques, big data, computing resources and algorithmic tools. Next generation systems development for new challenges such as climate change, and security;

– Space Situational Awareness: robust EU capacity to monitor and forecast state of the space environment e.g. space weather, space debris and near Earth objects, and new service concepts, such as space traffic management, applications and services to secure critical infrastructure in space and on Earth;

– Secure Satellite Communications for EU governmental actors: solutions for the widest possible range of governmental users and associated user equipment in architectural, technological and system solutions for space infrastructure, supporting the EU's autonomy;

– End-to-end satellite Communications for citizens and businesses: cost-effective, advanced satellite communications to connect assets and people in underserved areas, as part of 5G-enabled ubiquitous connectivity and development of the Internet of Things (IoT), and contributing to the Next Generation Internet (NGI) infrastructure. Enhanced ground segment and user equipment, standardisation and interoperability to ensure EU industrial leadership;

– Non-dependence and sustainability of the supply chain: increased technology readiness levels in satellites and launchers; associated space and ground segments, and production and testing facilities. To secure EU technological leadership and autonomy, improved supply chain sustainability, reduced dependence on non-EU critical space technologies and improved knowledge of how space technologies can offer solutions to other industrial sectors;

– Space ecosystem: in-orbit validation and demonstration services, including rideshare services for light satellites; space demonstrators in areas such as hybrid, smart or reconfigurable satellites, in-orbit manufacturing and assembly, launcher reusability, in-orbit servicing and micro-launchers; breakthrough innovations, and technology transfer, in areas such as recycling, green space, artificial intelligence, robotics, digitisation, cost-efficiency, miniaturisation;

– Space science: exploitation of scientific data delivered by scientific and exploration missions, combined with the development of innovative instruments in an international environment; contribution to precursor scientific missions for the evolution of the Space Programme.

4. CLUSTER 'CLIMATE, ENERGY AND MOBILITY'

4.1. Rationale

The intersection of research and innovation on climate, energy and mobility will address in a highly integrated and effective way, one of the most important global challenges for the sustainability and future of our environment and way of life.

To meet the objectives of the Paris Agreement the EU will need to transition to low-carbon, resource-efficient and resilient economies and societies. This will be based on profound changes in technology and services, to the ways in which businesses and consumers behave, as well as involving new forms of governance. Limiting the increase of global average temperature to well below 2°C, and pursuing efforts to limit the temperature increase to 1.5°C, requires rapid progress in decarbonising the energy system and substantially reducing greenhouse-gas (GHG) emissions from the transport sector[6]. It will also need new impetus to accelerate the pace of developing next-generation breakthroughs as well as demonstrating and deploying innovative technologies and solutions, using also the opportunities provided by digital and space technologies. This will be pursued through an integrated approach encompassing decarbonisation, resource efficiency, reduction of air pollution, access to raw materials and circular economy.

Progress in these sectors - but also across the spectrum of EU industry including agriculture, buildings, industrial processes and product use, and waste management - will require continued efforts to better understand the mechanisms of climate change and the associated impacts across the economy and society, exploiting synergies with national activities, other EU types of actions and international cooperation.

Over the past decade, considerable advances have been made in climate science, in particular in observations and data assimilation and climate modelling. However, the complexity of the climate-system and the need to support implementation of the Paris Agreement, the Sustainable Development Goals and EU policies necessitate a reinforced effort to fill the remaining knowledge gaps.

The EU has established a comprehensive policy framework in the Energy Union strategy, with binding targets, legislative acts and research and innovation activities aiming to lead in developing and deploying efficient energy production systems based on renewables.

Transport ensures the mobility of people and goods necessary for an integrated European single market, territorial cohesion and an open and inclusive society. At the same time, transport has significant negative effects on human health, congestion, land, air quality and noise, as well as safety resulting in numerous premature deaths and increased socio-economic costs. Therefore, sustainable mobility and transport networks need to become clean, safe, smart, secure, silent, reliable and affordable, offering a seamless integrated door-to-door service.

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[6] Substantial decarbonisation of other sectors is addressed in other areas of the Horizon Europe Global Challenges and Industrial Competitiveness pillar.

The issues faced by the transport and energy sectors go however beyond the need for emission reduction. There are several challenges to be tackled, including the increasing penetration of digital and space-based technologies, changes in user behaviour and mobility patterns, new market entrants and disruptive business models, globalisation, increasing international competition and an older, more urban and increasingly diverse, population.

Both sectors are major drivers of Europe's economic competitiveness and growth. The EU has upwards of 1.6 million people working in the field of renewables and energy efficiency. Transportation and the storage sectors employ more than 11 million in the EU, accounting for around 5% of GDP and 20% of exports. The EU is a world leader in vehicle, aircraft and vessel design and manufacturing, while patenting of innovative clean energy technologies places the EU in second place worldwide.

Finding new ways to accelerate the deployment of clean technologies and solutions for the decarbonisation of the European economy requires also increased demand for innovation. This can be stimulated through the empowerment of citizens as well as socio-economic and public sector innovation and will lead to approaches broader than technology-driven innovation. Socio-economic research covering inter alia user needs and patterns, foresight activities, environmental, economic, social and behavioural aspects, business cases and models and pre-normative research for standard setting, will also facilitate actions fostering regulatory, financing and social innovation, skills, as well as engagement and empowerment of market players and consumers.

Activities under this Cluster contribute in particular to the goals of the Energy Union, as well as to those of the Digital Single Market, the Jobs, Growth and Investment agenda, the strengthening of the EU as a global actor, the new EU Industrial Policy Strategy, the Circular Economy, the Raw Materials Initiative, the Security Union and the Urban Agenda, as well as the Common Agricultural Policy of the EU as well as EU legal provisions to reduce noise and air pollution.

Activities will contribute directly to the following Sustainable Development Goals (SDGs) in particular: SDG 7 - Affordable and Clean Energy; SDG 9 - Industry, Innovation and Infrastructure; SDG 11 - Sustainable Cities and Communities; SDG 13 - Climate Action.

4.2. Areas of Intervention

4.2.1. Climate Science and Solutions

Effective implementation of the Paris Agreement has to be based on science, requiring continuously updating of our knowledge on the climate-earth system, as well as the mitigation and adaptations options available, allowing for a systemic and comprehensive picture of challenges and opportunities for the EU's economy. On this basis, science-based solutions for a cost-effective transition to a low-carbon, climate-resilient and resource-efficient society will be developed.

Broad Lines

– Knowledge base on the functioning and future evolution of the earth-climate system, as well as associated impacts, risks, and opportunities;

- Decarbonisation pathways, mitigation actions and policies covering all sectors of the economy, compatible with the Paris Agreement and the United Nations Sustainable Development Goals;
- Climate projections and techniques for predictability and climate services for businesses, public authorities and citizens;
- Adaptation pathways and policies for vulnerable ecosystems, critical economic sectors and infrastructure in the EU (local/regional/national), including improved risk assessment tools.

4.2.2. Energy Supply

The EU aims to be world leader in affordable, secure and sustainable energy technologies improving its competitiveness in global value chains and its position in growth markets. Diverse climatic, geographical, environmental and socio-economic conditions in the EU as well as the need to ensure energy security and access to raw materials, dictate a broad portfolio of energy solutions, including of non-technical nature. As regards renewable energy technologies, costs need to decrease further, performance must improve, integration into the energy system must be improved and breakthrough technologies need to be developed. As regards fossil fuels, decarbonising their usage will be essential to meet the climate objectives.

Broad Lines

- Renewable energy technologies and solutions for power generation, heating and cooling, sustainable transport fuels and intermediate carriers, at various scales and development stages, adapted to geographic conditions and markets, both within the EU and worldwide;
- Disruptive renewable energy technologies for new applications and breakthrough solutions;
- Technologies and solutions to reduce greenhouse gas emissions from fossil fuel-based power generation via CO2 capture, utilisation and storage (CCUS).

4.2.3. Energy Systems and Grids

The expected growth of variable electricity production and shift towards more electric heating, cooling and transport dictates the need for new approaches to manage energy grids. Next to decarbonisation, the goal is to ensure energy affordability, security and stability of supply, achieved through investments in innovative network infrastructure technologies and innovative system management. Energy storage in different forms will play a key role in providing services to the grid, also improving and reinforcing network capacities. Exploiting synergies between different networks (e.g. electricity grids, heating and cooling networks, gas networks, transport recharging and refuelling infrastructure, hydrogen, and telecom networks) and actors (e.g. industrial sites, data centres, self-producers) will be crucial for enabling the smart, integrated operation of the relevant infrastructures.

Broad Lines

- Technologies and tools for electricity networks to integrate renewables and new loads such as electro-mobility and heat pumps;
- Pan-European energy network approaches to management;
- Integrated approaches to match renewable energy production and consumption at local level including on islands, based on new services and community initiatives;
- Network flexibility and synergies between the different energy sources, networks, infrastructures and actors;

4.2.4. Buildings and Industrial Facilities in Energy Transition

Buildings and industry installations play an increasingly active role in their interaction with the energy system. Therefore, they are crucial elements in the transition to renewable energy.

Buildings are an important factor for quality of life of citizens. Integrating different technologies, appliances and systems and linking various energy uses, buildings as well as their inhabitants and users represent a very high potential for energy generation, storage and efficiency improvements.

Industries, and especially those that are energy-intensive, could further improve energy efficiency, and favour the integration of renewable energy sources.

Broad Lines

- Electricity and heat between an industrial plant and an energy system operator;
- Tools and infrastructure for process control of production plants to optimise energy flows in interaction with the energy system;
- Relevant processes, design and materials;
- Smart buildings and large mobility hubs (ports, airports, logistic centres) as active elements of wider energy networks and of innovative mobility solutions;
- Buildings life-cycle design, construction, operation and dismantling, taking into account circularity and environmental performance, for energy and resource efficiency, climate resilience, and recycling;
- New business models, approaches and services for renovation financing, enhancement of construction skills, engagement of buildings occupants and other market actors;
- Energy performance of buildings monitoring and optimisation;
- Tools and smart appliances for energy efficiency gains in buildings;
- Renovation processes of existing buildings towards 'Nearly Zero Energy Buildings';

4.2.5. Communities and Cities

It is estimated that by 2050, more than 80% of the EU's population will live in urban areas, consuming the lion's share of available resources, including energy, and being areas particularly vulnerable to the adverse meteorological change impacts worsen by climate change and natural disasters already now and increasingly in the future. A key challenge is to significantly increase the overall energy and resource efficiency as well as climate-resilience of Europe's cities in a holistic fashion, targeting the building stock, energy systems, mobility, climate change, as well as water, soil, air quality, waste and noise. Synergies with ERDF-funded urban policy and actions should be investigated and exploited.

Broad Lines

- City/district energy/mobility systems towards the EU-wide deployment of low-carbon, Positive Energy Districts and zero-emission mobility and logistics by 2050, boosting the global competitiveness of integrated EU solutions;
- Urban planning, infrastructures and systems including mutual interfaces and interoperability, nature-based solutions and the use of digital technologies and space based services and data, taking into account the effects of projected climate change and integrate climate resilience;
- Quality of life for the citizens, safe mobility, urban social innovation, cities' circular and regenerative capacity, reduced environmental footprint and pollution;
- Global cities research agenda.

4.2.6. Industrial Competitiveness in Transport

The shift towards clean technologies, connectivity and automation will depend on the timely design and manufacture of aircraft, vehicles and vessels integrating different technologies and accelerating their introduction. Increasing comfort, efficiency, affordability, while minimising lifecycle impact on the environment, human health and on energy use remain objectives of paramount importance. Innovative, highly capable transport infrastructure is essential for the proper functioning of all transport modes in view of increased mobility demand and rapidly changing technology regimes. An integrated approach to infrastructure and vehicle/vessel/aircraft development deserves particular attention also in order to minimise energy and environmental impact.

Broad Lines

- Merging of physical and digital vehicle/vessel/aircraft design, manufacturing, operations, standardisation, certification and regulations and integration (including integration between digital design and digital manufacturing);
- Vehicle/vessel/aircraft concepts and designs, including their spare parts, using improved materials and structures, efficiency, energy storage and recovery, safety and security features with less environment and health impact.
- On-board technologies and sub-systems, including automated functions, for all modes of transport taking account of relevant infrastructure interface needs and exploring; technological synergies between modes; safety/accidence avoidance

systems and enhancing cybersecurity; developing the human-machine interface;

– New materials, techniques and methods of construction, operations and maintenance of infrastructures, ensuring reliable network availability and full life-cycle approach;

– Infrastructure maintenance, regeneration and upgrading transport integration, interoperability and intermodality.

4.2.7. Clean Transport and Mobility

For the EU to reach its air quality, climate, and energy goals, including a 60% reduction in green-house gas emissions by 2050 as well as noise reduction, will require rethinking the whole mobility system including users, vehicles, fuels and infrastructures. It will also require the deployment of low-emission alternative energies and market uptake of zero-emission vehicles/vessels/aircrafts. In addition to the harmful effects of greenhouse gas emissions, transport contributes significantly to poor air quality and noise in Europe with negative consequences for the health of citizens[7]. Building on progress with electrification and the use of fuel cells for cars, buses and light duty vehicles it is essential to accelerate research and innovation solutions for other sectors such as aviation, maritime and inland navigation and lorries.

Broad Lines

– Electrification of all transport modes (e.g. batteries, fuel cells, hybridisation, etc.) including new technologies for vehicle/vessel/aircraft powertrains, fast charging/refuelling, energy harvesting and user-friendly and accessible interfaces with the charging infrastructure, ensuring interoperability and seamless services provision; development and deployment of competitive, safe, high-performing and sustainable batteries for low and zero-emission vehicles;

– Sustainable new fuels and new smart vehicles/vessels/aircraft for existing and future mobility patterns and supporting infrastructure; technologies and user-based solutions for interoperability and seamless services provision;

– Reducing the impact of mobility on the environment and human health.

4.2.8. Smart Mobility

Smart mobility will help ensure the efficiency, safety and resilience of door-to-door mobility and all its components, in particular by using digital technologies, advanced satellite navigation (EGNOS/Galileo), and artificial intelligence. New technologies will help to optimise the use and efficiency of transport infrastructure and networks, improving multi-modality and connectivity, optimising traffic management and enable innovative transport solutions and services, thus reducing congestion and negative environmental impacts, providing better mobility and logistics services for citizens and businesses. Connected and

[7] Around one-third of EU citizens live in urban areas with concentration levels of pollutants above legal thresholds

automated mobility together with the enabling infrastructure will improve efficiency and safety in all transport modes..

Broad Lines

- Digital network-and traffic management: advanced decision support systems; next generation traffic management (including multi-modal network and traffic management); contributing to seamless, multimodal and interconnected mobility for passengers and freight; use and limitations of big data; use of innovative satellite positioning/navigation (EGNOS/Galileo);
- Single European Sky: solutions for higher degrees of automation, connectivity, safety, interoperability, performance, emission reduction and service;
- Rail technologies and operations for a high-capacity, silent, interoperable, and automated railway system;
- Connected, cooperative and automated mobility systems and services, including technological solutions and non-technological issues.

4.2.9. Energy Storage

Massive, concentrated and decentralised storage solutions (comprising chemical, electrochemical, electrical, mechanical and thermal) for the energy system will increase efficiency, flexibility, technology independence and accessibility as well as the security of supply. Low-emission, decarbonised transport will require a growing share of electrical and/or other alternatively fuelled vehicles, with better-performing and cheaper, recyclable and reusable batteries, as well as local provision of synthetic/renewable fuels such as hydrogen and innovative solutions for on-site storage.

Broad Lines

- Technologies including liquid and gaseous renewable fuels and their associated value chains, for daily to seasonal energy storage needs;
- Batteries and the EU value chain, including design, large-scale battery cell production technologies, reuse and recycling methods;
- Low zero-carbon hydrogen including fuel cells, and the EU value chain from design to end use across various applications.

5. CLUSTER 'FOOD AND NATURAL RESOURCES'

5.1. Rationale

Human activities are exerting increasing pressure on soils, seas and oceans, water, air, biodiversity and other natural resources. Nourishing the planet's growing population is directly dependent on the health of natural systems and resources. However, combined with climate change, humanity's growing demand for natural resources creates environmental pressures that go far beyond sustainable levels, affecting ecosystems and their capacity to provide services for human well-being. The concepts of the circular economy, the bioeconomy and the blue economy provide an opportunity to balance environmental, social and economic goals and to set human activities on a path to sustainability.

Meeting the goals of sustainable development, guaranteeing the production and consumption of safe and healthy food, promoting sustainable practices in agriculture, aquaculture, fisheries and forestry, ensuring access to clean water, soil and air for all, cleaning up the seas and oceans, preserving and restoring the planet’s vital natural systems and environment requires that we harness the potential of research and innovation. But the pathways for the transition to sustainability and ways to overconme reslient barriers are hardly understood. Making the transition to sustainable consumption and production and restoring planetary health requires investing in technologies, new business models, and social and environmental innovation. This creates new opportunities for a sustainable, resilient, innovative and responsible European economy, boosting resource efficiency, productivity and competitiveness, and generating jobs and growth.

Activities will build a knowledge base and deliver solutions to: sustainably manage and use natural resources from land and sea - and enhance the role of terrestrial and aquatic systems as carbon sinks; ensure food and nutrition security, providing safe, healthy and nutritious diets; accelerate the transition from a fossil-based linear economy to a resource efficient, resilient, low emission, low-carbon circular economy, and supporting the development of a sustainable bio-based economy and the blue economy; and develop resilient and vibrant rural, coastal and urban areas.

They will help to maintain and enhance the provision of biodiversity and secure the long-term provision of ecosystem services, climate adaptation and carbon sequestration (both on land and sea). They will help reduce greenhouse gas (GHG) and other emissions, waste and pollution from primary production (both terrestrial and aquatic), processing, consumption and other human activities. They will trigger investments, supporting the shift towards a circular economy, bioeconomy and blue economy, whilst protecting environmental health and integrity.

They will also foster participatory approaches to research and innovation, including the multi-actor approach and develop knowledge and innovation systems at local, regional, national and European levels. Social innovation with citizens' engagement and trust in innovation will be crucial to encourage new governance, production and consumption patterns.

As these challenges are complex, interlinked and global in nature, activities will follow a systemic approach, cooperating with Member States and international partners, with other funding sources and with other policy initiatives. This will involve user-driven exploitation of

environmental big data sources, such as those from Copernicus, EGNOS/Galileo, INSPIRE, EOSC, GEOSS, CEOS, EMODnet.

Research and innovation activities under this Cluster contribute in particular to the implementation of the goals of: the Environmental Action Programme, the Common Agricultural Policy, the Common Fisheries policy, the Food Law legislation, the Maritime policy, the Circular Economy Action Plan, the EU Bioeconomy Strategy, and the 2030 climate and energy framework as well as EU legal provisions to reduce air pollution.

Activities will contribute directly to the following Sustainable Development Goals (SDGs) in particular: SDG 2 – Zero Hunger; SD 6 - Clean Water and Sanitation; SDG 11 – Sustainable Cities and Communities; SDG 12 - Responsible Consumption and Production; SDG 13 – Climate Action; SDG 14 – Life Below Water; SDG 15 - Life on Land.

5.2. Areas of intervention

5.2.1. Environmental Observation

The capacity to observe the environment underpins research and innovation[8] for the sustainable use and monitoring of food and natural resources. Improved spatio-temporal coverage and sampling intervals at reduced cost, as well as big data access and integration from multiple sources provide new ways to monitor, understand and predict the Earth system. There is a need for a wider deployment, exploitation and update of new technologies and continued research and innovation to address gaps in Earth Observation (EO) on land and sea and in the atmosphere, collaborating in particular through the Global Earth Observation System of Systems (GEOSS) and its European component EuroGEOSS.

Broad Lines

- User driven and systemic approaches including open data, to environmental data and information for complex modelling and predictive systems;
- Extension of the Copernicus product and service portfolio;
- Biodiversity status, ecosystem protection, climate mitigation and adaptation, food security, agriculture and forestry, land use and land use change, urban and peri-urban development, natural resources management, ocean exploitation and conservation, maritime security, and other relevant domains;
- User oriented applications including their scaling up, to contribute to the management of European natural resources and ecosystems services and their related value chain.

[8] Earth Observation will support research and innovation under other intervention areas within this Global Challenge as well as other relevant parts of Horizon Europe.

5.2.2. Biodiversity and Natural Capital

Improved understanding of biodiversity and ecosystems, the multiple services they provide and planetary 'boundaries' as well as solutions harnessing nature's power and complexity is needed to address societal challenges, to enhance sustainability and to attain the EU objective of 'Living well within the limits of our planet' by 2050 as laid down in the 7th EU Environmental Action Programme. Due account must be taken throughout whole value chains of potential upstream impacts. International cooperation and contribution to international efforts and initiatives, such as the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, are essential to achieve the objectives in this area. There is a need to better understand the governance of the transition to susntainability in the eceonomic, social and natural system, from the local to the global level.

Broad Lines

- The state and value of biodiversity, terrestrial and marine ecosystems, natural capital and ecosystem services;
- Holistic and systemic approaches within a socio-ecological framework for the links between biodiversity, ecosystems and ecosystems services and their causality relationships with drivers of change, across different scales and economic activities, including the governance of transition processes to sustainability;
- Modelling of trends and integrated scenarios for biodiversity, ecosystem services and good quality of life at different scales and horizons; the potential contribution of biotopes and ecosystems as carbon sinks under various climate change scenarios;
- Ecotoxicology of compounds and new pollutants, their interactions and environmental behaviour, and altered biochemical loops under changing climate;
- Mainstreaming biodiversity and ecosystem services in decision-making frameworks and accounting systems of governments and businesses, as well as quantification of their benefits;
- Adaptable and multi-functional nature-based solutions, addressing challenges in cities, rural and coastal areas related to climate change, natural disasters, biodiversity loss, ecosystem degradation, pollution, and citizens' health and well-being;
- Multi-actor living labs approaches engaging authorities, stakeholders, business and civil society in co-designing and co-creating systemic solutions for the preservation, restoration and sustainable use of natural capital the governance of the transition to sutainabilty and sustainable management options in economic activities throughout whole value loops.

5.2.3. Agriculture, Forestry and Rural Areas

Resilient and sustainable farming and forestry systems provide economic, environmental and social benefits in a changing context for primary production. In addition to contributing to food and nutrition security, they feed into dynamic value chains, manage land and natural

resources as well as deliver a range of vital public goods including carbon sequestration, biodiversity preservation, pollination and public health. Integrated approaches are needed to promote the multiple functions of agro- and forest (eco)systems taking into account the changing context for primary production, notably in relation to climate and environment, resource availability, demography and consumption patterns. It is also necessary to address the spatial and socio-economic dimension of agriculture and forestry activities and mobilise the potential of rural areas.

Broad Lines

- Methods, technologies and tools for sustainable and resilient production in farming and forestry;
- Sustainable management and efficient use of natural resources (e.g. soils, water, nutrients and biodiversity including genetic resources) in agriculture and forestry; alternatives to fossil-based resources and adoption of circular economy principles;
- Climate and environmental impact of activities in the primary sector; potential of agriculture and forestry as carbon sinks and for mitigation of greenhouse gas emissions including negative emissions approaches;
- Plant pests and diseases and animal health and welfare; alternatives to the use of contentious pesticides, antibiotics and other substances;
- Antimicrobial resistance and threats from biological and agrochemical hazards as well as chemical contaminants tackling the links between plant, animal , ecosystems and public health from One-Health and Global-Health perspectives;
- The use and delivery of ecosystems services in agriculture and forestry systems applying ecological approaches and testing nature-based solutions from farm to landscape levels for an environmentally friendly agriculture;
- Agricultural and forestry systems from farm to landscape levels; the use and delivery of ecosystem services in primary production;
- Innovations in farming at the interfaces between agriculture, aquaculture and forestry and in urban areas;
- Land use, rural development and territorial linkages; capitalising on the social, cultural, economic and environmental assets of rural areas for new services, business models, value chains and public goods;
- Digital innovations in farming, forestry and across value chains and rural areas through the use of data and development of infrastructures, technologies and governance models;
- Agricultural knowledge and innovation systems and their interconnection at various scales; advice, building skills and information sharing.

5.2.4. Sea and Oceans

Seas and oceans' natural capital and ecosystem services offer significant socio-economic and welfare benefits. This potential is at risk because of the severe pressure from human and natural stressors such as pollution, overfishing, climate change, sea-level rise and extreme weather events. To prevent seas and oceans from reaching a point of no return, it is necessary to strengthen our knowledge and understanding in order to sustainably manage, protect and restore marine and coastal ecosystems and prevent marine pollution, in a context of an improved and responsible ocean governance framework. This will also include research to sustainably unlock the vast and unexploited economic potential of seas and oceans aiming at producing more food without increasing pressures on them, and also contribute to alleviate pressure on land, freshwater and ocean resources. There is a need for partnering approaches, including sea basin and macro-regional strategies, extending beyond the EU (e.g. in the Mediterranean, the Baltic, the Black Sea, the Atlantic, the Caribbean Sea and in the Indian Ocean); and for contributing to International Ocean Governance commitments, initiatives like the United Nations Decade of Ocean Science for Sustainable Development and commitments linked to the conservation of marine biological diversity in areas beyond national jurisdiction.

Broad Lines

- Sustainable sea and ocean farming, fisheries and mariculture for food, including alternative sources of protein with increased food security, food sovereignty and climate resilience;
- Strengthened resilience of marine ecosystems thereby ensuring seas and ocean health, combating and mitigating the effects of natural and human pressures like pollution and plastics, eutrophication, acidification, seas and oceans warming, sea level rise, considering the intersection between land and sea and fostering a circular approach;
- Ocean governance at global and regional levels to ensure conservation and sustainable use of the seas and oceans resources;
- Technologies for the digital ocean (seafloor, water column and water surface) connecting services and communities in land-based, climate, space and weather related activities, and promoted through the Blue Cloud as part of the European Open Science Cloud;
- Monitoring and predictive/forecasting capacities including sea-level rise and other natural hazards e.g. storms surges, tsunamis;
- Blue value-chains, the multiple-use of marine space and growth of the renewable energy sector from seas and oceans, including sustainable micro- and macro- algae;
- Nature-based solutions based on marine and coastal ecosystem dynamics, biodiversity and multiple ecosystem services, which will enable systemic approaches to sustainably use the resources of seas and oceans, contribute to environmental protection, coastal management, and adaptation to climate change;
- Blue innovation including in the blue and digital economies, across coastline areas, coastal cities and ports in order to strengthen resilience of coastal areas and increase citizens' benefits.

– Better understanding of the role of oceans for climate change mitigation and adaptation.

5.2.5. Food Systems

The combined effects of population growth, resource scarcity and overexploitation, environmental degradation, climate change and migration create unprecedented challenges which require food system transformation (FOOD 2030).[9] Current food production and consumption are largely unsustainable while we are confronted with the double burden of malnutrition, characterised by the coexistence of undernutrition and obesity. Future food systems need to deliver sufficient safe, healthy and quality food for all, underpinned by resource efficiency, sustainability (including the reduction of GHG emissions, pollution and waste production), linking land and sea, reducing food waste, enhancing food production from the seas and oceans and encompassing the entire 'food value chain' from producers to consumers – and back again. This needs to go hand in hand with development of the food safety system of the future and the design, development and delivery of tools, technologies and digital solutions that provide significant benefits for consumers and improve the competitiveness and sustainability of the food value chain. Furthermore, there is a need to foster behavioural changes in food consumption and production patterns as well as to engage primary producers, industry (including SMEs), retailers, food service sectors, consumers, and public services. *Broad Lines*

– Sustainable and healthy diets for people's well-being across their lifespan;

– Personalised nutrition especially for vulnerable groups, to mitigate the risk factors for diet-related and non-communicable diseases;

– Consumers' behaviour, lifestyle and motivations, promoting social innovation and societal engagement for better health and environmental sustainability throughout the entire food value chain;

– Modern food safety and authenticity systems, enhancing consumer confidence in the food system;

– Food system mitigation of and adaptation to climate change, including the exploration of the potential and use of the microbiome, forgotten crops, alternative proteins;

– Environmentally sustainable, circular and resource efficient food systems from land and sea, towards zero food waste throughout the entire food system, through reuse of food and biomass, recycling of food waste, new food packaging, demand for tailored and local food;

– Innovation and food systems for place-based innovation and empowerment of communities, fostering fair trade and pricing, inclusiveness and sustainability through partnerships between industry, local authorities, researchers and society.

[9] SWD(2016) 319 final: European Research and Innovation for Food and Nutrition Security

5.2.6. Bio-based Innovation Systems

Bio-based innovation lays the foundations for the transition away from a fossil-based economy by encompassing the sustainable sourcing, industrial processing and conversion of biomass from land and sea into bio-based materials and products. It also capitalises on the potential of living resources, life sciences and industrial biotechnology for new discoveries, products and processes. Bio-based innovation, including technologies, can bring new economic activities and employment to regions and cities, contribute to revitalising rural and coastal economies and strengthen the circularity of the bioeconomy.

Broad Lines

- Sustainable biomass sourcing and production systems, focusing on high-value applications and uses, social and environmental sustainability, impact on climate and biodiversity reduction targets and overall resource efficiency;
- Life sciences and their convergence with digital technologies for prospecting, understanding and sustainably use biological resources;
- Bio-based value chains, materials, including bio-inspired materials, products and processes with novel qualities, functionalities and improved sustainability (including reducing greenhouse gases emissions), fostering the development of advanced biorefineries using a wider range of biomass;
- Biotechnology, including cross sectoral cutting-edge biotechnology, for application in competitive, sustainable and novel industrial processes, environmental services and consumer products[10];
- Circularity of the bio-based economy through technological, systemic, social and business model innovation to radically increase the value generated per unit of biological resources, keeping the value of such resources in the economy for longer and supporting the principle of the cascading use of sustainable biomass through research and innovation;
- Inclusive bioeconomy patterns with different actors participating in the creation of value, maximising societal impact.
- Increased understanding of the boundaries of the bio-based economy and its synergies and trade-offs with a healthy environment.

5.2.7. Circular Systems

Circular production and consumption systems will provide benefits to the European economy by reducing resource dependency and increasing the competitiveness of enterprises, and to European citizens by creating new job opportunities and reducing pressures on the environment and climate. Beyond industrial transformation, the transition to a low-emission, resource efficient and circular economy will also need a broader system shift that requires systemic eco-innovative solutions, new business models, markets and investments, enabling infrastructure, social innovation changes in consumer behaviour, and governance models stimulating multi-stakeholder collaboration to ensure that the intended system change

[10] Health biotechnology applications will be addressed by the Health cluster under this pillar.

achieves better economic, environmental and social outcomes[11]. Opening for international cooperation will be important for comparability, generating and sharing knowledge and avoiding duplication of efforts, e.g. through international initiatives such as the International Resource Panel.

Broad Lines

- Systemic transition to a resource-efficient and circular economy, with new paradigms in consumer interaction, new business models for resource efficiency and environmental performance; products and services stimulating resource efficiency during the whole lifecycle; systems for sharing, reuse, repair, remanufacturing, recycling and composting;
- Metrics and indicators for measuring the circular economy and life cycle performance; governance systems which accelerate expansion of the circular economy and resource efficiency while creating markets for secondary materials; multi-stakeholder and cross-value chain collaboration; instruments for investment in the circular economy;
- Solutions for sustainable and regenerative development of cities, peri-urban areas and regions, integrating the circular economy transformation with nature-based solutions, technological, digital, social, cultural and territorial governance innovations;
- Eco-innovation for prevention and remediation of environmental pollution from hazardous substances and chemicals of emerging concern; looking also at the interface between chemicals, products and waste;
- Circular use of water resources, including reduction of water demand, prevention of losses, water reuse, recycling and valorisation of wastewater and governance models for smart water allocation, addressing sources of pollution and tackling other pressures on water resources.

[11] The activities in Circular Systems Area of Intervention are complementary to those of Low-Carbon and Clean Industry in the Digital and Industry cluster.

6. NON-NUCLEAR DIRECT ACTIONS OF THE JOINT RESEARCH CENTRE

6.1. Rationale

High-quality and trusted scientific evidence is essential for good public policies. New initiatives and proposals for EU legislation need transparent, comprehensive and balanced evidence, whereas implementation of policies needs evidence to measure and monitor their impact and progress.

The JRC adds value to EU policies because its science is excellent, multi-disciplinary and independent of national, private and other external interests. Serving all areas of EU policy, it provides the cross-sectoral support that policymakers need to tackle increasingly complex societal challenges. The JRC's independence from special interests combined with its scientific-technical reference role enable it to facilitate consensus building between stakeholders and policy makers and to help diffusing sensitive situations. With its capacity to respond rapidly to policy needs, the JRC's activities are complementary with indirect actions aiming at supporting longer term policy objectives.

The JRC performs its own research and is a strategic manager of knowledge, information, data and competences to deliver high quality and relevant evidence for smarter policies. To achieve this, the JRC works together with the best organisations world-wide, and with international, national and regional stakeholders. Its research contributes to the general objectives and priorities of Horizon Europe and is focussed on European policy priorities, supporting a Europe that is safe and secure, prosperous and sustainable, social and stronger on the global scene.

6.2. Areas of intervention

6.2.1. Strengthening the knowledge base for policy making

Knowledge and data are growing exponentially. If policy makers are to make sense and use of this they must be reviewed and filtered. There is also a need for cross-cutting scientific methods and analytical tools for use by all Commission services, especially to anticipate upcoming societal challenges and support better regulation. This includes innovative processes to engage stakeholders and citizens in policy-making issues.

Broad Lines

- Modelling, micro-economic evaluation, risk assessment methodologies, quality assurance tools for measurements, design of monitoring schemes, indicators and scoreboards, sensitivity analysis and auditing, lifecycle assessment, data and text mining, (big) data analytics and applications, design thinking, horizon scanning, anticipation and foresight studies, behavioural research, and stakeholders and citizen engagement;
- Knowledge and competence centres;
- Communities of practice and knowledge sharing platforms;
- Data management, data sharing and coherence.

6.2.2. Global Challenges

The JRC will contribute to the specific EU policies and commitments addressed by the five Global Challenges clusters, notably the EU's commitment to the Sustainable Development Goals.

Broad Lines

1. Health

- Scientific and technical policy support for improved public health and health care systems, including medical devices and health technology assessments, databases, digitisation;
- Safety assessment methods for potential health and environmental risks posed by chemical substances and pollutants;
- EU Reference Laboratory for Alternatives to Animal Testing;
- Quality assurance tools such as certified reference materials for health biomarkers;
- Research on newly emerging health issues and health threats.

2. Inclusive and secure society

- Research on inequality, poverty and exclusion, social mobility, cultural diversity, and skills; assessment of social, demographic and technological transformations on the economy and on society;
- Support to the preservation of cultural heritage;
- Knowledge centre for migration and demography;
- Knowledge centre for disaster risk management;
- Support to security policies in the areas of protection of critical infrastructures and public spaces, CBRN-E (Chemical, Biological, Radiological, Nuclear, and Explosive materials) and hybrid threats, border protection and document security, and information and intelligence for countering terrorism;
- Technologies for CBRN-E materials detection, biometric systems, and intelligence-gathering techniques;
- Support to the EU's security position in the world; assessment of competitiveness and innovation of the Union defence industry; exploitation of security-defence synergies;
- Research for reinforced Cybersecurity capabilities, cyber-resilience, and cyber-deterrence.

3. Digital and Industry

- Implications of digitisation, with a focus on new and emerging ICT technologies such as machine learning and artificial computing, distributed ledgers, Internet of Things, and High-Performance Computing;
- Digitisation in individual sectors, such as energy, transport, construction, health and government;
- Industrial metrology and quality assurance tools for smart manufacturing;

- Research on nanotechnology and other Key Enabling Technologies;
- Research on best available techniques and environmental management practices, techno-economic analyses and life cycle assessment of industrial processes, waste management, water reuse, raw materials, critical raw materials and quality criteria for recovered materials, all supporting circular economy;
- Implementation of Copernicus actions;
- Technical and scientific support for applications of the EU Global Navigation Satellite System Programmes.

4. Climate, Energy and Mobility

- Support to implementation of the EU climate, energy and transport policies, transition to a low-carbon economy and strategies for decarbonisation towards 2050; analysis of integrated national climate and energy plans; assessment of decarbonisation pathway in all sectors, including agriculture and Land Use Land Use Change and Forestry;
- Assessment of risks in vulnerable ecosystems and critical economic sectors and infrastructure, with focus on adaptation strategies;
- Analysis of the R&I dimension of Energy Union; assessment of EU competitiveness in the global clean energy market;
- Assessment of deploying renewables and clean energy production technologies;
- Analysis of energy use of buildings, smart and sustainable cities, and industries;
- Technical and socio-economic analysis of energy storage, particularly sector coupling and batteries;
- Analysis of the EU's energy security of supply, including energy infrastructure, and energy markets;
- Support to energy transition, including the Covenant of Mayors, clean energy for EU Islands, sensitive regions, and Africa;
- Integrated analysis for deployment of Cooperative, Connected and Automated Mobility;
- Integrated analysis for development and deployment of the next generation of battery technologies;
- Harmonised test procedures and market surveillance for CO2 and air pollutant emissions from vehicles, assessment of innovative technologies;
- Assessment of smart transport, traffic management systems and congestion indicators;
- Analyses of alternative fuels and related infrastructure needs.

5. Food and Natural Resources

- Research on land, soil, forests, air, water, marine resources, raw materials and biodiversity to support the effective preservation, restoration and sustainable use of natural capital, including sustainable resources management in Africa ;

- Knowledge centre for global food nutrition security;
- Assessment of climate change and potential mitigation and adaptation measures for agricultural and fisheries policies, including food security;
- Monitoring and forecasting of agricultural resources in EU and neighbourhood countries;
- Research for sustainable and economically thriving aquaculture and fisheries, and for Blue Growth and the Blue Economy;
- Validated methods, laboratory proficiency tests and new analytical tools for implementing food safety policies;
- EU Reference Laboratories on Feed Additives, Genetically Modified Organisms and Food Contact Materials;
- Knowledge centre for food fraud and quality;
- Knowledge centre for bioeconomy.

6.2.3. Innovation, economic development, and competitiveness

The JRC will contribute to innovation and technology transfer.. It will support the functioning of the internal market and the economic governance of the Union. It will contribute to development and monitoring of policies targeting a more social and sustainable Europe. It will support the EU's external dimension and international goals and help in promoting good governance. A well-functioning internal market with a strong economic governance and fair social system will foster innovation and competitiveness.

Broad Lines

- Analysis of innovation policies;
- Economic, financial and fiscal analysis;
- Pre-normative research and testing for harmonisation and standardisation;
- Production of certified reference materials;
- Market surveillances activities;
- Management of intellectual property rights;
- Promotion of technology transfer cooperation.

6.2.4. Scientific Excellence

The JRC shall pursue excellence in research and extensive collaboration with top level research institutions worldwide. It will carry out research in emerging fields of science and technology and promote open science and open data as well as knowledge transfer.

Broad Lines

- Exploratory research programmes;
- Dedicated collaborative and exchange programmes with research institutions and scientists;

– Access to JRC research infrastructures;
– Training of scientists and national experts;
– Open science and open data.

6.2.5. Territorial development and support for Member States and Regions

The JRC will contribute to regional and urban policies, with focus on innovation-led territorial development, and with a view to reducing disparities between regions. It will also offer technical assistance to Member States and third countries and support the implementation of European legislation and actions.

Broad Lines

– Implementation of regional and urban policies, smart specialisation strategies, strategies for economic transformation of regions in transition, integrated urban development strategies and data;
– Capacity building of local and regional actors for implementation of macro-regional strategies;
– Knowledge centre for territorial policies;
– 'On demand' advice and tailored support to Member States, regions or cities, including through a virtual network of Science4Policy Platforms.

PILLAR III

OPEN INNOVATION

Open innovation is a vital paradigm for the EU to continue delivering prosperity to its citizens and meeting challenges of the future. Implementing it requires a systemic, cross-cutting and multifaceted approach. Europe's economic progress, social welfare and quality of life rely on its ability to boost productivity and growth, which, in turn, depends heavily on its ability to innovate. Innovation is also key to solving the major challenges that lie ahead for the EU.

Like its predecessors, Innovation is at the heart of Horizon Europe. The quest for new ideas, products and processes is driving Horizon Europe objectives and implementing modalities, from strategic programming to calls, and is present from the onset to the end of any project supported, from 'blue-sky' research to industrial or technological roadmaps and missions.

Yet, innovation deserves specific measures, as the EU must decisively enhance the conditions and environment European innovation can thrive, so that ideas are quickly shared between actors in the innovation ecosystem, and new ideas and technologies swiftly transformed into the products and services needed for the EU to deliver.

Recent decades have seen the emergence of major and global new markets in entertainment, media, health care, lodging and retail, based on breakthrough innovations in ICT, biotech, internet and the platform economy. These market-creating innovations, which impact the EU economy as a whole, are deployed by fast growing and often new companies. But only a few originate in the EU.

A new global wave of breakthrough innovation is coming up, one that will be based on more 'deep-tech' technologies such as block-chain, artificial intelligence, genomics and robotics, and other technologies, which may also emerge from individual innovators and communities of citizens. They have in common that they are taking shape at the intersection between different technologies, industry sectors and scientific disciplines, offering radically new combinations of products, processes, services and business models, and have the potential to open up new markets worldwide. Additional sectors such as manufacturing, financial services, transport or energy will also be impacted.

Europe has to ride that wave. It is well positioned as the new wave comes in 'deep-tech' areas, such as artificial intelligence, quantum technologies, clean energy sources, where Europe has some competitive advantages regarding science and knowledge, and can build on close public-private cooperation (e.g. in health care or energy).

For Europe to lead that new wave of breakthrough innovation, the following underlying challenges need to be met:

– Improve the transformation of science into innovation in order to accelerate the transfer of ideas, technologies and talent from the research base into start-ups and industry;

– Speed up industrial transformation: European industry is lagging behind in embracing new technologies and scaling up: 77% of the young and big R&D companies are in US or Asia and only 16% are based in Europe;

– Increase risk finance to overcome financing gaps: Europe's innovators suffer from a low supply of risk finance. Venture capital is key to turning breakthrough innovations into world-leading companies but, in Europe, it is less than a quarter of the amounts raised in the US and in Asia. Europe must bridge the 'Valleys of death', whereby ideas and innovations fail to reach the market due to the gap between public support and private investment, in particular with regard to high-risk breakthrough innovations and long-term investments;

– Enhance and simplify the European landscape for funding and supporting research and innovation: the multitude of funding sources provides a complex landscape for innovators. EU intervention has to cooperate and coordinate with other initiatives at European, national and regional level, public and private, to better enhance and align supporting capacities, and provide for an easy-to-navigate landscape for any European innovator;

– Overcome fragmentation to the innovation ecosystem. While Europe is home to a growing number of hotspots, these are not well connected. Companies with international growth potential have to cope with fragmentation of national markets with their diverse languages, business cultures and regulations.

In order to cope with that new global wave of breakthrough innovation, EU support to breakthrough innovators requires an agile, simple, seamless and tailored approach. Policy to develop and deploy breakthrough innovations and scale-up companies has to be bold in taking risks and must take into account the above-mentioned challenges and add value to related innovation activities implemented by individual Member State.

Horizon Europe's Open Innovation pillar, in cooperation with other EU policies and in particular the InvestEU Programme, is designed to deliver such tangible results. It builds on lessons learned and on experience gained under the previous framework programmes, in particular from activities targeting future technologies and innovation (such as Future Emerging Technologies (FET) and Fast Track to Innovation (FTI)), SMEs (such as the SME Instrument), but also private and corporate finance (such as FP7 RSFF, Horizon 2020 InnovFin), all part of the 'EIC pilot' activities launched for the period 2018-2020.

Based on these experiences, this Pillar provides for the launch of the European Innovation Council (EIC), which will promote breakthrough innovation with rapid scale-up potential at global level and with dedicated types of actions and activities:

– Supporting the development of future and emerging breakthrough innovations;

– Bridging financing gaps in the development, deployment and scaling up of market-creating innovations;

– Increasing the impact and visibility of EU innovation support.

Whilst the EIC will directly support breakthrough innovations, the overall environment from which European innovations nurture and emerge must be further developed and enhanced: it must be a common European endeavour to support innovation all across Europe, and in all dimensions and forms, including through complementary EU and national policies and resources whenever possible. Hence, this Pillar provides also for:

– Renewed and reinforced coordination and cooperation mechanisms with Member States and Associated Countries, but also with private initiatives, in order to support all types of European innovation ecosystems and their actors;

– Support to the European Institute of Innovation and Technology (EIT) and Knowledge and Innovation Communities (KICs).

Additionally, as a continued effort to enhance risk-finance capacities for research and innovation in Europe and where necessary, this pillar will link with the InvestEU programme. Building on the successes and the experiences gained under Horizon 2020 InnovFin, as well as under EFSI, the InvestEU Programme will enhance access to risk finance for bankable research organisations, innovators and entrepreneurs, in particular for SMEs and small midcaps, as well as for investors.

1. THE EUROPEAN INNOVATION COUNCIL (EIC)

1.1. Areas of Intervention

The objective of the EIC is to identify, develop and deploy breakthrough and disruptive innovations (including technologies), and support the rapid scale-up of innovative firms at EU and international levels along the pathway from ideas to market.

The EIC will be implemented primarily through two complementary types of action, namely *the Pathfinder for advanced research*, for the early stages of technology development, and *the Accelerator* for innovation and market deployment actions, including the pre-mass commercialisation stages and company growth. With the idea to offer a single one-stop shop and a single process of support, the *Accelerator* will also award blended finance, combining grants with equity investments. It will in addition also channel access to loans provided under the InvestEU programme.

These two complementary types of actions will share common characteristics. They will:

- Focus on breakthrough and disruptive innovations, including social, that have the potential to create new markets, as opposed to those which make incremental improvements in existing products, services or business models;
- Be mainly bottom-up, open to innovations from all fields of science, technology and applications in any sector, while also enabling targeted support for emerging breakthrough or disruptive technologies of potential strategic significance;
- Innovations that cut across different scientific, technological (e.g. combining physical and digital) fields and sectors will be encouraged;
- They will be centred on innovators, simplifying procedures and administrative requirements, making use of interviews to help assess applications, and ensuring fast decision making;
- They will support high-risk innovations where the risks, whether technological, market and/or regulatory, cannot be borne by the market alone or exclusively supported by financial instruments under InvestEU.
- They will be managed pro-actively with milestones to gauge progress and the possibility to reorient projects where needed.

As well as financial support, innovators will have access to EIC business advisory services providing to projects coaching, mentoring and technical assistance, and pairing innovators with peers, industrial partners and investors. Innovators will also have facilitated access to expertise, facilities (including innovation hubs [12]) and partners from across EU supported activities (including those of the EIT, in particular through its KICs).

[12] These are public or private facilities that offer access to latest knowledge and expertise on digital and related enabling technologies necessary for companies to become more competitive with regard to production, services and business processes.

Particular attention will be paid to ensuring proper and efficient complementarity with individual or networked Member States initiatives, including in the form of European Partnership.

1.1.1. The Pathfinder for Advanced Research

The *Pathfinder's* will provide grants to high-risk cutting-edge projects exploring new territories aiming to develop into potentially radical innovative technologies of the future and new market opportunities. It will build on the experience from the Future and Emerging Technology (FET) schemes supported under FP7 and Horizon 2020, including the Horizon 2020 FET-Innovation Launchpad, as well as the Horizon 2020 SME Instrument Phase 1.

The *Pathfinder* overall objective will be to nurture potential market creating innovation out of breakthrough technological ideas, and bring them to demonstration stage or development of business cases or strategies for further take-up by the *Accelerator* or any other market deployment solution. To that end, the *Pathfinder* will initially support the earliest stages of scientific and technological research and development, including proof of concept and prototypes for technology validation.

In order to be fully open to broad-sweeping explorations, opportunities of serendipity and unexpected ideas, concepts and discoveries, the *Pathfinder* will be mainly implemented through a continuous open call for bottom-up proposals. The *Pathfinder* will also provide for competitive challenges to develop key strategic objectives[13] calling for deep-tech and radical thinking. Regrouping of selected projects into thematic or objective driven portfolios will allow establishing critical mass of efforts and structuring new multidisciplinary research communities.

These portfolios of selected projects[14] will be further developed and enhanced, each along a vision developed with their innovators, but also shared with the research and innovation community at large. The *Pathfinder's Transition activities* will be implemented to help innovators develop the pathway to commercial development, such as demonstration activities and feasibility studies to assess potential business cases, and support the creation of spin offs and startups. These *Pathfinder's Transition activities* may also consist of complementary grants to top-up or enlarge the scope of previous and on-going actions, to bring in new partners, to enable collaboration within the portfolio and to develop its multidisciplinary community.

The *Pathfinder* will be open to all types of innovators, from individuals to universities, research organisations and companies, in particular startups and SMEs, and from single beneficiaries to multi-disciplinary consortia. In the case of single beneficiary projects, larger companies will not be permitted. The *Pathfinder* will be implemented in close coordination with other parts of Horizon Europe, in particular with the European Research Council (ERC),

[13] These could include topics such as Artificial Intelligence, Quantum technologies, Biocontrol or Second generation digital twins, or any other topics identified in the context of the Horizon Europe Strategic programming (including with Member States' networked programmes).

[14] These may also include projects selected under Horizon 2020 programmes such as FET. These may also include other EU supported relevant activities and funded Seal of Excellence stemming from *Pathfinder* calls.

the Marie Skłodowska-Curie Actions (MSCA), and the Knowledge and Innovation Communities (KICs) of the European Institute of Innovation and Technology (EIT) activities. It will also be implemented in close coordination with Member States programmes and activities.

1.1.2. The Accelerator

Available private and corporate financing remains scarce between late stage of research and innovation activities and market take-up for high-risk breakthrough and market-creating innovations. In order to bridge the 'valley of death', in particular for 'deep tech' innovations that are key to Europe's future growth, public support must develop a radically new approach. Where the market does not provide viable financial solutions, public support should provide for a specific risk-sharing mechanism, bearing more if not all of the initial risk of potential breakthrough market-creating innovations to attract alternate private investors in a second stage, as operations unfold and the risk is lowered.

Consequently the *Accelerator* will provide financial support to not yet 'bankable' or investors-attractive innovators and companies that have the ambition to develop and deploy in EU and international markets their breakthrough innovations and to scale up rapidly. For that purpose it will build on the experience from the Phases 2 and 3 of Horizon 2020 SME Instrument and from Horizon 2020 InnovFin, in particular through the addition of non-grant components and the ability to support larger and longer investments.

The *Accelerator* will provide support in the form of EIC blended finance, a mix of:

– Grant or reimbursable advance[15], to cover innovation activities;

– Support for investment in equity[16] or other repayable forms, so as to bridge innovation activities with effective market deployment, including scale-up, in a manner that does not crowd out private investments or distorts competition in the internal market. When relevant it will channel the innovator to access to debt financing (e.g. loans) provided by the InvestEU programme.

Support will be awarded through a single process and with a single decision, providing the supported innovator with a single global commitment to financial resources covering the various stages of innovation down to market deployment including pre-mass commercialisation. The full implementation of the awarded support will be subject to milestones and review. The combination and volume of financing will be adapted to the needs of the firm, its size and stage, the nature of the technology/innovation and the length of the innovation cycle. It will cover financing needs until replacement by alternative sources of investment.

For innovations with high technological risks ('deep tech') the support will always include a grant component covering the innovation activities. Where the various risks are reduced

[15] Reimbursable advance shall be paid back to the EU on an agreed schedule or be transformed into equity, if the beneficiary so choses.

[16] Usually no more than 25% of the voting rights. In exceptional cases, the EU may secure the acquisition of a blocking minority to protect European interests in essential areas, e.g. cyber security.

(technological, market, regulatory, etc.), the relative importance of the reimbursable advance component is expected to increase.

While the EU may bear alone the initial risk of selected innovation and market deployment actions, the aim will be to de-risk these and stimulate, from the on-set and during the development of the action, co-investments from alternative sources and even substitutive investors. Where relevant, milestones will establish co-investment objectives. Once de-risked and meeting the conditions established under Article 209(2) of the Financial Regulation, operations will be proposed for support to implementing partners under InvestEU.

The *Accelerator* will mainly operate through a continuously open and bottom-up call, targeting individual entrepreneurs (mainly start-ups and SMEs), with a particular attention paid to young and to women innovators. This open and bottom-up call will be complemented by targeted support for on emerging breakthrough or disruptive technologies of potential strategic significance. Proposals may also be submitted by investors, including public innovation agencies, but the support will be awarded to the company.

The *Accelerator* will allow for fast-track take-up of innovations stemming from Pathfinder-supported projects from the *Pathfinder*, from similar Member States 'advanced research programmes' and from other pillars of the EU Framework Programmes[17], in order to support them to reach the market. This identification of projects supported in other pillars of Horizon Europe and also previous Framework Programmes will be based on pertinent methodologies, such as the Innovation Radar.

1.1.3. Additional EIC activities

Additionally, EIC will also implement:

– EIC business acceleration services in support of *Pathfinder* and *Accelerator* activities and actions. The aim will be to connect the EIC Community of funded innovators, including funded Seal of Excellence, to investors, partners and public buyers. It will provide a range of coaching and mentoring services to EIC actions. It will provide innovators with access to international networks of potential partners, including industrial ones, to complement a value chain or develop market opportunities, and find investors and other sources of private or corporate finance. Activities will include live events (e.g. brokerage events, pitching sessions) but also, the development of matching platforms or use of existing ones, in close relation with financial intermediaries supported by the InvestEU and with the EIB Group. These activities will also encourage peer exchanges as a source of learning in innovation ecosystem, making particular good use of Members of the High Level Advisory board of the EIC and EIC Fellows;

[17] Such as ERC Proof of Concept, from projects supported under the 'Global Challenges and Industrial Competitiveness" Pillar, startups emerging from the KICs of the European Institute of Innovation and Technology, … Including from Horizon 2020 activities, particularly project selected under Horizon 2020 SME Phase 2 and related Seal of Excellence financed by Member States, (existing and future) European Partnerships.

– EIC Fellowship to honour the EU's leading innovators. They will be awarded by the Commission on the advice of the High Level Advisory Board to recognise them as ambassadors for innovation;

– EIC Challenges, i.e. inducement prizes, to help develop novel solutions to global challenges, bring in new actors and develop new communities. EIC recognition prizes will include iCapital, the Social Innovation Inducement Prize, and the Women Innovators' Prize.[18] The design of its prizes will be linked to EIC to other parts of the Framework programme, including missions and other funding bodies. Opportunities for cooperation with organisations (such as enterprises, universities, research organisations, business accelerators, charities and foundations) will be explored.

– EIC Innovative Procurement, to procure prototypes, or develop first purchase programme to facilitate the testing and acquisition of pre-market innovative technologies by public entities.

1.2. Implementation

The implementation of the EIC calls for the deployment of specific management features, to reflect its innovator-centric approach and types of actions.

1.2.1. The EIC Board

The High Level Advisory Board of the EIC (*EIC Board*) will assist the Commission in implementing the EIC. As well as advising on the EIC work programmes, the EIC Board will take an active role in advising the management and following up actions. It will have a communication function, with members playing an ambassadorial role helping to stimulate innovation in the EU. Communication channels will include attendance at key innovation events, social media, constitution of an EIC community of innovators, engaging with key media with a focus on innovation, common events with incubators and acceleration hubs.

The EIC Board will provide recommendations to the Commission regarding innovation trends or initiatives needed to enhance and foster the EU innovation ecosystem, including potential regulatory barriers. The Board's advice should also identify emerging areas of innovation to be taken into account in the activities under the Global Challenges and Industrial Competitiveness pillar and missions. In this way, the Board is expected to contribute to the overall coherence of the Horizon Europe programme.

1.2.2. EIC programme managers

The Commission will take a pro-active approach to the management of high risk projects, through access to the necessary expertise.

The Commission will appoint on a temporary basis a number of EIC programme managers to assist it with technology-based vision and operational guidance.

[18] The EIC prizes will take over the management of prizes launched under Horizon 2020 and provide for the design and implementation of new inducement prizes and recognition awards.

Programme managers will come from multiple spheres, including companies, universities, national laboratories and research centers. They will bring deep expertise from personal experience and years in the field. They will be recognised leaders, either having managed multidisciplinary research teams or directing large institutional programs, and know the importance of communicating their visions tirelessly, creatively, and broadly. Lastly, they will have experience in overseeing important budgets, which require sense of responsibility.

Programme managers will be expected to boost the impact of EIC funding by fostering an « active management » culture, a hands-on approach involving development at portfolio and projects levels of vision-based budgets, timelines and milestones EIC projects must meet to receive continued funding.

In particular, programme managers will oversee the implementation of *Pathfinder* calls, and propose evaluation rankings in view of consistent strategic portfolio of projects, expected to make essential contributions to the emergence of potential societal or economic market creating innovations.

Programme managers will have the task of nurturing *Pathfinder* portfolios by developing together with beneficiaries a common vision and a common strategic approach that leads to a critical mass of effort. This will involve building up and structuring of new communities, with the objective of bringing transforming breakthrough ideas into genuine and mature market creating innovations. Programme managers will implement *transition activities*, further developing portfolio with additional activities and partners, and closely monitoring potential spin-offs and start-ups.

Programme managers will review *Pathfinder* and *Accelerator*'s projects, for each milestone or at relevant intervals, to assess whether they should be continued, reoriented or terminated according to defined methods and procedures for project management. Such assessments may involve external experts.

Given the high risk nature of the actions, it is expected that a significant number projects will not reach completion. Budget decommitted from such terminations will be used to support other EIC actions.

1.2.3. Implementation of the EIC blended finance

The Commission will manage all operational elements of Accelerator projects, including the grant or other non-repayable forms of support.

For the purpose of managing EIC blended finance, the Commission may make use of indirect management, or where this is not possible, may establish a special purpose vehicle (EIC SPV). The Commisison shall seek to ensure the participation of other public and private investors. Where this is not possible at the initial set up, the special purpose vehicle will be structured in such a way that it can attract other public or private investors in order to increase the leverage effect of the Union contribution.

The EIC SPV will proactively leverage from the on-set co- and alternate public and private investments into individual *Accelerator's* operations and the SPV, perform due diligence, and negotiate technical terms of each investment in compliance with the priciples of additionality

and prevention of conflict of interests with other activities of the entities or counterparts. The EIC SPV will also define and implement an exit strategy for equity participation, which may include proposing to implementing partners financing under InvestEU, where appropriate and for operations whose risks have been sufficiently lowered so that they meet criteria of Article 209(2) of the Financial Regulation.

2. EUROPEAN INNOVATION ECOSYSTEMS

2.1. Rationale

To fully harness the potential of innovation involving researchers, entrepreneurs, industry and society at large, the EU must improve the environment within which innovation can flourish at all levels. This will mean contributing to the development of an effective innovation ecosystem at EU level, and encouraging cooperation, networking, and the exchange of ideas, funding and skills among national and local innovation ecosystems.

The EU must also aim to develop ecosystems that support social innovation and public sector innovation, in addition to innovation in private enterprises. Indeed, the government sector must innovate and renew itself in order to be able to support the changes in regulation and governance required to support the large-scale deployment of new technologies and a growing public demand for the more efficient and effective delivery of services. Social innovations are crucial to enhance the welfare of our societies.

2.2. Areas of intervention

As a first step the Commission will organise an EIC Forum of Member States and Associated countries' public authorities and bodies in charge of national innovation policies and programmes, with the aim of promoting coordination and dialogue on the development of the EU's innovation ecosystem. Within this EIC Forum, the Commission will:

- Discuss the development of innovation-friendly regulation, through the continued application of the Innovation Principle and development of innovative approaches to public procurement including developing and enhancing the Public Procurement of Innovation (PPI) instrument to drive innovation. The Observatory of Public Sector Innovation will also continue to support internal government innovation efforts, alongside the revamped Policy Support Facility;
- Promote the alignment of research and innovation agendas with EU efforts to consolidate an open market for capital flows and investment, such as the development of key framework conditions in favour of innovation under the Capital Markets Union;
- Enhance coordination between national innovation programmes and the EIC, so as to stimulate operational synergies and avoid overlap, by sharing data on programmes and their implementation, resources and expertise, analysis and monitoring of technological and innovation trends, and by interconnecting respective innovators' communities;
- Establish a joint communication strategy on innovation in the EU. It will aim at stimulating the EU's most talented innovators, entrepreneurs, particularly young drivers, SMEs and start-ups, also from fresh corners of the EU. It will stress the EU added-value that technical, non-technical, and social innovators can bring to EU citizens by developing their idea/vision into a thriving enterprise (social value/impact, jobs and growth, societal progression).

Activities will be implemented to ensure effective complementarity between EIC's types of action and their specific focus on breakthrough innovation, with activities implemented by Member States and Associated Countries, but also by private initiatives, in order to support all types of innovation, reach out to all innovators across the EU, and provide them with enhanced and adequate support.

To that end, the EU will:

– Promote and co-fund joint innovation programmes managed by authorities in charge of public national, regional or local innovation policies and programmes, to which private entities supporting innovation and innovators may be associated. Such demand-driven joint programmes may target, among others, early stage and feasibility study support, academia-enterprise cooperation, support to high-tech SMEs' collaborative research, technology and knowledge transfer, internationalisation of SMEs, market analysis and development, digitalisation of low-tech SMEs, financial instruments for close to market innovations activities or market deployment, social innovation. They may also include joint public procurement initiatives, enabling innovations to be commercialised in the public sector, in particular in support of the development of new policy. This could be particularly effective to stimulate innovation in public service areas and to provide market opportunities to European innovators.

– Support also joint programmes for mentoring, coaching, technical assistance and other services that are delivered close to innovators, by networks such as Enterprise Europe Network (EEN), clusters, pan-European platforms such as Startup Europe, local innovation actors, public but also private, in particular incubators and innovation hubs that could moreover be interconnected to favour partnering between innovators. Support may also be given to promote soft skills for innovation, including to networks of vocational institutions and in close relation with the European Institute of Innovation and Technology;

– Improve data and knowledge about innovation support, including mapping of support schemes, establishing data sharing platforms, benchmarking and evaluation of support schemes;

The EU will also launch actions necessary to further monitor and nurture the overall innovation landscape and innovation management capacity in Europe.

The ecosystem support activities will be implemented by the Commission, supported by an executive agency for the evaluation process.

3. EUROPEAN INSTITUTE OF INNOVATION AND TECHNOLOGY (EIT)

3.1. Rationale

As the report of the High Level Group on maximising the impact of EU research and innovation (the Lamy High level Group) clearly states, the way forward is 'to educate for the future and invest in people who will make the change'. In particular, European universities are called to stimulate entrepreneurship, tear down disciplinary borders and institutionalise strong non-disciplinary academia-industry collaborations. According to recent surveys, access to talented people is by far the most important factor influencing the location choices of European founders of start-ups. Entrepreneurship education and training opportunities play a key role in cultivating future innovators and in developing the abilities of existing ones to grow their business to greater levels of success. Access to entrepreneurial talent, together with access to professional services, capital and markets on the EU level, and bringing key innovation actors together around a common goal are key ingredients for nurturing an innovation ecosystem. There is a need to coordinate efforts across the EU.in order to create a critical mass of interconnected EU-wide entrepreneurial clusters and ecosystems,

Efforts are still needed to develop ecosystems where researchers, innovators, industries and governments can easily interact. Innovation ecosystems, in fact, still do not work optimally due to a number of reasons such as:

– Interaction among innovation players is still hampered by organizational, regulatory and cultural barriers between them;

– Efforts to strengthen innovation systems lack coordination and a clear focus on specific objectives and impact.

To address future challenges, embrace the opportunities of new technologies and contribute to sustainable economic growth, jobs, competitiveness and the well-being of Europe's citizens, there is the need to further strengthen Europe's capacity to innovate by: fostering the creation of new environments conducive to collaboration and innovation; strengthening the innovation capabilities of academia and the research sector; supporting a new generation of entrepreneurial people; stimulating the creation and the development of innovative ventures.

The nature and scale of the innovation challenges require liaising and mobilising players and resources at European scale, by fostering cross-border collaboration. There is a need to break down silos between disciplines and along value chains and nurture the establishment of a favorable environment for an effective exchange of knowledge and expertise, and for the development and attraction of entrepreneurial talents.

3.2. Areas of Intervention

3.2.1. Sustainable innovation ecosystems across Europe

The EIT will play a reinforced role in strengthening sustainable innovation ecosystems across Europe. In particular, the EIT will continue to operate primarily through its Knowledge and Innovation Communities (KICs), the large-scale European partnerships that address specific societal challenges. It will continue to strengthen innovation ecosystems around them, by

fostering the integration of research, innovation and education. Furthermore, EIT will contribute to bridge existing gaps in innovation performance across Europe by expanding its Regional Innovation Scheme (EIT RIS). The EIT will work with innovation ecosystems that exhibit high innovation potential based on strategy, thematic alignment and impact, in close synergy with Smart Specialisation Strategies and Platforms.

Broad Lines

- Reinforcing the effectiveness of the existing KICs and setting up new ones in a limited number of thematic areas;
- Accelerating regions towards excellence in countries that are modest or moderate innovators.

3.2.2. Entrepreneurial and innovation skills in a lifelong learning perspective and the entrepreneurial transformation of EU universities

The EIT education activities will be reinforced to foster innovation and entrepreneurship through better education and training. A stronger focus on human capital development will be grounded on the expansion of existing EIT KICs education programmes in the view of continuing to offer students and professionals high quality curricula based on innovation and entrepreneurship in line in particular with the EU industrial and skills strategy. This may include researchers and innovators supported by other parts of Horizon Europe, in particular MSCA. The EIT will also support the renewal of European Universities and their integration in innovation ecosystems by stimulating and increasing their entrepreneurial potential and capabilities and encouraging them to better anticipate new skills requirements.

Broad Lines

- Development of innovative curricula, taking into account the future needs of industry, and cross-cutting programmes to be offered to students, entrepreneurs and professionals across Europe and beyond where specialist and sector specific knowledge is combined with entrepreneurial and innovation oriented skills, such as digital and key enabling technologies high-tech skills;
- Strengthening and expanding the EIT label in order to improve the quality of education programmes based on partnerships between different higher education institutions, research centres and companies and offering learning-by-doing curricula and robust entrepreneurship education as well as international, inter-organisational and cross-sectorial mobility;
- Development of innovation and entrepreneurship capabilities of the higher education sector, by leveraging the EIT Community expertise in linking education, research and business;
- Reinforcing the role of the EIT Alumni community as role model for new students and strong instrument to communicate EIT impact.

3.2.3. New solutions to the market

The EIT will facilitate and empower entrepreneurs, innovators, educators, students and other innovation actors to work together in cross-disciplinary teams to generate ideas and transform them into both incremental and disruptive innovations. Activities will be characterised by an open innovation and cross-border approach, with a focus on including relevant Knowledge Triangle activities that are pertinent to making them a success (e.g. project's promoters can improve their access to: specifically qualified graduates, start-ups with innovative ideas, non-domestic firms with relevant complementary assets etc.).

Broad Lines

- Support to the development of new products and services where Knowledge Triangle actors will collaborate to make solutions market-ready;
- Provision of high-level services and support to innovative businesses, including technical assistance to fine-tuning of products or services, substantive mentoring, support to secure target customers and raise capital, in order to swiftly reach the market and speed up their growth process.

3.2.4. Synergies and value added within Horizon Europe

The EIT will step up its efforts to capitalise on synergies and complementarities with different actors and initiatives at EU and global levels and extend its network of collaborating organisations at both strategic and operational levels.

Broad Lines

- Cooperation with the EIC in streamlining the support (i.e. funding and services) offered to highly innovative ventures in both start-up and scale-up stages, in particular through KICs;
- Planning and implementation of EIT activities in order to maximise synergies and complementarities with the actions under the Global Challenges and Industrial Competitiveness Pillar;
- Engage with EU Member States at both national and regional level, establishing a structured dialogue and coordinating efforts to enable synergies with existing national initiatives, in order to identify, share and disseminate good practices and learnings;
- Provision of input to innovation policy discussions and contribution to the implementation of EU policy priorities by continuously working with all relevant European Commission services, other EU programmes and their stakeholders, and further exploring opportunities within policy implementing initiatives;
- Exploitation of synergies with other EU programmes supporting human capital development and innovation (e.g. ESF+, ERDF and Erasmus);
- Building strategic alliances with key innovation actors at EU and international level, and support to KICs to develop collaboration and linkages with key Knowledge Triangle partners from third countries, with the aim of opening new markets for KICs'-backed solutions and attract talents from abroad.

PART - STRENGTHENING THE EUROPEAN RESEARCH AREA

The EU has a history of world-class scientific and technological achievements, but its research and innovation potential fails to be fully exploited. Despite much progress in developing the European Research Area (ERA), Europe has still a fragmented research and innovation landscape, and all Member States face bottlenecks in their research and innovation systems which require policy reforms. In some areas, progress is too slow to catch-up with an increasingly dynamic research and innovation ecosystem[19].

The level of research and innovation investment in Europe is still far below the policy objective of 3% of GDP and continues to grow less than our main competitors such as US, Japan, China or South-Korea.

Meanwhile, there is a growing disparity in Europe between the innovation-leading and the innovation-lagging regions. Change is needed if Europe as a whole is to capitalise on excellence from across the continent, maximise the value of public and private investments, and their impacts on productivity, economic growth, job creation and well-being.

In addition, research and innovation are seen by some as distant and elitist without clear benefits for citizens, instilling attitudes that hamper the creation and uptake of innovative solutions, and scepticism about evidence-based public policies. This requires both better linkages between scientists, citizens and policy-makers, and more robust approaches to pooling scientific evidence itself.

The EU now needs to raise the bar on the quality and impact of its research and innovation system, requiring a revitalised European Research Area (ERA)[20], better supported by the EU's research and innovation Framework Programme. Specifically, a well-integrated yet tailored set of EU measures[21] is needed, combined with reforms and performance enhancements at national level (to which the Smart Specialisation Strategies supported under the European Regional Development Fund can contribute) and, in turn, institutional changes within research funding and performing organisations, including universities. By combining efforts at EU level, synergies can be exploited and the necessary scale can be found to make support to national policy reforms more efficient and impactful.

The activities supported under this part addresses ERA policy priorities, while generally underpinning all parts of Horizon Europe. Activities may also be established to foster brain circulation across ERA through mobility of researchers and innovators.

The goal is for an EU where knowledge and a highly skilled workforce circulate freely, research outputs are shared rapidly and efficiently, researchers benefit from attractive careers and gender equality is ensured, where Member States develop common strategic research agendas, aligning national plans, defining and implementing joint programmes, and where the

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19 The ERA progress report of 2018

20 Council Conclusions on the ERA Roadmap, 19 May 2015 *[To be updated as necessary]*.

21 TFEU Article 181.2

outcomes of research and innovation are understood and trusted by informed citizens and benefit society as a whole.

This part will contribute *de facto* to all Sustainable Development Goals (SDGs), but directly to the following: SDG 4 - Quality Education; SDG 5 - Gender Equality; SDG 9 - Industry, Innovation and Infrastructure; SDG 17 - Partnership for the Goals.

1. SHARING EXCELLENCE[22]

Reducing disparities in research and innovation performance by sharing knowledge and expertise across the EU will help countries and regions that are lagging behind in terms of research and innovation performance, including the EU outermost regions, to attain a competitive position in the global value chains. Activities may also be established to foster brain circulation right across ERA and better exploitation of existing (and possibly jointly managed EU programmes) research infrastructures in the targeted countries through mobility of researchers and innovators.

Further action is therefore needed to counter the trend for closed collaborations, which can exclude large number of promising institutions, and to exploit the potential of the EU's talent pool by maximising and sharing the benefits of research and innovation across the EU.

Broad Lines

- Teaming, to create new centres of excellence or upgrade existing ones in eligible countries, building on partnerships between leading scientific institutions and partner institutions;
- Twinning, to significantly strengthen a university or research organisation from an eligible country in a defined field, by linking it with internationally-leading research institutions from other Member States or Associated Countries.
- ERA Chairs, to support universities or research organisations attract and maintain high quality human resources under the direction of an outstanding researcher and research manager (the 'ERA Chair holder'), and to implement structural changes to achieve excellence on a sustainable basis.
- European Cooperation in Science and Technology (COST), involving ambitious conditions regarding the inclusion of eligible countries, and other measures to provide scientific networking, capacity building and career development support to researchers from these target countries. 80% of the total budget of COST will be devoted to actions fully aligned with the objectives of this intervention area.

The above mentioned funding lines will facilitate specific research elements customised to the particular needs of the actions.

This intervention area will support the Horizon Europe specific objectives: Spread and connect excellence across the EU; Reinforce the creation of high quality knowledge; Increase cross-sectorial, cross-disciplinary cross-border cooperation.

[22] A criterion based on research and innovation excellence will be used to define those Member States and Associated Countries where legal entities need to be established in order to be eligible to submit proposals as coordinators under 'sharing excellence'. This criterion will address the dimensions of the overall economic performance (GDP), research performance and innovation performance in a combined manner normalised to the size of the related countries. The countries identified with this criterion are called 'eligible countries' in the context of 'sharing excellence'. On the basis of Article 349 TFEU, legal entities from Outermost Regions will be also fully eligible as coordinators under 'sharing excellence'.

2. REFORMING AND ENHANCING THE EU RESEARCH AND INNOVATION SYSTEM

Policy reforms at national level will be mutually reinforced through the development of EU-level policy initiatives, research, networking, partnering, coordination, data collection and monitoring and evaluation.

Broad Lines

- Strengthening the evidence base for research and innovation policy, for a better understanding of the different dimensions and components of national research and innovation systems, including drivers, impacts, associated polices;
- Foresight activities, to anticipate emerging needs, in coordination and co-design with national agencies and future-oriented stakeholders, in a participative manner, building on advances in forecasting methodology, making outcomes more policy relevant, while exploiting synergies across and beyond the programme;
- Accelerating the transition towards open science, by monitoring, analysing and supporting the development and uptake of open science policies and practices[23] at the level of Member States, regions, institutions and researchers, in a way that maximises synergies and coherence at EU level;
- Support to national research and innovation policy reform, including though a strengthened set of services of the Policy Support Facility (PSF)[24] (i.e. peer reviews, specific support activities, mutual learning exercises and the knowledge centre) to Member States and Associated Countries, operating in synergy with the European Regional Devleopment Fund, the Structural Reform Support Service (SRSS) and the Reform Delivery Tool;
- Providing researchers with attractive career environments, skills and competences needed in the modern knowledge economy[25]. Linking the ERA and the European Higher Education Area by supporting the modernisation of universities and other research and innovation organisations, through recognition and reward mechanisms to spur actions at national level, as well as incentives promoting the adoption of open science practices, entrepreneurship (and links to innovation ecosystems), trans-disciplinarity, citizen engagement, international and inter-sectoral mobility, gender equality plans and comprehensive approaches to institutional changes. In that context, also complementing the Erasmus programme support for the European Universities

[23] The policies and practices to be addressed range from sharing research outputs as early and widely as possible through commonly agreed formats and a shared infrastructure (e.g. the European Open Science Cloud), citizen science, and developing and using new, broader approaches and indicators for evaluating research and rewarding researchers.

[24] The Policy Support Facility (PSF), launched under Horizon 2020. The PSF works on a demand-driven basis and it offers, on a voluntary basis, high level expertise and tailor-made advice to national public authorities. Through its services, it has already been instrumental in provoking policy change in countries such as Poland, Bulgaria, Moldova or Ukraine and in bringing forward policy changes, driven by exchanges of good practice, in areas such as R&D tax incentives, open science, performance-based funding of public research organisations and the inter-operability of national research and innovation programmes.

[25] Including notably the European Charter for researchers, the code of conduct for the recruitment of researchers, EURAXESS and RESAVER Pension Fund.

initiative, in particular its research dimension, as part of developing new joint and integrated long term and sustainable strategies on education, research and innovation based on trans-disciplinary and cross-sectoral approaches to make the knowledge triangle a reality, providing impetus to economic growth.

- Citizen science, supporting all types of formal, non-formal and informal science education, including engagement of citizens in the co-design of research and innovation agenda settings and policy, in the co-creation of scientific content and innovation through transdisciplinary activities;
- Supporting gender equality in scientific careers and in decision making, as well as the integration of the gender dimension in research and innovation content;
- Ethics and integrity, to further develop a coherent EU framework in adherence with the highest ethics standards and the European Code of Conduct for Research Integrity;
- Supporting international cooperation, through bilateral, multilateral and bi-regional policy dialogues with third countries, regions and international fora will facilitate mutual learning and priority setting, promote reciprocal access and monitor impact of cooperation;
- Scientific input to other policies, through the creation and maintenance of structures and processes to ensure that EU policy-making is based on the best available scientific evidence and high-level scientific advice;
- EU research and innovation programme implementation, including the collection and analysis of evidence for the monitoring, evaluation, design and impact assessment of the Framework Programmes; strengthening dedicated support structures and facilitating trans-national cooperation among them (e.g. building on activities of National Contact Points in previous Framework Programmes); dissemination and exploitation of research and innovation results, data and knowledge, including through dedicated support to beneficiaries; fostering synergies with other EU programmes; targeted communication activities to raise the awareness of the broader impact and relevance of EU funded research and innovation.

ANNEX II

Programme Committee configurations

List of configurations of the Programme Committee in accordance with Article 12(2):

1. Strategic configuration: Strategic overview of the implementation of the whole programme, coherence across the different parts of the programme, missions and Strengthening the European Research Area
2. European Research Council (ERC) and Marie Skłodowska-Curie Actions (MSCA)
3. Research Infrastructures
4. Health
5. Inclusive and Secure Society
6. Digital and Industry
7. Climate, Energy and Mobility
8. Food and Natural Resources
9. The European Innovation Council (EIC) and European Innovation ecosystems

ANNEX III

Information to be provided by the Commission in accordance with Article 12(6)

1. Information on individual projects, enabling the monitoring of the entire lifetime of each proposal, covering in particular:

— submitted proposals,

— evaluation results for each proposal,

— grant agreements,

— completed projects.

2. Information on the outcome of each call and project implementation, covering in particular:

— results of each call,

— outcome of negotiations on grant agreements,

— project implementation, including payment data and outcome of projects.

3. Information on programme implementation as well as the synergies with other relevant Union programmes.

4. Information on the execution of the Horizon Europe budget, including information on commitments and payments for initiatives under Articles 185 and 187 TFEU.

Proposal for a Council Regulation establishing the Research and Training Programme of the European Atomic Energy Community for the period 2021-2025 complementing Horizon Europe – the Framework Programme for Research and Innovation

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(COM(2018) 437 final)

EUROPEAN
COMMISSION

Brussels, 7.6.2018
COM(2018) 437 final

2018/0226 (NLE)

Proposal for a

COUNCIL REGULATION

establishing the Research and Training Programme of the European Atomic Energy Community for the period 2021-2025 complementing Horizon Europe – the Framework Programme for Research and Innovation

{SEC(2018) 291 final} - {SWD(2018) 307 final} - {SWD(2018) 308 final} -
{SWD(2018) 309 final}

EXPLANATORY MEMORANDUM

1. CONTEXT OF THE PROPOSAL

1.1. Reasons for and objectives of the proposal

This proposal is part of the legislative package for the 'Horizon Europe' Framework Programme for Research and Innovation. It is designed to implement the EU's next long-term financial framework for 2021-2027, the priorities set out in the Commission's Agenda for Jobs, Growth, Fairness and Democratic Change, and the Commission's overall policy priorities (Horizon Europe).

The proposal for the Euratom research and training programme deals with the key issue of the various applications of nuclear energy in Europe. Using the power and non-power applications of nuclear energy to benefit the general public in Europe calls for long-term efforts to reduce safety and security risks and support the development of safe nuclear technologies and optimal radiation protection. Public and private research at national level has a significant role to play in this effort. Euratom's task is to complement the Member States' contributions by means of a Community-based research and training programme.

In this proposal for a Euratom Research and Training Programme for 2021-2025 (referred to below as 'the Programme'), the Commission seeks the Council's agreement to a five-year programme[1] which will pursue the current programme's key research activities[2], expand research into non-power applications of ionising radiation, and make improvements in the areas of education, training and access to research infrastructure. The proposed programme will complement Horizon Europe using the same instruments and rules for participation. The proposal determines the budget and a common set of research objectives for both direct[3] and indirect[4] actions to be implemented in accordance with the work programmes agreed with Member States.

The Programme will support research into radiation protection in the context of both nuclear energy generation and non-power applications of ionising radiation. Research into the latter will be designed to reduce risks from low-dose exposure through the use of these technologies. Research into radiation protection has already benefited the medical sector. There is also significant potential for public benefit in sectors including industry, agriculture, environment and security. A provision allowing for cross-cutting activities and synergies with 'Horizon Europe' will also benefit further research into non-power applications of radiation. One of the Programme's goals is to make nuclear technologies safer by developing a better understanding of the ageing of nuclear reactors and improving accident management strategies. The Programme will also support research into assessing and demonstrating the safety aspects of future fission technologies as far as is necessary to maintain safety expertise in the Community. The rapidly growing use of nuclear fission technologies worldwide makes this field of Euratom research all the more important. The Programme will include other

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1 The time limit of five years is established in Article 7 of the Euratom Treaty.

2 These include nuclear safety, security, radioactive waste and spent fuel management, radiation protection and fusion energy.

3 Direct actions means research and innovation activities undertaken by the Commission through its Joint Research Centre (the 'JRC').

4 Indirect actions means research and innovation activities undertaken by participants receiving financial support from the European Atomic Energy Community .

equally important tasks: advancing possible ways of managing and disposing of spent fuel and radioactive waste, and supporting preparedness for emergencies involving radiation.

Given the substantial increase in the deployment of nuclear fission technologies worldwide, Euratom needs to pursue its research into developing techniques to support nuclear safeguards, security and non-proliferation efforts.

The Programme also focuses on developing fusion energy, one of the few possible future options for baseload, low-carbon electricity production. Research into the feasibility of this technology is needed for the sake of future generations' wellbeing. While the deployment of fusion power plants that can contribute to the decarbonisation of the EU's energy mix remains a distant prospect, the Programme has the aim of implementing the European fusion roadmap, with a view to meeting the goal of producing electricity through fusion. This includes demonstrating fusion's feasibility as an energy source by exploiting existing and future fusion facilities, including ITER[5], and preparing for future fusion power plants by developing designs, materials and technologies.

In its efforts to develop fusion energy, the Programme will increase involvement and role of industry, with specific focus on facilitating know-how transfer from fusion laboratories to industry that should take over the responsibility for the design of DEMO[6] at the appropriate time.

In addition to these research activities, the proposal provides for more specific research into decommissioning of nuclear installations. The programme will address issues, such as improving the necessary skills, sharing best practice, developing techniques and co-funding research into common issues in nuclear decommissioning.

As regards nuclear expertise and excellence in the Community, the proposed Euratom regulation and the proposal for Horizon Europe will now enable nuclear researchers to take part in education and training schemes, such as Marie Skłodowska-Curie Actions. This will help maintain the necessary skills within the Community.

As regards research infrastructure, the proposal offers financial support for providing, making available and giving appropriate access to European and international research infrastructures, including those of the JRC.

This proposal states that it is to apply from 1 January 2021. It covers a Union of 27 Member States, given the UK's notification of its intention to withdraw from the European Atomic Energy Community under Article 50 of the Treaty on European Union, as applied by Article 106a of the Treaty establishing the European Atomic Energy Community and received by the European Council on 29 March 2017.

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5 Research facility with the aim to prove main principles of fusion power plant at industrial scale. ITER will not produce electricity.

6 Demonstration fusion power plant – facility foreseen after ITER to demonstrate all elements of fusion power plant including production of electricity with a closed fuel cycle.

1.2. Consistency with existing policy provisions in the policy area

The Programme carries over the main objectives of the research activities of the 2014-20 Euratom programmes[7], while implementing the changes explained above.

The Programme is also consistent with the proposals for 'Horizon Europe', as they are the only EU and Euratom programmes that support R&I and complement national funding. Most of the provisions on implementation, evaluation and governance are the same for both. Research areas supported by the Euratom Programme are not included in 'Horizon Europe', for both legal reasons (separate treaties) and managerial ones (avoiding duplication). However, there will be more focus on developing synergies with Horizon Europe.

1.3. Consistency with other Union policies

The proposal is fully consistent and compatible with existing EU policies. This initiative was developed taking into account the current Commission's priorities[8], the Budget for Results initiative (which means that EU spending programmes must provide even better value for money than in the past), the implementation of the EU Global Strategy[9] and the Commission's proposal on the next long-term EU financial framework.

The Programme is also consistent with EU policies on nuclear and safety aspects. It thus supports the implementation of:

– Council Directive 2009/71/Euratom establishing a Community framework for the nuclear safety of nuclear installations[10], as amended by Council Directive 2014/87/Euratom[11];

– Council Directive 2011/70/Euratom establishing a Community framework for the responsible and safe management of spent fuel and radioactive waste[12];

– Council Directive 2013/59/Euratom laying down basic safety standards for protection against the dangers arising from exposure to ionising radiation[13];

– Chapter 7 of the Euratom Treaty concerning the EU's nuclear safeguards system. The programme also contributes to the Community's security agendas and strategies[14].

The Programme's actions should be used to address market failures or sub-optimal investment situations, in a proportionate manner, without duplicating or crowding out private financing and have a clear European added value. This will ensure consistency between the actions of the programme and EU State aid rules, avoiding undue distortions of competition in the internal market.

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7 Including the proposal for the extension of the programme for 2019-2020 (COM (2017) 698).

8 This initiative contributes to the following Commission priorities: Jobs, Growth and Investment; Digital Single Market; A Resilient Energy Union with a Forward-Looking Climate Change Policy; Deeper and Fairer Internal Market with a Strengthened Industrial Base; EU as stronger global actor.

9 'A Global Strategy for the EU's Foreign and Security Policy', June 2016.

10 OJ L 172, 2.7.2009, p. 18.

11 OJ L 219, 25.7.2014, p. 42.

12 OJ L 199, 2.8.2011, p. 48.

13 OJ L 13, 17.1.2014, p. 1.

14 European Agenda on Security COM(2015) 185 final; CBRN Action Plan COM(2017) 610 final

2. LEGAL BASIS, SUBSIDIARITY AND PROPORTIONALITY

2.1. Legal basis

The Euratom Treaty states that the Commission is responsible for promoting and facilitating nuclear research in the Member States and for complementing it by conducting a Community research and training programme (Article 4 of the Treaty). This programme is to be adopted by the Council, acting unanimously on a proposal from the Commission (Article 7 of the Treaty).

2.2. Subsidiarity

The problem addressed by the Euratom programme applies to the EU as a whole because nuclear safety and security issues transcend borders, and because developing fusion energy calls for research efforts on a very large scale. Though only half of Member States operate nuclear power plants as part of the national energy mix, many more operate reactors for research purposes or for radioisotope production. Given that a nuclear accident could affect several Member States, irrespective of borders, all EU countries have an interest in nuclear safety, even if they do not themselves operate reactors.

All Member States use radiation for medical purposes and in industrial applications (agriculture, food irradiation, metrology, etc.). While the relative importance of the issue may vary across the EU, all of them therefore have an interest in nuclear and radiation safety, and all of them produce varying quantities of radioactive waste which require processing and eventual disposal. The harmonised standards laid down by the various directives and the related research implications clearly underline the need to address technical and training issues uniformly across the EU.

Although nuclear security is a national responsibility, the Programme's direct actions help respond to some of the security challenges facing the EU and to their global dimensions in the field of nuclear detection, nuclear forensics and related training.

2.3. Proportionality

Measures will be taken at EU level to strengthen the overall research and innovation framework and coordinate Member States' research efforts so as to avoid duplication, retaining critical mass in key areas and ensuring public funds are spent to best effect. Such measures may leverage additional public and private investments in research and innovation. They are also needed to support EU policy-making and to meet the objectives set out in EU policies. The proposed measures do not go beyond what is required to achieve the Community's objectives.

2.4. Choice of instrument

The legal act takes the form of a regulation, as it creates rights and obligations for beneficiaries that are binding in their entirety and directly applicable in all EU Member States and countries associated with the programme.

3. RESULTS OF EX-POST EVALUATIONS, STAKEHOLDER CONSULTATIONS AND IMPACT ASSESSMENTS

3.1. Ex-post evaluations/fitness checks of existing legislation

The interim evaluation of the 2014-2018 Euratom programme[15] concluded that it is very relevant as regards all the activities covered, including nuclear safety, security and safeguards, radioactive waste management, radiation protection and fusion energy. As regards its efficiency and effectiveness, the evaluation identified a number of areas requiring action by the Commission and/or beneficiaries. It concluded that the following action should be taken:

– continue supporting nuclear research, focusing on nuclear safety, safeguards, security, waste management, radiation protection and developing fusion;

– further improve, together with beneficiaries, the organisation and management of the European Joint Programmes in the nuclear field;

– continue and step up Euratom's education and training measures, to develop relevant knowledge and skills underpinning all aspects of nuclear safety, security and radiation protection;

– further exploit synergies between the Euratom programme and other thematic areas of the Union Framework Programme, addressing cross-cutting aspects such as the medical applications of radiation, climate change, security and emergency preparedness, and the contribution to nuclear science;

– further exploit synergies between direct and indirect actions under the Euratom programme.

The Impact Assessment contains a more detailed explanation on how this proposal addresses these issues.

3.2. Stakeholder consultations

The Commission's services have conducted the following consultations: a general consultation on the Multiannual Financial Framework (MFF) and the 'Competitiveness' chapter including research (January - March 2018), a targeted consultation on some of the Programme's activities based on a web questionnaire (January - February 2018), and a workshop with research stakeholders held on 21 February 2018 in Brussels. The consultations covered the key areas relevant to the impact assessment, including relevance, effectiveness, efficiency, implementation and EU added value. Several research stakeholders also submitted position papers on different aspects of Euratom research to the Commission. The Impact Assessment summarizes the input received and how this was taken into account in the proposal.

3.3. Collection and use of expertise

In the course of drawing up its proposal, the Commission collected input and drew on expertise from a number of sources. In 2017, the Euratom Scientific and Technical Committee (STC) issued an opinion on the future Euratom programme, and two independent expert groups reported on the interim evaluation of direct and indirect actions implemented under the 2014-2018 Euratom programme[16]. In 2016, a separate panel of experts conducted a mid-term review of the European joint programme on fusion research, implemented by the EUROfusion

15 COM (2017) 697 and SWD(2017) 426 and 427.

16 https://ec.europa.eu/research/evaluations/index_en.cfm?pg=h2020evaluation

consortium. The Impact Assessment contains details on the expertise received and how this was taken into account in the proposal.

3.4. Impact assessment

This proposal is supported by an impact assessment on which the Regulatory Scrutiny Board issued a positive opinion.

The impact assessment accompanying this proposal focuses on the outcome of the Euratom Programme's interim evaluation and stakeholder consultation. It identifies the changes needed in the Programme's scope, objectives and method of implementation and takes account of the new MFF's cross-cutting objectives (flexibility; focus on performance, coherence and synergies; and simplification). It satisfies the requirements of the Financial Regulation as regards conducting an ex-ante evaluation for the proposed Council Regulation establishing the Euratom Research and Training Programme for 2021-2025.

3.5. Simplification

The Programme will be implemented using the instruments and rules of participation applicable to the Horizon Europe Framework Programme. Simplification measures proposed in Horizon Europe will be applicable to applicants to and beneficiaries of the Euratom programme. While ensuring the need for continuity, where appropriate, the proposed rules are expected to further reduce the administrative burden, continuing the simplification process pursued by the current programmes. The programme will be further simplified in that it will propose a single list of objectives for direct and indirect actions. Likely impacts on simplification and the administrative burden are explored in more detail in the impact assessment.

3.6. Fundamental rights

This Regulation respects fundamental rights and observes the principles recognised in the Charter of Fundamental Rights of the European Union.

4. BUDGETARY IMPLICATIONS

The budget for this proposal uses current prices. The legislative financial statement attached to the proposal sets out the implications in terms of the budget and human and administrative resources.

5. OTHER ASPECTS

5.1. Implementation plans and monitoring, evaluation and reporting arrangements

The Commission's services will implement the Programme. However, the Commission may decide, if this seems appropriate, to delegate implementation of certain parts of the Programme, as provided for by Article 10 of the Euratom Treaty, to Member States, persons or undertakings, or to third countries, international organisations or nationals of third countries.

Evaluations will be carried out in line with paragraphs 22 and 23 of the Interinstitutional Agreement of 13 April 2016[17], where the three institutions confirmed that evaluations of

[17] Interinstitutional Agreement between the European Parliament, the Council of the European Union and the European Commission on Better Law-Making of 13 April 2016; OJ L 123, 12.5.2016, p. 1–14

existing legislation and policy should provide the basis for impact assessments of options for further action. The evaluations will assess the programme's effects on the ground based on the programme indicators/targets and a detailed analysis of the degree to which the Programme can be deemed relevant, effective, efficient, provides enough EU added value and is coherent with other EU policies. They will include lessons learnt to identify any lacks/problems or any potential to further improve the actions or their results and to help maximise their exploitation/impact.

The monitoring and evaluation system, shared with Horizon Europe, provides for key impact pathways, which will help reporting on progress towards achieving the Programme objectives. These fall into four complementary impact categories (scientific, social, innovation and policy impacts), reflecting the nature of R&I investments. For each impact category, indicators will be used to report on progress in the short, medium and longer term. Direct and indirect actions will be subject to a common interim evaluation.

5.2. Detailed explanation of the specific provisions of the proposal

The proposal will change the existing Euratom programme as follows:

– Structure of specific objectives (Article 3 and Annex I): the basic act introduces a single set of specific objectives for both direct and indirect actions. This will enable the Commission, when drawing up work programmes, to propose combining instruments and assets such as its own research infrastructure and JRC's knowledge base. This approach is designed to meet one of the MFF's cross-cutting objectives: simplification and achieving synergies.

– Revision of specific objectives (Article 3 and Annex I):

- Reduction in the number of specific objectives from 13 in the 2014-18 programme to four, for both direct and indirect actions.
- Introduction of a specific objective on supporting EU policy on nuclear safety, safeguards and security.
- Definition of research support for decommissioning: eligible measures include research supporting the development and evaluation of technologies for decommissioning and environmental remediation of nuclear installations, and sharing best practice and knowledge. The focus on decommissioning reflects the increasing demand for such services, the principle of environmental remediation, and the many nuclear reactors that will be permanently shut down.
- Revision of the scope of research into radiation protection, which is intended to contribute to the safe use of the nuclear science and technology applications of ionising radiation, including the secure and safe supply and use of radioisotopes. Medical, industrial, space and research applications are some of the options.
- The single specific objective of fusion research reflects a shift towards the design of future fusion power plants. The new objective for fusion research combines three specific objectives from the current programme.
- Single specific objective for all measures needed to maintain and further develop expertise and excellence in the EU. It includes education and training measures, support for mobility, access to research infrastructure, technology

transfer and knowledge management and dissemination (the current programme has separate objectives for these measures).

– Opening of 'Marie Skłodowska-Curie Actions (MSCA)' to nuclear researchers: new provisions proposed for Horizon Europe and the Euratom Programme will make students and researchers in the nuclear field eligible for MSCA. In using a well-established instrument for supporting education and training in Europe, the new Programme is designed to meet one of the MFF's cross-cutting objectives: achieving synergies between funding instruments.

– Legal provisions facilitating synergies between the Euratom Programme and Horizon Europe (Annex 1 to the basic act for Horizon Europe): both basic acts will provide for synergies, the details of which will be decided in the work programmes, in consultation with the Member States.

For the new Euratom Programme, as for previous ones, the award criteria will be excellence, impact and the quality and efficiency of implementation.

Horizon Europe's rules on participation and dissemination will also apply to the Euratom Programme.

In implementing the Programme, the Commission will be assisted by a Committee (see Article 16) within the meaning of Regulation (EU) No 182/2011. It would meet in two configurations (fission and fusion), depending on the subject matter to be discussed.

2018/0226 (NLE)

Proposal for a

COUNCIL REGULATION

establishing the Research and Training Programme of the European Atomic Energy Community for the period 2021-2025 complementing Horizon Europe – the Framework Programme for Research and Innovation

THE COUNCIL OF THE EUROPEAN UNION,

Having regard to the Treaty establishing the European Atomic Energy Community, and in particular the first paragraph of Article 7 thereof,

Having regard to the proposal from the European Commission,

Having regard to the opinion of the European Parliament[1],

Having regard to the opinion of the European Economic and Social Committee[2] ,

Whereas:

(1) One of the aims of the European Atomic Energy Community (the 'Community') is to contribute to the raising of the standard of living in the Member States including by promoting and facilitating nuclear research in the Member States and complementing it by carrying out a Community research and training programme.

(2) Nuclear research can contribute to social well-being, economic prosperity and environmental sustainability by improving nuclear safety, security and radiation protection. Radiation protection research has led to improvements in medical technologies from which many citizens benefit and that research can now lead to improvements in other sectors such as industry, agriculture, environment and security. Equally important is the potential contribution of nuclear research to the long-term decarbonisation of the energy system in a safe, efficient and secure way.

(3) In order to ensure continuity of nuclear research at Community level, it is necessary to establish the Research and Training Programme of the Community for the period from 1 January 2021 to 31 December 2025 (the 'Programme'). The Programme should continue carrying out the key research activities of previous programmes, while introducing new specific objectives, and using the same mode of implementation.

(4) The Commission's Report on the interim evaluation of the 2014-18 Euratom Research and Training Programme (COM(2017) 697 final) provides a set of guiding principles for the Programme. These include: to continue supporting nuclear research focused on nuclear safety, safeguards, security, waste management, radiation protection and development of fusion; to further improve, together with beneficiaries, the organisation and management of the European Joint Programmes in the nuclear field; to continue and reinforce the Euratom education and training actions for developing relevant competencies which underpin all aspects of nuclear safety, security and radiation protection; to further exploit synergies between Euratom

[1] Opinion of ..... Opinion delivered following non-compulsory consultation.
[2] OJ C..... Opinion delivered following non-compulsory consultation.

programme and other thematic areas of the Union Framework Programme; and to further exploit synergies between direct and indirect actions of the Euratom programme.

(5) The conception and design of the Programme is set against the need to establish a critical mass of supported activities. This is achieved by establishing a limited number of specific objectives focussed on safe use of nuclear fission for power and non-power applications, maintaining and developing necessary expertise, fostering fusion energy and supporting policy of the Union on nuclear safety, safeguards and security

(6) Fusion energy research is being implemented in accordance with the European Fusion Roadmap, which outlines the research and developments required to provide the basis for an electricity-generating fusion power plant. In the short to medium term the key step is the construction and exploitation of ITER and a vigorous fusion research programme shall complement the European activities on ITER in order to support the future ITER operations and the preparation for DEMO.

(7) By supporting nuclear research, the Programme should contribute to achieving the objectives of the Horizon Europe - Framework Programme for Research and Innovation ('Horizon Europe'') established by Regulation (EU) No […] of the European Parliament and of the Council[3] and should facilitate implementation of the Europe 2030 strategy and strengthening of the European Research Area.

(8) The Programme should seek synergies with Horizon Europe and other Union programmes, from their design and strategic planning, to project selection, management, communication, dissemination and exploitation of results, to monitoring, auditing and governance. With a view to avoiding overlaps and duplication and increasing the leverage of EU funding, transfers from other Union programmes to Horizon Europe activities can take place. In such cases they will follow Horizon Europe rules.

(9) The Programme's actions should however be used to address market failures or sub-optimal investments situations, in a proportionate manner, without duplicating or crowding out private financing and have a clear European added value. This will ensure consistency between the actions of the programme and EU State aid rules, avoiding undue distortions of competition in the internal market.

(10) This Regulation lays down a financial envelope for the Euratom Research and Training Programme which is to constitute the prime reference amount, within the meaning of [reference to be updated as appropriate according to the new inter-institutional agreement: point 17 of the Interinstitutional Agreement of 2 December 2013 between the European Parliament, the Council and the Commission on budgetary discipline, on cooperation in budgetary matters and on sound financial management], for the European Parliament and the Council during the annual budgetary procedure.

(11) Regulation (EU, Euratom) No[…] of the European Parliament and of the Council[4] (the 'Financial Regulation') should apply to the Programme, unless otherwise specified in this Regulation. It lays down rules on the implementation of the Union budget, including the rules on grants, prizes, procurement, indirect implementation, financial assistance, financial instruments and budgetary guarantees.

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[3] Regulation (EU) No […] of the European Parliament and of the Council of […] establishing EU FP9 - the Framework Programme for Research and Innovation (2021-2027) and repealing Regulation (EU) No 1291/2013 (OJ […]).

[4]

(12) The types of financing and the methods of implementation under this Regulation should be chosen on the basis of their ability to achieve the specific objectives of the actions and to deliver results, taking into account, in particular, the costs of controls, the administrative burden, and the expected risk of non-compliance. For grants, this should include consideration of the use of lump sums, flat rates and unit costs.

(13) Horizontal financial rules adopted by the European Parliament and the Council on the basis of Article 322 of the Treaty on the Functioning of the European Union and Article 106a of the Euratom Treaty apply to this Regulation. These rules are laid down in the Financial Regulation and determine in particular the procedure for establishing and implementing the budget through grants, procurement, prizes, indirect implementation, and provide for checks on the responsibility of financial actors. Rules adopted on the basis of Article 322 TFEU and of Article 106a of the Euratom treaty also concern the protection of the Union's budget in case of generalised deficiencies as regards the rule of law in the Member States, as the respect for the rule of law is an essential precondition for sound financial management and effective Community funding.

(14) The policy objectives of this Programme may be also addressed through financial instruments under the policy window research and innovation of the InvestEU Fund. Financial support should be used to address market failures or sub-optimal investment situations, in a proportionate manner and actions should not duplicate or crowd out private financing or distort competition in the Internal market. Actions should have a clear European added value.

(15) In order to ensure the most efficient implementation possible and achieve a coherent, comprehensive and transparent framework for beneficiaries, participation in the Programme, and dissemination of research results should be subject to the relevant rules of Horizon Europe with certain adaptations or exceptions. Definitions and main types of action set out in Horizon Europe should apply to the Programme.

(16) The participant guarantee fund set up under Horizon 2020 and managed by the Commission has proved to be an important safeguard mechanism which mitigates the risks associated with the amounts due and not reimbursed by defaulting participants. Therefore, it should be continued and the Mutual Insurance Mechanism ('the Mechanism') established pursuant to Horizon Europe should also cover actions under this Regulation.

(17) The Joint Research Centre (JRC) should continue to provide Union policies with independent customer-driven scientific evidence and technical support throughout the whole policy cycle. The direct actions of the JRC should be implemented in a flexible, efficient and transparent manner, taking into account the relevant needs of the users of the JRC and the needs of Union policies, and ensuring the protection of the financial interests of the Union. The JRC should continue to generate additional resources.

(18) In accordance with the Financial Regulation, Regulation (EU, Euratom) No 883/2013 of the European Parliament and of the Council[5], Council Regulation (Euratom, EC) No 2988/95[6],Council Regulation (Euratom, EC) No 2185/96[7] and Council Regulation (EU)

[5] Regulation (EU, Euratom) No 883/2013 of the European Parliament and of the Council of 11 September 2013 concerning investigations conducted by the European Anti-Fraud Office (OLAF) and repealing Regulation (EC) No 1073/1999 of the European Parliament and of the Council and Council Regulation (Euratom) No 1074/1999,(OJ L248, 18.9.2013, p. 1.

[6] Council Regulation (EC, Euratom) No 2988/95 of 18 December 1995 on the protection of the European Communities financial interests (OJ L 312, 23.12.95, p.1).

[7] Council Regulation (Euratom, EC) No 2185/96 of 11 November 1996 concerning on-the-spot checks and inspections carried out by the Commission in order to protect the European Communities' financial interests against fraud and other irregularities (OJ L292,15.11.96 , , p.2).

2017/193[8], the financial interests of the Union are to be protected through proportionate measures, including the prevention, detection, correction and investigation of irregularities, including fraud, the recovery of funds lost, wrongly paid or incorrectly used and, where appropriate, the imposition of administrative sanctions. In particular, in accordance with Regulation (EU, Euratom) No 883/2013 and Regulation (Euratom, EC) No 2185/96 the European Anti-Fraud Office (OLAF) may carry out administrative investigations, including on-the-spot checks and inspections, with a view to establishing whether there has been fraud, corruption or any other illegal activity affecting the financial interests of the Union. In accordance with Regulation (EU) 2017/1939, the European Public Prosecutor's Office (EPPO) may investigate and prosecute fraud and other criminal offences affecting the financial interests of the Union as provided for in Directive (EU) 2017/1371 of the European Parliament and of the Council[9]. In accordance with the Financial Regulation, any person or entity receiving Union funds is to fully cooperate in the protection of the Union's financial interests, to grant the necessary rights and access to the Commission, OLAF, the EPPO and the European Court of Auditors (ECA) and to ensure that any third parties involved in the implementation of Union funds grant equivalent rights.

(19) In order to ensure uniform conditions for the implementation of the actions under the Programme, implementing powers should be conferred on the Commission. Those powers should be exercised in accordance with Regulation (EU) No 182/2011 of the European Parliament and of the Council[10].

(20) Pursuant to paragraph 22 and 23 of the Inter-institutional agreement for Better Law-Making of 13 April 2016, there is a need to evaluate this Programme on the basis of information collected through specific monitoring requirements, while avoiding overregulation and administrative burdens, in particular on Member States. These requirements, where appropriate, can include measurable indicators, as a basis for evaluating the effects of the Programme on the ground.

(21) The Board of Governors of the Joint Research Centre (the 'JRC'), set up by Commission Decision 96/282/Euratom[11], has been consulted on the scientific and technological content of the direct actions of the JRC.

(22) The Commission has consulted the Euratom Scientific and Technical Committee.

(23) For reasons of legal certainty, Regulation (Euratom) No […] should be repealed,

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8 Council Regulation (EU) 2017/1939 of 12 October 2017 implementing enhanced cooperation on the establishment of the European Public Prosecutor's Office ('the EPPO') (OJ L283, 31.10.2017,, p.1).

9 Directive (EU) 2017/1371 of the European Parliament and of the Council of 5 July 2017 on the fight against fraud to the Union's financial interests by means of criminal law (OJ L 198, 28.7.2017, p. 29).

10 Regulation (EU) No 182/2011 of the European Parliament and of the Council of 16 February 2011 laying down the rules and general principles concerning mechanisms for control by the Member States of the Commission's exercise of implementing powers (OJ L 55, 28.2.2011, p. 13)

11 Commission Decision 96/282/Euratom of 10 April 1996 on the reorganization of the Joint Research Centre (OJ L 107, 30.4.1996, p. 12).

HAS ADOPTED THIS REGULATION:

CHAPTER I

GENERAL PROVISIONS

Article 1

Subject matter

This Regulation establishes the Research and Training Programme of the European Atomic Energy Community for the period from 1 January 2021 to 31 December 2025 (the 'Programme') and the rules for participation and dissemination in indirect actions under this the Programme.

It lays down the objectives of the Programme, the budget for the period 2021-2025, the forms of the European Atomic Energy Community (the 'Community') funding and the rules for providing such funding.

Article 2

Definitions

For the purposes of this Regulation, the definitions set out in Regulation (EU) No xxx of the European Parliament and of the Council ('Horizon Europe')[12] apply. References in the defintions to the Union and the Programme shall be construed as references to the Community and this Programme. By derogation, 'work programme' means the document adopted by the Commission for the implementation of the Programme in accordance with Article 16 of this Regulation.

Article 3

Programme objectives

1. The Programme has the following general objectives:

   (a) to pursue nuclear research and training activities to support continuous improvement of nuclear safety, security and radiation protection;

   (b) to potentially contribute to the long-term decarbonisation of the energy system in a safe, efficient and secure way.

2. The Programme has the following specific objectives:

   (a) improve the safe and secure use of nuclear energy and non-power applications of ionizing radiation, including nuclear safety, security, safeguards, radiation protection, safe spent fuel and radioactive waste management and decommissioning;

   (b) maintain and further develop expertise and competence in the Community;

   (c) foster the development of fusion energy and contribute to the implementation of the fusion roadmap;

   (d) support the policy of the Community on nuclear safety, safeguards and security.

3. The objectives listed in paragraphs 1 and 2 shall be implemented in accordance with Annex I.

[12] Full title + OJ reference

Article 4

Budget

1. The financial envelope for the implementation of the Programme shall be EUR 1 675 000 000 in current prices.

2. The indicative distribution of the amount referred to in paragraph 1 shall be:

   (a) EUR 724 563 000 for fusion research and development;

   (b) EUR 330 930 000 for nuclear fission, safety and radiation protection;

   (c) EUR 619 507 000 for direct actions undertaken by the Joint Research Centre.

   The Commission may not deviate, within the annual budgetary procedure, from the amount referred to in paragraph 2 (c) of this Article.

3. The amount referred to in paragraph 1 may also cover expenses for preparation, monitoring, control, audit, evaluation and other activities and expenditures necessary for managing and implementing the Programme, including administrative expenditure, as well as evaluating the achievement of its objectives. It may moreover cover expenses relating to the studies, meetings of experts, information and communication actions, in so far as they are related to the objectives of the Programme, as well as expenses linked to information technology networks focusing on information processing and exchange, including corporate information technology tools and other technical and administrative assistance needed in connection with the management of the Programme.

4. If necessary, appropriations may be entered in the budget beyond 2025 to cover the expenses provided for in paragraph 3, to enable the management of actions not completed by 31 December 2027.

5. Budgetary commitments for actions extending over more than one financial year may be broken down over several years into annual instalments.

6. Without prejudice to the Financial Regulation, expenditure for actions resulting from projects included in the first work programme may be eligible as from 1 January 2021.

7. Resources allocated to Member States under shared management and transferrable in accordance with Article 21 of Regulation (EU) XX […Common Provisions Regulation] may, at their request, be transferred to the Programme. The Commission shall implement those resources directly in accordance with point (a) of Article 62(1) of the Financial Regulation or indirectly in accordance with point (c) of that Article. Where possible, those resources shall be used for the benefit of the Member State concerned.

Article 5

Third countries associated to the Programme

1. The Programme shall be open to association of the following third countries:

   (a) acceding countries, candidate countries and potential candidates, in accordance with the general principles and general terms and conditions for the participation of those countries in Community programmes established in the respective framework agreements and Association Council decisions, or similar agreements, and in accordance with the specific conditions laid down in agreements between the Community and those countries;

(b) countries covered by the European Neighbourhood Policy, in accordance with the general principles and general terms and conditions for the participation of those countries in Community programmes established in the respective framework agreements and Association Council decisions, or similar agreements, and in accordance with the specific conditions laid down in agreements between the Community and those countries;

(c) third countries and territories that fulfil all of the following criteria:

– a good capacity in science, technology and innovation;

– commitment to a rules-based open market economy, including fair and equitable dealing with intellectual property rights, backed by democratic institutions;

– active promotion of policies to improve the economic and social well-being of citizens.

Association to the Programme of each of the third countries under point (c) shall be in accordance with the conditions laid down in a specific agreement covering the participation of the third country to any Community or Union Programme, provided that the agreement:

– ensures a fair balance as regards the contributions and benefits of the third country participating in the Programme;

– lays down the conditions of participation in the Programme, including the calculation of financial contributions to the Programme and its administrative costs. These contributions shall constitute assigned revenues in accordance with Article 21(5) of the Financial Regulation;

– does not confer to the third country a decisional power on the Programme;

– guarantees the rights of the Union to ensure sound financial management and to protect its financial interests.

2. The scope of association of each third country to the Programme shall take into account the objective of driving economic growth in the Union through innovation. Accordingly, with the exception of acceding countries, candidate countries and potential candidates, parts of the Programme may be excluded from an association agreement for a specific country.

3. The association agreement shall, where appropriate, provide for the participation of legal entities established in the Union in equivalent programmes of associated countries in accordance with the conditions laid down therein.

4. The conditions determining the level of financial contribution shall ensure an automatic correction of any significant imbalance compared to the amount that entities established in the associated country receive through participation in the Programme, taking into account the costs in the management, execution and operation of the Programme.

Article 6

Implementation and forms of funding

1. The Programme shall be implemented in direct management in accordance with the Financial Regulation or in indirect management with funding bodies referred to in Article 61(1)(c) of the Financial Regulation.

2. The Programme may provide funding in any of the forms laid down in the Financial Regulation, in particular grants, prizes and procurement. It may also provide financing in the form of financial instruments within blending operations.

3. The main types of action to be used under the Programme are set out and defined in Annex II to Horizon Europe.

4. The Programme shall also support direct actions undertaken by the JRC.

Article 7

European Partnerships

1. Parts of the Programme may be implemented through European Partnerships.

2. The involvement of the Community in European Partnerships may take any of the following forms:

   (a) participation in partnerships set up on the basis of memoranda of understanding or contractual arrangements between the Commission and public or private partners specifying the objectives of the partnership, related commitments for financial and/or in-kind contributions of the partners, key performance and impact indicators, and outputs to be delivered. They include the identification of complementary research and innovation activities that are implemented by the partners and by the Programme (co-programmed European Partnerships);

   (b) participation in and financial contribution to a programme of research and innovation activities, based on the commitment of the partners for financial and in-kind contributions and integration of their relevant activities using a Programme co-fund action (co-funded European Partnerships).

3. European Partnerships shall:

   (a) Be established in cases where they will more effectively achieve objectives of the Programme than the Community alone.

   (b) Adhere to the principles of Union added value, transparency, openness, impact, leverage effect, long-term financial commitment of all the involved parties, flexibility, coherence and complementarity with Union, local, regional national and international initiatives.

   (c) Be limited in time and shall include conditions for phasing-out the Programme funding.

4. Provisions and criteria for their selection, implementation, monitoring, evaluation and phasing-out are set out in Annex III to Horizon Europe.

Article 8

Open access and open science

The provisions on open access and open science set out in Horizon Europe shall apply to the Programme.

Article 9

Eligible actions and rules for participation and dissemination of research results

1. Only actions implementing the objectives referred to in Article 3 are eligible for funding.

2. Subject to the third and fourth paragraphs of this article, Title II on rules for participation of Horizon Europe shall apply to actions supported under the Programme. References therein to the Union and the Programme shall be construed as references to the Community and this Programme, where appropriate. References therein to 'security rules' shall include the defence interests of the Member States within the meaning of Article 24 of the Euratom Treaty.

3. By way of derogation from Article 36(4) of Horizon Europe, the right to object may extend to grants of non-exclusive licenses.

4. By way of derogation from Article 37(5) of Horizon Europe, a beneficiary that has received Community funding shall grant access to its results to the Community institutions, funding bodies or the Joint undertaking Fusion for Energy for the purpose of developing, implementing and monitoring Community policies and programmes or obligations under international cooperation with third countries and international organisations,. Such access rights shall include the right to authorise third parties to use the results in public procurement and the right to sub-license and shall be limited to non-commercial and non-competitive use and shall be granted on a royalty-free basis.

5. The mutual insurance mechanism established pursuant to Horizon Europe shall cover the risk associated with non-recovery of sums due by beneficiaries to the Commission or funding bodies under this Regulation.

Article 10

Cumulative, complementary and combined funding

1. The Programme shall be implemented in synergy with other Union funding programmes, In order to achieve the objectives of the Programme and to address challenges common to the Programme and to Horizon Europe, activities cutting across the objectives set out in the Programme or those implementing Horizon Europe, or both, may benefit from the Community financial contribution. In particular, the Programme may provide a financial contribution to the Marie Skłodowska-Curie Actions (MSCA) in order to support activities relevant for nuclear research.

2. An action that has received a contribution from another Union programme may also receive a contribution under the Programme, provided that the contributions do not cover the same costs. The rules of each contributing Union programme shall apply to its respective contribution to the action. The cumulative funding shall not exceed the total eligible costs of the action and the support from the different Union programmes may be calculated on a pro-rata basis in accordance with the documents setting out the conditions for support.

3. Actions which comply with the following cumulative, comparative, conditions:

   (a) they have been assessed in a call for proposals under the Programme;

   (b) they comply with the minimum quality requirements of that call for proposals;

   (c) they may not be financed under that call for proposals due to budgetary constraints,

may receive support from the European Regional Development Fund, the Cohesion Fund, the European Social Fund+ or the European Agricultural Fund for Rural Development, in accordance with paragraph 5 of Article [67] of Regulation (EU) XX [Common Provisions Regulation] and Article [8] or Regulation (EU) XX [Financing, management and monitoring of the Common Agricultural Policy], provided that such actions are consistent with the objectives of the programme concerned. The rules of the Fund providing support shall apply.

CHAPTER II

PROGRAMMING, MONITORING, EVALUATION AND CONTROL

Article 11

Work programmes

1. The Programme shall be implemented by work programmes referred to in Article 110 of Financial Regulation by means of implementing acts in accordance with the examination procedure pursuant to Article 16(4). Work programmes shall set out, where applicable, the overall amount reserved for blending operations.

2. In addition to the requirements of Article 110 of the Financial Regulation, the work programmes shall include the following:

   (a) an indication of the amount allocated to each action and an indicative implementation timetable;

   (b) for grants, the priorities, the selection and award criteria and the relative weight of the different award criteria and the maximum rate of funding of the total eligible costs;

   (c) any additional obligations for beneficiaries, in accordance with Articles 35 and 37 of Horizon Europe.

3. For multi-annual work programme on direct actions undertaken by the JRC, the Commission shall seek the opinion of the Board of Governors of the JRC in accordance with Decision 96/282/Euratom.

Article 12

Monitoring and reporting

1. Indicators to report on the progress of the Programme towards the achievement of the objectives established in Article 3 are set out in Annex II along impact pathways.

2. To ensure effective assessment of progress of the Programme towards the achievement of its objectives, the Commission shall adopt implementing acts to develop the provisions for a monitoring and evaluation framework, including through amendments to Annex II to review and complement the impact pathway indicators where necessary and set baselines and targets. Those implementing acts shall be adopted in accordance with the advisory procedure pursuant to Article 16(3).

3. The performance reporting system shall ensure that data for monitoring programme implementation and results are collected efficiently, effectively and in a timely manner. To that end, proportionate reporting requirements shall be imposed on recipients of Community funds and, where relevant, on Member States.

Article 13

Information, communication, publicity and dissemination and exploitation

1. The recipients of the Programme funding shall acknowledge the origin and ensure the visibility of the Community funding (in particular when promoting the actions and their results) by providing coherent, effective and proportionate targeted information to multiple audiences, including the media and the public.

2. The Commission shall implement activities on information and communication relating to the Programme, and its actions, and results. Financial resources allocated to the Programme shall also contribute to the corporate communication of the political priorities of the Community, as far as they are related to the objectives referred to in Article 3.

3. The Commission shall also establish a dissemination and exploitation strategy for increasing the availability and diffusion of the Programme's research and innovation results and knowledge to accelerate exploitation towards market uptake and boost the impact of the Programme. Financial resources allocated to the Programme shall also contribute to the corporate communication of the political priorities of the Community as well as information, communication, publicity, dissemination and exploitation activities as far as they are related to the objectives referred to in Article 3.

Article 14

Evaluation

1. Evaluations shall be carried out in a timely manner to feed into the decision-making process on the programme, its successor and other initiatives relevant to research and innovation.
2. The interim evaluation of the Programme shall be carried out once there is sufficient information available about the implementation of the Programme, but no later than three years after the start of the programme implementation. It shall include an assessment of the long-term impact of previous Euratom Programmes and shall form the basis to adjust programme implementation, as appropriate.
3. At the end of the implementation of the Programme, but no later than four years after the end of the period specified in Article 1, a final evaluation of the Programme shall be carried out by the Commission. It shall include an assessment of the long-term impact of previous Programmes.
4. The Commission shall communicate the conclusions of the evaluations, accompanied by its observations, to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions.

Article 15

Audits

1. The control system for the Programme shall ensure an appropriate balance between trust and control, taking into account administrative and other costs of controls at all levels, especially for beneficiaries.
2. Actions that receive joint funding from different Union programmes shall be audited only once, covering all involved programmes and their respective applicable rules.
3. The Commission or funding body may rely on combined systems reviews at beneficiary level. Those combined reviews shall be optional for certain types of beneficiaries and shall consist in a systems and process audit, complemented by an audit of transactions, carried out by a competent independent auditor qualified to carry out statutory audits of accounting documents in accordance with Directive 2006/43/EC of the European Parliament and of the Council. They may be used by the Commission or funding body to determine overall assurance on the sound financial management of expenditure and for reconsideration of the level of ex-post audits and certificates on financial statements.

4. In accordance with Article 127 of the Financial Regulation, the Commission or funding body may rely on audits on the use of Community contributions carried out by other persons or entities, including by other than those mandated by the Union institutions or bodies.

5. Audits may be carried out up to two years after the payment of the balance.

Article 16

Committee procedure

1. The Commission shall be assisted by a Committee. That committee shall be a committee within the meaning of Regulation (EU) No 182/2011.

2. The Committee shall meet in two different configurations, dealing respectively with fission related aspects and fusion related aspects of the Programme.

3. Where reference is made to this paragraph, Article 4 of Regulation (EU) No 182/2011 shall apply.

4. Where reference is made to this paragraph, Article 5 of Regulation (EU) No 182/2011 shall apply.

5. Where the opinion of the Committee is to be obtained by written procedure, that procedure shall be terminated without result when, within the time-limit for delivery of the opinion, the chair of the Committee so decides or a simple majority of Committee members so requests.

6. The Commission shall regularly inform the Committee of the overall progress of the implementation of the Programme and shall provide it with timely information on all actions proposed or funded under the Programme.

Article 17

Protection of financial interests of the Union

1. The Commission or its representatives, and the Court of Auditors, shall have the power of audit or, in the case of international organisations, the power of verification in accordance with agreements reached with them, on the basis of documents and on-the-spot, over all grant beneficiaries, contractors and subcontractors who have received Union funds under this Regulation.

2. The European Anti-Fraud Office (OLAF) may carry out administrative investigations, including on-the-spot checks and inspections, in accordance with the provisions and procedures laid down in Regulation (EU, Euratom) No 883/2013 of the European Parliament and of the Council and Council Regulation (Euratom, EC) No 2185/96, with a view to establishing whether there has been fraud, corruption or any other illegal activity affecting the financial interests of the Union in connection with Union funding or budgetary guarantees under this Regulation.

3. Competent authorities of third countries and international organisations may also be required to cooperate with the European Public Prosecutor's Office (EPPO), in accordance with Mutual Legal Assistance Agreements, when it carries out investigations into criminal offences falling within its competence in accordance with Regulation (EU) 2017/1939.

4. Without prejudice to paragraphs 1 and 2, cooperation agreements with third countries and with international organisations, contracts, grant agreements and other legal commitments, as well as agreements establishing a budgetary guarantee, resulting from the implementation of this Regulation shall contain provisions expressly empowering the Commission, the Court of

Auditors and OLAF to conduct such audits, on-the-spot checks and inspections, according to their respective competences. This shall include provisions to ensure that any third parties involved in the implementation of Union funds or of a financing operation supported, in whole or in part, by a budgetary guarantee grant equivalent rights.

CHAPTER III

TRANSITIONAL AND FINAL PROVISIONS

Article 18

Repeal

Regulation [*No: ...establishing the Euratom Programme 2019-2020*] is repealed with effect from 1 January 2021.

Article 19

Transitional provisions

1. This Regulation shall not affect the continuation or modification of the actions concerned, under Regulation [*the Euratom Programme 2019-2020*], which shall continue to apply to those actions until their closure.
2. Where necessary, any remaining tasks of the Committee established by Regulation [*the Euratom Programme 2019-2020*] shall be undertaken by the Committee referred to in Article 16.
3. The financial envelope for the Programme may also cover technical and administrative assistance expenses necessary to ensure the transition between the Programme and the measures adopted under its predecessor, [*the Euratom Programme 2019-2020*].
4. Reflows from financial instruments established by Regulation [*the Euratom Programme 2019-2020*] may be invested in the Invest EU programme established by Regulation XX[13].

Article 20

Entry into force

This Regulation shall enter into force on the twentieth day following that of its publication in the *Official Journal of the European Union*.

This Regulation shall be binding in its entirety and directly applicable in all Member States.

Done at Brussels,

For the Council
The President

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LEGISLATIVE FINANCIAL STATEMENT

1. FRAMEWORK OF THE PROPOSAL/INITIATIVE

1.1. Title of the proposal/initiative

1.2. Policy area(s) concerned *(programme cluster)*

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1. FRAMEWORK OF THE PROPOSAL/INITIATIVE

1.1. Title of the proposal/initiative

Council Regulation establishing the Research and Training Programme of the European Atomic Energy Community for the period 2021-2025 complementing the Horizon Europe - Framework Programme for Research and Innovation and repealing Council Regulation on the Research and Training Programme of the European Atomic Energy Community (2019-2020) complementing the Horizon 2020 Framework Programme for Research and Innovation.

1.2. Policy area(s) concerned *(Programme cluster)*

01.03 Euratom Research and Training Programme

1.3. The proposal/initiative relates to:

X a new action

☐ a new action **following a pilot project/preparatory action**[1]

☐ **the extension of an existing action**

☐ **a merger or redirection of one or more actions towards another/a new action**

1.4. Grounds for the proposal/initiative

1.4.1. Requirement(s) to be met in the short or long term including a detailed timeline for roll-out of the implementation of the initiative

Use of power and non-power applications of nuclear energy requires a continuous effort in reducing safety and security risks and in supporting the development of safe and secure nuclear technologies and optimal radiation protection. A growing number of different application of ionising radiation requires protection of the people and the environment from unnecessary exposure to radiation. Ionising radiation technologies are used every day in Europe in a number of fields such as health, industry and research, providing large benefits to European citizens and European economy. Public and private research in Member States can significantly contribute to providing these benefits and the task of Euratom is to complement national efforts by carrying out a Community-based research and training programme.

Euratom-supported research should help Member States and industry in meeting the requirements of the Euratom Treaty and of a series of directives:

– Council Directive 2014/87/Euratom of 8 July 2014 amending Directive 2009/71/Euratom establishing a Community framework for the nuclear safety of nuclear installations, which introduces a high-level, EU-wide safety objective to prevent accidents and avoid radioactive releases outside a nuclear installation. This Directive highlights the need for Member States to use research results in its implementation and creates a system of peer reviews.

– Council Directive 2011/70/Euratom establishing a Community framework for the responsible and safe management of spent fuel and radioactive waste

[1] As referred to in Article 58(2)(a) or (b) of the Financial Regulation.

– Council Directive 2013/59/Euratom laying down basic safety standards for protection against the dangers arising from exposure fo ionising radiation.

– provisions of the Euratom safeguards requirements established in the chapter 7 of the Euratom Treaty and the regulations related to their application.

The proposed programme will be implemented from 2021 for 5 years in line with Article 7 of the Euratom Treaty, with a possibility of extension for 2 years until 2027 in line with the duration of the Horizon Europe and Multiannual Financial Framework.

The proposed programme will continue with the key research activities of the on-going Euratom programme (radiation protection, nuclear safety, security, waste management, radiation protection and fusion energy), while increasing emphasis on non-power applications of ionising radiation and decommissioning.

1.4.2. Added value of Union involvement (it may result from different factors, e.g. coordination gains, legal certainty, greater effectiveness or complementarities). For the purposes of this point 'added value of Union involvement' is the value resulting from Union intervention which is additional to the value that would have been otherwise created by Member States alone.

The key European added value of the Programme is the mobilisation of a wider pool of excellence, expertise and multi-disciplinarity in fission and fusion research than is possible at the level of individual Member States. Nuclear and ionising radiation technologies continue to play an important role in the lives of European citizens, whether this concerns energy and its security of supply or the use of radiation and radionuclides in medical and industrial applications. Safe and secure use of these technologies is of paramount importance and research programmes help maintaining the highest safety, security and safeguards standards in this field. The Programme focuses also on the development of fusion energy, a potentially inexhaustible and climate-friendly energy source.

An EU-wide approach to nuclear safety, radioactive waste management and radiation protection is important to ensure the highest standards for protection of citizens and environment across Europe and beyond. The programme also enables a broader coordination of education and training throughout Europe, the use of research infrastructures and international cooperation. This is of particular benefit to smaller Member States that can take advantage of economies of scale afforded by the Europe-wide pooling effect. The programme provides, through the Joint Research Centre (JRC), an important independent scientific advice in support of the implementation of European policies in the field of nuclear safety, radioactive waste management, radiation protection, nuclear security, safeguards and non-proliferation. With its unique infrastructure and laboratories, JRC plays a crucial role in nuclear research and trainings in Europe. The involvement of European industry in fusion research activities foster innovation e.g. through the development of high-tech spin-off products in other sectors such as medical and aviation.

1.4.3. Lessons learned from similar experiences in the past

Pursuant to Article 22 of Regulation (Euratom) No 1314/2013 the Commission carried out in 2017 an interim evaluation of the 2014-2018 Euratom programme. Its report (COM(2017)697) sets out a strategic overview of the evaluation process and its responses to the recommendations of the independent expert groups. The accompanying Commission staff working documents (SWD(2017)426 and 427)

provide more details on the evaluation with regard to relevance, efficiency, effectiveness and European added value. Key messages from evaluation are as follows:

– Continue supporting nuclear research focused on nuclear safety, safeguards, security, waste management, radiation protection and development of fusion

– Further improve, together with beneficiaries, the organisation and management of the European Joint Programmes in the nuclear field.

– Continue and reinforce the Euratom education and training actions for developing relevant competencies which underpin all aspects of nuclear safety, security and radiation protection.

– Further exploit synergies between Euratom programme and other thematic areas of EU Framework Programme in order to address cross-cutting aspects such as medical applications of radiation, climate change, security and emergency preparedness and the contribution of nuclear science

– Further exploit synergies between direct and indirect actions of the Euratom programme

1.4.4. Compatibility and possible synergy with other appropriate instruments

The Euratom programme complements and provides synergies with the Horizon Europe Research and Innovation Programme in areas such as health (medical applications of ionising radiation), security, energy and education and training. The Euratom fusion research programme will be carried out in full complementarity and coordination with ITER activities. The programme will continue the alignment of Member State's programmes in fusion, radiation protection and management of radioactive waste via the implementation of European Joint Programmes. Moreover, synergies with the Decommissioning of Nuclear facilities Programmes are expected in areas such as technology development and testing, training and exchange of best practices.

The programme is consistent with all relevant Union policies in fields relating to research and innovation in general, and nuclear and related safety aspects in particular. It thus supports the implementation of:

– Council Directive 2009/71/Euratom establishing a Community framework for the nuclear safety of nuclear installations, as amended by Council Directive 2014/87/Euratom;

– Council Directive 2011/70/Euratom establishing a Community framework for the responsible and safe management of spent fuel and radioactive waste;

– Council Directive 2013/59/Euratom laying down basic safety standards for protection against the dangers arising from exposure to ionising radiation.

– Chapter 7 of the Euratom Treaty related to the EU's nuclear safeguards system.

1.5. Duration and financial impact

X limited duration

– **X** in effect from 01/01/2021 to 31/12/2025.

– **X** Financial impact from 2021 to 2025 for commitment appropriations and from 2021 to 2031 for payment appropriations.

☐ **unlimited duration**

– Implementation with a start-up period from YYYY to YYYY,

followed by full-scale operation.

1.6. Management mode(s) planned[2]

X Direct management by the Commission

– **X** by its departments, including by its staff in the Union delegations;

– ☐ by the executive agencies

☐ **Shared management** with the Member States

☐ **Indirect management** by entrusting budget implementation tasks to:

– ☐ third countries or the bodies they have designated;

– ☐ international organisations and their agencies (to be specified);

– ☐ the EIB and the European Investment Fund;

– ☐ bodies referred to in Articles 70 and 71 of the Financial Regulation;

– ☐ public law bodies;

– ☐ bodies governed by private law with a public service mission to the extent that they provide adequate financial guarantees;

– ☐ bodies governed by the private law of a Member State that are entrusted with the implementation of a public-private partnership and that provide adequate financial guarantees;

– ☐ persons entrusted with the implementation of specific actions in the CFSP pursuant to Title V of the TEU, and identified in the relevant basic act.

– *If more than one management mode is indicated, please provide details in the 'Comments' section.*

Comments

The programme will be implemented directly by Commission's departments. However, the Commission may decide, if deemed appropriate, to entrust the carrying out of certain parts of the programme to Member States, persons or undertakings, or to third countries, international organisations or nationals of third countries in accordance with Article 10 of the Euratom Treaty.

[2] Details of management modes and references to the Financial Regulation may be found on the BudgWeb site: https://myintracomm.ec.europa.eu/budgweb/EN/man/budgmanag/Pages/budgmanag.aspx

2. MANAGEMENT MEASURES

2.1. Monitoring and reporting rules

Specify frequency and conditions.

Short, medium and long term indicators have been set on the basis of a number of impact pathways. Reporting rules for participants have been designed with these indicators in mind, but also with a conscious intention to limit the administrative burden for participants. Wherever possible data will be collected from open sources.

All data on the management processes (applications, success rates, time to grant, type of beneficiaries, etc.) will be collected and stored, and made available in real time via a dedicated data storage. Today the reference system (CORDA) works well and is available for Member States and other interested bodies.

Report will be produced giving information on management processes (from year one) and, progressively, information on outputs and results. An interim evaluation and a final evaluation are planned.

In addition, the JRC's direct actions are assessed internally by means of an annual internal evaluation and externally through peer review by a number of top-level experts selected in consultation with the JRC's Board of Governors.

2.2. Management and control system(s)

2.2.1. Justification of the management mode(s), the funding implementation mechanism(s), the payment modalities and the control strategy proposed

The Euratom programme will be implemented in direct management mode. However, the Commission, may decide, if deemed appropriate and effective, the implementation of Euratom activities through shared and/or indirect management.

The control strategy will be based on:

– procedures for selecting the best projects and translating them into legal instruments;

– project and contract management throughout the lifetime of every project;

– ex-ante checks on 100% of claims,

– certificates on the financial statements above a certain threshold;

– ex-post audits on a sample of paid claims;

– and scientific evaluation of project results.

The first indications from Horizon 2020 (including Euratom programme) audits are that error rates have been maintained well within the expected range (see section 2.2.2). This demonstrates that, even if it can still be further developed, simplification measures already introduced have been effective.

2.2.2. Information concerning the risks identified and the internal control system(s) set up to mitigate them

The basic funding model to date has been the reimbursement of eligible costs. As the European Court of Auditors has consistently pointed out, most recently in its 2016 Annual Report, "the principal risk to the regularity of transactions is that beneficiaries declare ineligible costs which are neither detected nor corrected before

[reimbursement]. This risk is particularly high for the Seventh Framework Programme [and by analogy Euratom programme], which has complex eligibility rules that are often misinterpreted by beneficiaries (especially those less familiar with the rules, such as SMEs, first-time participants and non-EU entities)".

The Court recognised the value of the simplifications introduced in Horizon 2020 [and thus also for the Euratom 2014-2018 programme]. It did however recommend, in its 2016 Annual Report, the wider use of Simplified Cost Options (SCOs). Such SCOs are already in use in parts of the programme, or for specific types of expenditure.

For grants, the estimated representative rate of error for Seventh Framework Programme [including Euratom] was 5%, with a "residual" error rate of around 3%, after taking account of all recoveries and corrections that have been or will be implemented. However, the error rates were lower in those parts of the programme where it was possible to use Simplified Cost Options (SCOs) more widely and/or where a small and stable group of beneficiaries were involved.

The first results of Horizon 2020 (including Euratom programme) suggest a representative error rate of around 3%, with a residual error rate less than 2.5%. Note, however, that this is an early estimate which should be used with care, it is likely to rise, perhaps to the 3-4% level (the level or error anticipated by the Commission for its Horizon 2020 and Euratom 2014-2018 proposal was 3.5%, although this did not take account of various additional complexities added during the legislative process). The residual error rate should remain some way below 3%; it is too early to say whether a rate of 2% will be attained.

Some errors arise because beneficiaries have not understood the rules. These errors can be addressed by simplification, although some complexity will always remain. Other errors arise because beneficiaries have not followed the rules. Although this is in a minority of cases, simplification of the current rules will not resolve them.

An analysis of error rates[33] has been carried out for the Horizon 2020 (including Euratom programme) and audits so far performed shows that:

- Around 63% of the error relates to errors in the charging of personnel costs. Regular problems identified are incorrect calculation of productive hours; incorrect rates or incorrect number of hours charged.

- Around 22% of the error relates to other direct costs (not personnel). The most regular error identified is the lack of direct measurement of costs.

- Around 6% of the error relates to sub-contracting costs, 4% to travel costs and 5% to other categories. Note that indirect costs, 28% of the error in Seventh Framework Programme (including Euratom), has been reduced to almost zero thanks to the introduction of the flat rate of indirect costs.

The errors identified during audits of Horizon 2020 and Euratom programme show that some could be avoided by simplifications and the avoidance of unnecessary formalism in rules. Some changes have already been made in Horizon 2020 and in Euratom (new rules for internal invoicing and additional remuneration for example), and others will be made where possible in Horizon Europe and Euratom programme

[33] % of the value in EUR vs all adjustments in direct costs in favour of the EU Budget

2021-2025. However, such changes will now be limited in their effect on the error rate, generally only avoiding small errors.

The wider use of SCOs such as flat rates and unit costs, as well as continuing simplification of the rules, will assist in lowering the future error rate, estimated at 3-4% on a representative basis. However, the underlying problem of errors in a funding method based on the reimbursement of eligible costs remains. In such a system the representative error rate might be reduced to 2.5-3.5%, with the residual error rate, after corrections, expected to be around (but not necessarily below) 2%.

Horizon 2020 saw the introduction of lump sum funding for the SME stage 1 scheme. This allows for a payment of EUR 50 000 on delivery of a satisfactory scientific deliverable. No additional justification for this payment, such as invoices, timesheets, proofs of payment, etc., are required. There are no financial errors.

Lump sum funding was proposed for Horizon 2020 but was considered to be unsuitable or premature. Nevertheless, the Commission is, in the Horizon 2020 Work Programme for 2018, implementing pilot schemes based on lump sum funding. At the same time it has undertaken a number of communication actions to allay the concerns of stakeholders about this form of funding.

The pilot scheme has to be evaluated, especially to see if it achieves all the objectives of the Programme (not just lowering the error rate). But, clearly, wider use of flat rate funding would reduce the error rate. However, it would move the risks to other stages of the internal control system – evaluation will become more important, as will the assessment of the deliverable.

The Euratom programme proposal allows the Commission to use the lump sum funding model and the Commission intends to use this funding model more widely. However, it is too early to say how widely it can be used. This will depend on the results of the pilots currently under way.

The number of transactions involved means that a high level of systematic ex-ante control would be very expensive. The current control strategy therefore relies on risk-based ex-ante controls and ex-post controls to assess the level of error and to detect and recover ineligible amounts. As the error rates have remained within the range established this control strategy is considered to be effective. Further development of some aspects is included, for example the inclusion of systems and processes audit, but radical change is not proposed.

2.2.3. Estimation and justification of the cost-effectiveness of the controls (ratio of "control costs ÷ value of the related funds managed"), and assessment of the expected levels of risk of error (at payment & at closure)

The estimate of the costs of the control system (evaluation, selection, project management, ex-ante and ex-post control) are in the range of 3-4 % across the Commission services responsible for the implementation of the previous Framework Programmes for 2017 (including costs for the management of the Seventh Framework Programme and Horizon 2020). This is considered to be a reasonable cost in the light of the efforts needed to ensure that objectives are achieved and the number of transactions.

The expected risk of error at payment for grants with a funding model based on the reimbursement of eligible costs is 2.5-3.5%. The risk of error at closure (after the effect of controls and corrections) is around (but not necessarily below) 2%.The

expected risk of error for grants with a funding model based on lump sum funding is close to 0% (at payment and at closure).The overall expectation for error rates will depend on the balance between the two methods of funding (reimbursement of eligible costs and lump sums). The Commission aims to apply the lump sum funding model where appropriate. However, the main driver to adopt lump sum funding will not be reduction of the error rate, but the achievement of all the objectives of the programme. This scenario is based on the assumption that the measures of simplification are not subject to substantial modifications in the decision making process.

Note: this section only concerns the process of grant management, for administrative and operational expenditure implemented through public procurement processes the risk of error at payment and closure should be below 2%.

2.3. Measures to prevent fraud and irregularities

Specify existing or envisaged prevention and protection measures, e.g. from the Anti-Fraud Strategy.

The Commission services charged with the implementation of the Euratom programme are determined to fight against fraud at all stages of the grant management process. They have developed, and are implementing, anti-fraud strategies, including an enhanced use of intelligence, especially using advanced IT tools, and training and information for staff. These efforts will continue. Overall the measures proposed should have a positive impact on the fight against fraud, especially the greater emphasis on risk based audit and reinforced scientific evaluation and control.

The current Anti-Fraud Strategy of the Commission services responsible for the implementation of the previous Euratom programmes, covering grants, as well as the anti-fraud strategies relating to other expenditure, will be updated after the revision of the Commission's Anti-Fraud Strategy in 2018. This will also cover risks related to lump sum funding, which has different risks that need to be taken into account.

It should be underlined that detected fraud has been very low in proportion to total expenditure, nevertheless the Directorates General charged with the implementation of the research budget remain committed to combat it.

The legislation will ensure that audits and on-the-spot checks can be carried out by the Commission services, including OLAF, using the standard provisions recommended by OLAF.

3. ESTIMATED FINANCIAL IMPACT OF THE PROPOSAL/INITIATIVE

3.1. Heading of the multiannual financial framework and new expenditure budget line(s) proposed

Heading of multiannual financial framework	Budget line	Type of expenditure	Contribution			
	1. Single market, Innovation and Digital	Diff./Non-diff.[34]	from EFTA countries[35]	from candidate countries[36]	from third countries	within the meaning of Article [21(2)(b)] of the Financial Regulation
H1	01.010301 Expenditure related to officials and temporary staff implementing research and innovation programmes - Euratom programme 01.010302 External personnel implementing research and innovation programmes - Euratom programme 01.010303 Other management expenditure for research and innovation programmes - Euratom programme 01.030100 Fusion research and development 01.030201 Nuclear fission, safety and radiation protection 01.030202 Direct actions undertaken by the Joint Research Centre	Non-diff. Diff.	NO	YES	YES	NO

[34] Diff. = Differentiated appropriations / Non-diff. = Non-differentiated appropriations.
[35] EFTA: European Free Trade Association.
[36] Candidate countries and, where applicable, potential candidates from the Western Balkans.

3.2. Estimated impact on expenditure

3.2.1. Summary of estimated impact on expenditure

EUR million (to three decimal places)

Heading of multiannual financial framework	**1**	Single market, Innovation and Digital

			2021	**2022**	**2023**	**2024**	**2025**	**Post 2025**	**TOTAL**
Operational appropriations (split according to the budget lines listed under 3.1)	Commitments	(1)	202.364	205.998	210.531	214.085	219.475		1 052.453
	Payments	(2)	4.171	174.120	180.924	196.838	202.306	294.094	1 052.453
01 03 01 fusion research and development	Commitments	(1a)	130.964	133.300	136.249	138.523	142.054		681.089
	Payments	(2a)		125.000	128.000	132.000	135.000	161.089	681.089
01 03 02 01 fission, safety and radiation protection	Commitments	(1b)	59.815	60.882	62.229	63.268	64.881		311.074
	Payments	(2b)		40.000	42.000	53.000	55.000	121.074	311.074
01 03 02 02 direct actions undertaken by the Joint Research Center (JRC)	Commitments	(1c)	11.585	11.817	12.053	12.294	12.541		60.290
	Payments	(2c)	4.171	9.120	10.924	11.838	12.306	11.931	60.290
Appropriations of an administrative nature financed from the envelope of the programme[37]	Commitments = Payments	(3)	119.636	122.002	124.469	126.915	129.525		622.547
TOTAL appropriations for the envelope of the programme	Commitments	=1+3	**322.000**	**328.000**	**335.000**	**341.000**	**349.000**		**1 675.000**
	Payments	=2+3	**123.807**	**296.122**	**305.393**	**323.753**	**331.831**	**294.094**	**1 675.000**

[37] Technical and/or administrative assistance and expenditure in support of the implementation of EU programmes and/or actions (former 'BA' lines), indirect research, direct research.

Heading of multiannual financial framework	7	'Administrative expenditure'

EUR million (to three decimal places)

		2021	2022	2023	2024	2025	*Post 2025*	TOTAL
Human resources								
Other administrative expenditure								
TOTAL appropriations under HEADING 7 of the multiannual financial framework	(Total commitments = Total payments)							

EUR million (to three decimal places)

		2021	2022	2023	2024	2025	*Post 2025*	TOTAL
TOTAL appropriations across HEADINGS of the multiannual financial framework	Commitments	322.000	328.000	335.000	341.000	349.000		**1 675.000**
	Payments	123.807	296.121	305.393	323.753	331.831	294.094	**1 675.000**

3.2.2. Summary of estimated impact on appropriations of an administrative nature

– ☐ The proposal/initiative does not require the use of appropriations of an administrative nature

– X The proposal/initiative requires the use of appropriations of an administrative nature, as explained below:

EUR million (to three decimal places)

Years	2021	2022	2023	2024	2025	TOTAL
HEADING 7 of the multiannual financial framework						
Human resources						
Other administrative expenditure						
Subtotal HEADING 7 of the multiannual financial framework						
Outside HEADING 7[38] of the multiannual financial framework						
Human resources[39]	79.863	81.550	83.274	85.034	86.833	**416.554**
Other expenditure of an administrative nature[40]	39.773	40.452	41.195	41.881	42.692	**205.993**
Subtotal outside HEADING 7 of the multiannual financial framework	119.636	122.002	124.469	126.915	129.525	**622.547**
TOTAL	**119.636**	**122.002**	**124.469**	**126.915**	**129.525**	**622.547**

The administrative appropriations required will be met by the appropriations which are already assigned to management of the action and/or which have been redeployed, together if necessary with any additional allocation which may be granted to the managing DG under the annual allocation procedure and in the light of existing budgetary constraints.

38 Technical and/or administrative assistance and expenditure in support of the implementation of EU programmes and/or actions (former 'BA' lines), indirect research, direct research.

39 These figures include only the authorised staff in place in 2020 in Directorates General and do not include the additional staff paid from the contributions of the future associated countries as well as the necessary staff in case the Commission decides, if deemed appropriate, to entrust the carrying out of certain parts of the programme in accordance with Article 10 of the Euratom Treaty.

40 These figures represent the estimated maximum administrative expenditures needed for the implementation of the legal base.

3.2.2.1. Estimated requirements of human resources

– ☐ The proposal/initiative does not require the use of human resources.

– ☑ The proposal/initiative requires the use of human resources, as explained below:

Estimate to be expressed in full time equivalent units

Years		2021	2022	2023	2024	2025
Establishment plan posts (officials and temporary staff)						
Headquarters and Commission's Representation Offices						
Delegations						
Research		556	556	556	556	556
External staff (in Full Time Equivalent unit: FTE) - AC, AL, END, INT and JED						
Financed from HEADING 7 of the multiannual financial framework	- at Headquarters					
	- in Delegations					
Financed from the envelope of the programme[41]	- at Headquarters					
	- in Delegations					
Research		185	185	185	185	185
Other (specify)						
TOTAL		**741**	**741**	**741**	**741**	**741**

These figures include only the authorised staff in place in 2020 in Directorates General and do not include the additional staff paid from the contributions of the future associated countries as well as the necessary staff in case the Commission decides, if deemed appropriate, to entrust the carrying out of certain parts of the programme in accordance with Article 10 of the Euratom Treaty.

The human resources required will be met by staff from the DG who are already assigned to management of the action and/or have been redeployed within the DG, together if necessary with any additional allocation which may be granted to the managing DG under the annual allocation procedure and in the light of budgetary constraints.

Description of tasks to be carried out:

Officials and temporary staff	Tasks derived from the managerment and implementation of the nuclear research and training programme, in particular related to nuclear waste management, nuclear safety and nuclear safeguards, security and to nuclear fusion.
External staff	

[41] Sub-ceiling for external staff covered by operational appropriations (former 'BA' lines).

3.2.3. Third-party contributions

The proposal/initiative:

– ☐ does not provide for co-financing by third parties

– X provides for the co-financing by third parties estimated below:

Appropriations in EUR million (to three decimal places)

Years	2021	2022	2023	2024	2025	TOTAL
Specify the co-financing body						
TOTAL appropriations co-financed[42]	p.m.	p.m.	p.m.	p.m.	p.m.	p.m.

3.3. Estimated impact on revenue

– ☐ The proposal/initiative has no financial impact on revenue.

– X The proposal/initiative has the following financial impact:

– ☐ on own resources

– X on other revenue

please indicate, if the revenue is assigned to expenditure lines X

EUR million (to three decimal places)

Budget revenue line:	Impact of the proposal/initiative				
	2021	2022	2023	2024	2025
Item 6011 Item 6012 Item 6013 Item 6031	p.m.	p.m.	p.m.	p.m.	p.m.

For assigned revenue, specify the budget expenditure line(s) affected.

01.03XX Appropriations accruing from contributions from third parties

Other remarks (e.g. method/formula used for calculating the impact on revenue or any other information).

Third countries may contribute to the programme through association agreements. The conditions determining the level of financial contribution will be laid down in association agreements with each country and shall ensure an automatic correction of any significant imbalance compared to the amount that entities established in the associated country receive through participation in the programme, taking into account the costs in managing the programme.

[42] Bilateral Association Agreements are not fixed yet. Contributions from associated countries will come on top of the amounts presented in this Legislative Financial Statement.

Annexes to the proposal

COM(2018) 437 final

EUROPEAN
COMMISSION

Brussels, 7.6.2018
COM(2018) 437 final

ANNEXES 1 to 2

ANNEXES

to the

Proposal for a

COUNCIL REGULATION

establishing the Research and Training Programme of the European Atomic Energy Community for the period 2021-2025 complementing Horizon Europe – the Framework Programme for Research and Innovation

ANNEX I

The specific objectives listed under Article 3(2) pursued across the Programme, according to the broad lines of activity described in this annex. By implementing these specific objectives, the Programme supports Member States in the implementation of the Euratom legislation[1] and reinforces their research efforts and those of the private sector.

In order to achieve the specific objectives, the Programme will support cross-cutting activities that ensure synergy of research efforts in solving common challenges. Appropriate links and interfaces, such as joint calls, will be ensured with the Horizon Europe. Related research and innovation activities may also benefit from financial support provided by the Funds under Regulation [Common Provisions Regulation] as far as in line with these Funds' objectives and regulations.

Activities listed in this annex include international cooperation in nuclear research and innovation for peaceful uses, based on shared goals and mutual trust with the aim of providing clear and significant benefits for the Union, its citizens and environment. This includes International cooperation through multilateral frameworks (such as IAEA, IEA, OECD, ITER, GIF). JRC as the Euratom Implementing Agent for the Generation IV International Forum (GIF) will continue coordinating the Community contribution to GIF.

The priorities of the work programmes are to be established by the Commission on the basis of its policy priorities, inputs from national public authorities and nuclear research stakeholders grouped in bodies or frameworks such as European technology platforms, associations, initiatives and technical forums for nuclear systems and safety, management of radioactive waste, spent nuclear fuel and radiation protection/low-dose risk, nuclear safeguards and security, fusion research, or any relevant organisation or forum of nuclear stakeholders.

Research and training in the following fields will be eligible for funding from the Programme:

(a) Improve the safe and secure use of nuclear energy and non-power applications of ionizing radiation, including nuclear safety, security, safeguards, radiation

[1] In particular Council Directive 2009/71/Euratom of 25 June 2009 establishing a Community framework for the nuclear safety of nuclear installations as amended by Council Directive 2014/87/Euratom of 8 July 2014; Council Directive 2011/70/Euratom of 19 July 2011 establishing a Community framework for the responsible and safe management of spent fuel and radioactive waste; Council Directive 2006/117/Euratom of 20 November 2006 on the supervision and control of shipments of radioactive waste and spent fuel between Member States and into and out of the Community; Council Directive 2013/59/Euratom of 5 December 2013 laying down basic safety standards for protection against the dangers arising from exposure to ionising radiation, and repealing Directives 89/618/Euratom, 90/641/Euratom, 96/29/Euratom, 97/43/Euratom and 2003/122/Euratom, Council Directive 2013/51/Euratom of 22 October 2013 laying down requirements for the protection of the health of the general public with regard to radioactive substances in water intended for human consumption and Council Regulation (Euratom) 2016/52 of 15 January 2016 laying down maximum permitted levels of radioactive contamination of food and feed following a nuclear accident or any other case of radiological emergency.

protection, safe spent fuel and radioactive waste management and decommissioning

(1) **Nuclear safety:** safety of reactor systems and fuel cycles, in use in the Community or, to the extent necessary in order to maintain broad nuclear safety expertise in the Community, those reactor types and fuel cycles, which may be used in the future, focusing exclusively on safety aspects, including all aspects of the fuel cycle such as partitioning and transmutation.

(2) **Safe spent fuel and radioactive waste management:** management and in particular disposal of intermediate, high-level and long-lived radioactive waste and spent nuclear fuel, and of other radioactive waste streams and types for which industrially mature processes currently do not exist; Radioactive waste minimisation and reducing the radiotoxicity of this waste; Management and transfer of knowledge and competences between generations and across Member States' programmes in radioactive waste and spent fuel management.

(3) **Decommissioning:** research for the development and evaluation of technologies for decommissioning and environmental remediation of nuclear facilities; support for sharing best practices and knowledge on decommissioning.

(4) **Nuclear science and ionizing radiation applications, radiation protection, emergency preparedness**:

- Applications of nuclear science and ionizing radiation technologies in medical, industrial and research fields
- Risks from low doses from industrial, medical or environmental exposure.
- Emergency preparedness for accidents involving radiation, and research on radioecology.
- Supply and use of radioisotopes.
- Research on models for radiological dispersion in the environment, and support for data exchange, alert systems and cooperation on measurement techniques[2] (to be implemented by direct actions).

(5) **Nuclear security, safeguards and non-proliferation** (to be implemented by direct actions):

- Methods and technology to support and strengthen the Community's and international safeguards.
- Operational support and training to the Euratom safeguard system.
- Technical support to the implementation of the Non-Proliferation Treaty in the field of nuclear safeguards including support to strengthen EU export control regime.
- Support for the global CBRN (Chemical, Biological, Radiological, Nuclear) framework and related Community strategies.

[2] Art. 35, 36, 38 Euratom; Council Decision 87/600/Euratom

– Methods and technology for detection of nuclear and radioactive materials outside regulatory control and prevention of and response to incidents involving such materials including nuclear forensics.

– Support for the capacity building on nuclear security using the European Nuclear Security Training Centre.

(b) Maintain and further develop expertise and competence in the Union

(1) Education, training and mobility, including education and training schemes such as Marie Skłodowska-Curie Actions (MSCA).

(2) Promotion of innovation, knowledge management, dissemination and exploitation of nuclear science and technology

(3) Support for technology transfer from the research to industry.

(4) Support for the preparation and development of a competitive European fusion industrial capacity.

(5) Support for the provision, availability and appropriate access of European and international research infrastructures, including JRC's infrastructures[3].

(6) For fostering nuclear science as a base to support standardisation, direct actions will provide state-of-the-art reference data, materials and measurements related to nuclear safety, safeguards and security, as well as other applications as nuclear medicine.

(c) Foster the development of fusion energy and contribute to the implementation of the fusion roadmap

A Co-funded European Partnership in fusion research will implement the roadmap towards the goal of fusion electricity production by the second half of this century. This may include inter alia:

(1) Exploiting existing and future fusion facilities. For this purpose operating grants may be allocated to fusion research infrastructures when appropriate.

(2) Preparation for future fusion power plants by developing all relevant aspects including materials, technologies and designs.

(3) Implementing a focused education and training programme in addition to activities under (b)(1).

(4) Coordination of common activities with the Joint Undertaking Fusion for Energy.

(5) Collaboration with the ITER Organisation.

(6) Scientific collaboration in the framework of the Euratom international agreements.

The Co-funded European Partnership in fusion will be implemented through a grant to be awarded to the legal entities established or designated by the Member States and any third

[3] On the basis of the rolling investment plan for the JRC's infrastructures

country associated to the Programme. The grant may include resources in kind from the Community, or the secondment of Commission staff.

(d) Support the policy of the Community on nuclear safety, safeguards and security

The direct actions will support the Union policy on nuclear safety, safeguards and security and implementation of the relevant legislation by providing independent scientific and technical evidence and expertise.

ANNEX II

Key Impact Pathways Indicators

Impact pathways, and related key impact pathway indicators, shall structure the monitoring of the Euratom Programme performance towards its specific objectives. The impact pathways are time-sensitive: they distinguish between the short, medium and long term. Impact pathway indicators serve as proxies to report on the progress made towards achievement of specific objectives. The micro-data behind the key impact pathway indicators, which are shared with the Horizon Europe will be collected in a centrally managed and harmonised way, with minimal reporting burden on the beneficiaries. The key impact pathway indicators may be refined during the implementation of the Programme.

Scientific impact pathways indicators

The Programme is expected to make progress as regards knowledge for reinforcing nuclear safety and security; safe applications of ionising radiation; spent fuel and radioactive waste management; radiation protection; and the development of fusion energy. Progress in this area will be measured by indicators concerning scientific publications, progress in the implementation of the fusion roadmap, development of expertise and skills, access to research infrastructures.

<table>
<tr><th>Towards scientific impacts</th><th>Short-term</th><th>Medium-term</th><th>Longer-term</th></tr>
<tr><td rowspan="2">Improving the safe and secure use of nuclear energy and non-power applications of ionizing radiation, including nuclear safety, security, safeguards, radiation protection, safe spent fuel and radioactive waste management and decommissioning.</td><td><u>Publications</u> –
number of Euratom peer-reviewed scientific publications</td><td><u>Citations</u> -
Field-Weighted Citation Index of Euratom peer-reviewed scientific publications</td><td><u>World-class science</u> - Number and share of peer reviewed publications from Euratom programme that are core contribution to scientific fields</td></tr>
<tr><td><u>Shared knowledge</u> -
Share of research outputs (open data/ publication/ software etc.) shared through open knowledge infrastructure</td><td><u>Knowledge diffusion</u> - Share of open access research outputs actively used/cited</td><td><u>New collaborations</u> - Share of Euratom beneficiaries having developed new transdisciplinary/ trans-sectoral collaborations with users of their open Euratom R&I outputs</td></tr>
<tr><td>Fostering the development of fusion energy</td><td colspan="3"><u>Progress in the implementation of the fusion roadmap</u> –
Percentage of the fusion roadmap’s milestones established for the period 2021-2025 reached by the Euratom programme</td></tr>
<tr><td>Maintaining and further developing expertise and excellence in the Union</td><td><u>Skills</u> -
Number of researchers having benefitted from upskilling activities of the Euratom programme (through training, mobility and access to</td><td><u>Careers</u> -
Number and share of upskilled researchers with more influence in their R&I field</td><td><u>Working conditions</u> -
Number and share of upskilled researchers with improved working conditions</td></tr>
</table>

	infrastructure)		
	The number of researchers having access to research infrastructure through the programme support		
	Reference materials delivered and reference measurements incorporated to a library	Number of international standards modified	

Societal impacts pathways indicators

The Programme helps addressing EU policy priorities concerning nuclear safety and security, radiation protection and ionising radiation applications through research and innovation, as shown by the portfolios of projects generating outputs contributing to tackling challenges in these fields. Societal impact is also measured in terms of specific development in the field of nuclear security and safeguards.

Towards societal impacts	**Short-term**	**Medium-term**	**Longer-term**
Improving the safe and secure use of nuclear energy and non-power applications of ionizing radiation, including nuclear safety, security, safeguards, radiation protection, safe spent fuel and radioactive waste management and decommissioning	Outputs - Number and share of outputs aimed at addressing specific EU policy priorities	Solutions - Number and share of innovations and scientific results addressing specific EU policy priorities	Benefits - Aggregated estimated effects from use of Euratom-funded results, on tackling specific EU policy priorities, including contribution to the policy and law-making cycle
	Number of services delivered in support of safeguards in EU	Number of technical systems provided and in use	
	Number of training sessions delivered to front-line officers		
	Co-creation - Number and share of Euratom projects where EU citizens and end-users contribute to the co-creation of R&I content	Engagement - Number and share of Euratom beneficiary entities with citizen and end-users engagement mechanisms after Euratom project	Societal R&I uptake Uptake and outreach of Euratom co-created scientific results and innovative solutions

Innovation impact pathway indicators

The Programme is expected to deliver innovation impacts supporting progress towards its specific objectives. Progress in this area will be measured by indicators concerning intellectual property rights (IPR), innovative products, methods and processes and their use, along with job creation.

Towards economic / innovation impact	Short-term	Medium-term	Longer-term
Improving the safe and secure use of nuclear energy and non-power applications of ionizing radiation, including nuclear safety, security, safeguards, radiation protection, safe spent fuel and radioactive waste management and decommissioning Fostering the development of fusion energy	Innovative outputs - Number of innovative products, processes or methods from Euratom programme (by type of innovation) and Intellectual Property Rights (IPR) applications	Innovations - Number of innovations from Euratom projects (by type of innovation) including from awarded IPRs	Economic growth - Creation, growth and market shares of companies having developed Euratom funded innovations
	Supported employment - Number of FTE jobs created and jobs maintained in beneficiary entities for the Euratom project (by type of job)	Sustained employment - Increase of FTE jobs in beneficiary entities following Euratom project (by type of job)	Total employment - Number of direct and indirect jobs created or maintained due to diffusion of Euratom results (by type of job)
Maintaining and further developing expertise and excellence in the Union	Amount of public and private investment mobilised with the initial Euratom investment	Amount of public and private investment mobilised to exploit or scale up Euratom results	EU progress towards 3 % GDP due to Euratom programme

Policy impact pathways indicators

The Programme provides scientific evidence for policy-making. This in particular concerns scientific support for other Commission services, such as the support to Euratom safeguards, or to the implementation by Member States of nuclear and ionising radiation-related directives[4].

Towards policy impact	Short-term	Medium-term	Longer-term
Supporting Union policy on nuclear safety, safeguards and security	Number and share of Euratom projects producing policy-relevant findings	Number of outputs having a demonstrable impact on the EU policy	Number and share of Euratom projects findings cited in policy/programmatic documents

Targets will be defined for both indirect and direct actions to reflect the expected results for each part of the programme.

[4] Council Directive 2014/87/Euratom of 8 July 2014 amending Directive 2009/71/Euratom establishing a Community framework for the nuclear safety of nuclear installations; Council Directive 2011/70/Euratom of 19 July 2011 establishing a Community framework for the responsible and safe management of spent fuel and radioactive waste; and Commission Regulation (Euratom) No 302/2005 of 8 February 2005 on the application of Euratom safeguards.

Proposal for a Council Decision amending Decision 2007/198/Euratom establishing the European Joint Undertaking for ITER and the Development of Fusion Energy and conferring advantages upon it

4

(COM(2018) 445 final)

EUROPEAN
COMMISSION

Brussels, 7.6.2018
COM(2018) 445 final

2018/0235 (NLE)

Proposal for a

COUNCIL DECISION

amending Decision 2007/198/Euratom establishing the European Joint Undertaking for ITER and the Development of Fusion Energy and conferring advantages upon it

{SWD(2018) 325 final} - {SWD(2018) 326 final}

EXPLANATORY MEMORANDUM

1. CONTEXT OF THE PROPOSAL

This proposal provides for a date of application as of 1 January 2021 and is presented for a Union of 27 Member States, in line with the notification by the United Kingdom of its intention to withdraw from the European Union and Euratom based on Article 50 of the Treaty on European Union received by the European Council on 29 March 2017.

Fusion is expected to play an important role in Europe's future energy landscape as a virtually inexhaustible climate-friendly energy source. This proposal for a Council Decision seeks to secure funding for continued European participation in the ITER project aiming at key scientific breakthroughs in the development of fusion. It is particularly important following the 2015 Paris Agreement on climate change and the EU commitement to lead the way in decarbonising the economy and tackling climate change in a cost effective manner.

European participation in ITER is based on the ITER Agreement signed in November 2006 between seven global partners, Euratom, the United States, the Russian Federation, Japan, China, South Korea and India. ITER represents a unique first-of-a-kind project developed through international scientific collaboration which allows for the synergies and mobilisation of financial resources that would not be possible for a single state.

As the Host Party of the project according to the ITER Agreement, Europe has a stronger legal commitment under the ITER Agreement and accordingly has taken the lead in this project with a 45% share of the construction costs[1] (the other ITER Members' shares are around 9% each) to ensure timely completion of the construction. This proposal for a Council Decision amends the Council Decision (2007/198/Euratom) of 27 March 2007 establishing the European Joint Undertaking for ITER and the Development of Fusion Energy and conferring advantages upon it to provide the basis for the financing of the activities of this Joint Undertaking (hereinafter "Fusion for Energy") for the period 2021-2027 under the Euratom Treaty.

The 2007 Council Decision had already been amended by the Council Decision 2013/791/Euratom of 13 December 2013 to allow a financing of the Fusion for Energy activities. This proposal, which follows the same logic, is based on Article 47 of the Euratom Treaty and refers to the participation of Euratom in the financing of the Joint Undertaking during the Multi-annual Financial Framework 2021-2027.

The presently proposed amendment allows securing the financing of the project for the next Multiannual Financial Framework while it does not prevent voluntary contributions from Members of the Joint Undertaking other than Euratom as provided for in Article 12(1)(c) of the Statutes of that Undertaking.

The ITER Council endorsed in 2016 an updated schedule and associated cost estimates for the completion of the ITER construction. The new schedule targets the achievement of First Plasma in December 2025, as the earliest technically achievable date for the ITER construction, with the full performance operation, using deuterium-tritium fuel (the so-called Deuterium-Tritium phase) estimated in 2035. This schedule, together with the associated

[1] As per the Cost sharing for all Phases of the ITER Project agreed in 2006 between the ITER Parties. This cost distribution will change in the operation phase, with Europe providing 34%.

revised costs[2], form the basis of the new baseline of the ITER project; it does not include contingencies and therefore assumes that all major risks can be mitigated.

In its Communication to the European Parliament and the Council of the EU "EU contribution to a reformed ITER Project"[3] of 14 June 2017 and its accompanying Staff Working Document the Commission presented estimates of cost for the construction phase (for Europe only). For the period 2021-2027 the amount from EU budget[4], including the Commission's administrative expenditure related to the Fusion for Energy tasks and any other relevant activities, was[5] estimated at about EUR 6.1 billion (in current value)[6].

On 12 April 2018 the Council of the EU drew conclusions on the basis of the Communication from the Commission and reaffirmed the continued commitment of Euratom to the successful completion of the ITER project. The Council declared that it will endeavour to make available the resources for the Fusion for Energy activities within the limits of the Multiannual Financial Framework for the period 2021-2027. On this basis the Council mandated the Commission to approve the new ITER project baseline (scope, schedule and costs) on behalf of Euratom at an ITER Council meeting at Ministerial level.

The transfer of funds will be aligned with the period covered by the Multiannual Financial Framework and run for seven years. According to the ITER Agreement, the ITER project will have an initial duration of 35 years (i.e. until 2042); thus, subsequent Council decisions will be needed to continue to fund the Euratom contribution to this project.

The successful construction and operation of ITER is on the critical path of the European fusion roadmap which represents a comprehensive goal-oriented path to fusion electricity and has been endorsed by all fusion research stakeholders in Europe[7]. This Decision will accordingly facilitate synergies and complementarities with fusion research activities funded under the Euratom Research and Training Programme 2021-2025[8]. This Decision will also allow completing the activities carried out in the frame of the Broader Approach Agreement concluded between Euratom and Japan and complementing the international collaboration in the framework of the ITER Agreement.

The proposal has been prepared in order to ensure close interactions with other programmes, namely the EU FP9 and the Euratom FP9 proposals. The rationale is quite clear as ITER is a first of a kind innovative project in the energy area that needs close support from the research and innovation side, conducted in particular through Euratom research programmes, but also through the EU research programmmes. In this respect the texts of both programmes (Euratom and EU FP9) under the next MFF have been reinforced to ensure that the necessary interactions related to ITER are clearly stated.

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2 The revised cost estimates were approved by the ITER Council *ad referendum*, pending the decisions by the budgetary authorities of the ITER Parties.

3 COM(2017) 319 of 14.06.2017 and accompanying SWD(2017)232

4 In addition to the funding from EU budget, France as Host State of the project contributes at present directly to F4E budget in about 20% of the Euratom contribution. Furthermore, each year F4E Members pay a membership contribution to the Joint Undertaking.

5 SWD(2017)232, Table 4, p.24

6 This estimation does not include the contingencies on schedule and cost.

7 https://www.euro-fusion.org/eurofusion/roadmap/

8 See Commission proposal COM(2018)437

2. RESULTS OF CONSULTATIONS WITH THE INTERESTED PARTIES AND IMPACT ASSESSMENTS

This proposal takes full account of the responses to the Multiannual Financial Framework open public consultation that was organised under the coordination of the Secretariat General of the European Commission and was launched on 10 January and run until 8 March 2018. Furthermore, the proposal takes full account of consultations with stakeholders undertaken in the course of the preparatory activities which included an ex-ante evaluation and stakeholder events and surveys. While the open public consultations did not raise particular issues regarding the continuation of ITER funding, focused stakeholder consultations have confirmed that the EU investment in the construction of ITER is bringing important benefits to European industry and the research community. This was reiterated during an industry event organised in December 2017 which demonstrated that fusion is already delivering concrete opportunities for industry and is having a positive effect on jobs, economic growth and innovation, with positive impact beyond the fusion and energy fields. Independent studies commissioned for the preparation of the ex-ante evaluation provided quantifications of jobs created and net value added generated by European participation in the ITER project.

Last but not least, taking into account the Council conclusions of April 2018, this proposal will provide continuity for the project, in particular vis-à-vis the international partners and secure the ITER funding for the whole duration of the next Multiannual Financial Framework.

A limited number of proposals have been identified that, due to their continuity in terms of content and structure and/or size of the budget, should have an ex-ante assessment in the form of a Staff Working Document instead of an impact assessment. ITER was indicated, alongside other programmes such as Fiscalis, Humanitarian Aid, Common Foreign and Security Policy, as not requiring an impact assessment but rather an ex ante evaluation in the form of a Staff Working Document, in line with the requirements of the EU Financial Regulation.

This proposal provides for a date of application as of 1 January 2021 and are presented for a Union of 27 Member States, in line with the notification by the United Kingdom of its intention to withdraw from the European Union and Euratom based on Article 50 of the Treaty on European Union received by the European Council on 29 March 2017.

3. LEGAL ELEMENTS OF THE PROPOSAL

The legal basis for this Council Decision is provided for by Article 47 of the Euratom Treaty. This Decision shall constitute the basic act for the period covered by the next Multiannual Financial Framework and will be the basis for the adoption of the yearly financing decisions by the Commission. These decisions will allow the Commission to transfer the funds to Fusion for Energy during the period 2021-2027.

This Decision shall also covers the administrative expenditure of the Commission related to Fusion for Energy, the ITER Organization, the Broader Approach and any other relevant activities for the period 2021-2027.

4. BUDGETARY IMPLICATION

The 'legislative financial statement' attached to this proposal for a Council Decision sets out the budgetary implications and the human and administrative resources needed for its implementation.

5. IMPLEMENTATION PLANS AND MONITORING AND EVALUATION AND REPORTING ARRANGEMENTS

It is intended to continue implementing the budget for European participation in ITER through the use of a joint Undertaking. The establishment of a Joint Undertaking under Chapter 5 of the Euratom Treaty was considered in 2007 as the most appropriate solution to discharge the Euratom obligations towards the ITER Organization pursuant to the conclusion of the ITER Agreement by Euratom. This adequacy has been confirmed by several independent reviews and assessments since then.

Pursuant to Article 32 of its Financial Regulation the Joint Undertaking (F4E) draws up a programming document containing multi-annual and annual programming. The draft-programming document is sent to the F4E Governing Board, the Commission, the European Parliament and the Council no later than 31 January each year. The Commission sends the opinion of its relevant services on this document to F4E.

The overall planning and annual Work Programme of the Joint Undertaking (F4E) specify the timetable for the achievement of the milestones which cover the procurement activities during ITER construction. F4E regularly reports to its governance body (the Governing Board where Euratom is represented by the Commission) and to the Council of the EU on the project's progress.

A full series of key performance indicators dedicated to the specific monitoring of the schedule and cost performance have been introduced in 2017 to better monitor the progress and the efficiency of F4E in delivering the Euratom contribution to the ITER project. A dash board report based on these indicators is submitted regularly to the Governing Board. They include metrics based on an Earned Value Management system.

At the level of the overall ITER project, the ITER Organization reports to the ITER Council on a similar dashboard of performance indicators, including the percentage of the physical completion of the construction to First Plasma. In December 2017, this indicator reached 50% and should reach 100% at the achievement of First Plasma foreseen for December 2025.

In the context of the Commission's internal management planning and monitoring, it is proposed to use two indicators that should report on progress of the project towards the achievement of its general and specific objectives. The first indicator would be the "percentage of completion of ITER construction" and the second the "percentage of Euratom's in kind obligations discharged by F4E". Both indicators will be based on data reported by the ITER Organization.

The Commission proposal for the 2021-2027 Multiannual Financial Framework set a more ambitious goal for climate mainstreaming across all EU programmes, with an overall target of 25% of EU expenditure contributing to climate objectives. The contribution of this programme to the achievement of this overall target will be tracked through an EU climate marker system at an appropriate level of disaggregation, including the use of more precise methodologies where these are available. The Commission will continue to present the information annually in terms of commitment appropriations in the context of the annual draft budget.

To support the full utilisation of the potential of ITER to contribute to climate objectives, the Commission will seek to identify relevant actions throughout the expenditure preparation, implementation, review and evaluation processes.

The Commission will carry out interim and ex post evaluations and will communicate the conclusions to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. The evaluation will be carried out in line with paragraphs 22 and 23 of the Interinstitutional Agreement of 13 April 2016[9], where the three institutions confirmed that evaluations of existing legislation and policy should provide the basis for impact assessments of options for further action. The evaluation will assess the effects of ITER based on the established indicators/targets and a detailed analysis of the degree to which the project has proven relevant, effective, efficient, provides enough EU added value and is coherent with other EU policies. The evaluation will include lessons learnt to identify any lacks/problems or any potential to further improve the actions or their results and to help maximise their exploitation/impact. If the ex post evaluation is carried out close to the interim evaluation of the following period, both evaluations can be combined in as single one that will cover a larger period.

In addition, pursuant to Article 14 of its statutes F4E drafts an annual report. This report records the implementation of the F4E work programme. It is prepared by the F4E Director, assessed by the Governing Board and sent by the Governing Board, together with its assessment, to the Members, the European Parliament, the Council and the Commission.

[9] Interinstitutional Agreement between the European Parliament, the Council of the European Union and the European Commission on Better Law-Making of 13 April 2016; OJ L 123, 12.5.2016, p. 1–14

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Proposal for a

COUNCIL DECISION

amending Decision 2007/198/Euratom establishing the European Joint Undertaking for ITER and the Development of Fusion Energy and conferring advantages upon it

THE COUNCIL OF THE EUROPEAN UNION,

Having regard to the Treaty establishing the European Atomic Energy Community, and in particular the third and fourth paragraphs of Article 47 and Article 48 thereof,

Having regard to the proposal from the European Commission,

Whereas:

(1) The ITER Agreement[10] has been signed in November 2006 by Euratom, the United States, the Russian Federation, Japan, China, South Korea and India. Euratom, which is according to the ITER Agreement the Host Party, has taken the lead in this project.

(2) Decision 2007/198/Euratom[11] established the European Joint Undertaking for ITER and the Development of Fusion Energy (hereinafter Joint Undertaking) to provide the contribution of Euratom to the ITER International Fusion Energy Organisation and the Broader Approach Activities with Japan as well as to prepare and coordinate a programme of activities in preparation for the construction of a demonstration fusion reactor and related facilities.

(3) Decision 2007/198/Euratom provides in its Article 5 that the Joint Undertaking shall have a distinct financial regulation based on the principles of the Framework Financial Regulation[12] which may depart from the latter where the specific operating needs of the Joint Undertaking so require and subject to prior consultation with the Commission. Title IV of the financial regulation of the Joint undertaking regulates the implementation of the budget.

(4) Decision 2007/198/Euratom provided a financial reference amount deemed necessary for the Joint Undertaking together with the indicative total contribution of Euratom towards such amount, which should be made available through the Community research and training programmes adopted pursuant to Article 7 of the Treaty or through any other decision adopted by the Council.

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10 OJ L 358, 16.12.2006, p.62

11 Council Decision of 27 March 2007 establishing the European Joint Undertaking for ITER and the Development of Fusion Energy and conferring advantages upon it (2007/198/Euratom) (OJ L 90, 30.03.2007, p. 58).

12 Commission Delegated Regulation (EU) N° 1271/2013 of 30 September 2013 on the framework financial regulation for the bodies referred to in Article 208 of Regulation (EU, Euratom) N° 966/2012 of the European Parliament and of the Council (OJ L 328, 7.12.2013, p. 42)

(5) Decision 2007/198/Euratom was amended by Decision2013/791/Euratom[13] to allow a financing of the Fusion for Energy activities for the duration of the Multi-annual Financial Framework 2014-2020.

(6) A new ITER project baseline, prepared as part of the improvements in the management of the project, gained the support of the ITER Council in 2016 and 2017 and was subsequently used for estimating the funding needs of the Joint Undertaking. The updated schedule of the new baseline foresees the achievement of First Plasma in December 2025 and full performance operation, using deuterium-tritium fuel, in 2035. This schedule does not include contingencies and therefore assumes that all major risks can be mitigated.

(7) On 12 April 2018 the Council reaffirmed the continued commitment of Euratom to the successful completion of the ITER project and mandated the Commission to approve the new ITER project baseline on behalf of Euratom at an ITER Council meeting at Ministerial level.

(8) This Decision will allow synergies and complementarities with fusion research activities funded through the Euratom Research and Training Programme. The successful construction and operation of ITER is on the critical path of the European fusion roadmap endorsed by all fusion research stakeholders in Europe.

(9) The European Parliament and the Council set the maximum level of the Euratom commitments for ITER in the Multiannual Financial Framework for the period 2021-2027 at EUR 6.070.000.000 (in current values).

(10) Reflecting the importance of tackling climate change in lines with EU's commitments to implement the Paris Agreement, and the commitment of the United Nations Sustainable Development Goals, this Decision will mainstream climate actions and lead to the achievement of an overall target of 25% of the EU budget expenditures contributing to climate objectives. Actions under this Decision are expected to contribute 100% of the overall financial envelope of this Decision to climate objectives. Relevant actions will be identified during the implementation of this Decision and reassessed in the context of its revision and the interim evaluation.

(11) Pursuant to paragraph 22 and 23 of the Inter-institutional agreement for Better Law-Making of 13 April 2016, there is a need to evaluate ITER on the basis of information collected through specific monitoring requirements, while avoiding overregulation and administrative burdens. These requirements, where appropriate, can include measurable indicators, as a basis for evaluating the effects of ITER. The conclusions of the evaluations carried out by the Commission will be communicated to the European Parliament the Council, the European Economic and Social Committee and the Committee of the Regions. Should the timings of the ex post and interim evaluations be close to each other, both evaluations could be combined into a single one covering the combined period.

(12) In accordance with the Financial Regulation, Regulation (EU, Euratom) No 883/2013 of the European Parliament and of the Council[1], Council Regulation (Euratom, EC) No 2988/95[2],Council Regulation (Euratom, EC) No 2185/96[3] and Council Regulation (EU) 2017/1939 [4], the financial interests of the Union are to be protected

[13] Council Decision of 13 December 2013 amending Decision 2007/198/Euratom establishing the European Joint Undertaking for ITER and the Development of Fusion Energy and conferring advantages upon it (2013/791/Euratom) (OJ L349, 31.12.2013, p. 100).

through proportionate measures, including the prevention, detection, correction and investigation of irregularities and fraud, the recovery of funds lost, wrongly paid or incorrectly used and, where appropriate, the imposition of administrative sanctions. In particular, in accordance with Regulation (EU, Euratom) No 883/2013 and Regulation (Euratom, EC) No 2185/96 the European Anti-Fraud Office (OLAF) may carry out investigations, including on-the-spot checks and inspections, with a view to establishing whether there has been fraud, corruption or any other illegal activity affecting the financial interests of the Union. In accordance with Regulation (EU) 2017/1939, the European Public Prosecutor's Office (EPPO) may investigate and prosecute fraud and other illegal activities affecting the financial interests of the Union as provided for in Directive (EU) 2017/1371 of the European Parliament and of the Council[5]. In accordance with the Financial Regulation, any person or entity receiving Union funds is to fully cooperate in the protection of the Union's financial interests, to grant the necessary rights and access to the Commission, OLAF, the EPPO and the European Court of Auditors (ECA) and to ensure that any third parties involved in the implementation of Union funds grant equivalent rights.

(13) This Decision should ensure the visibility of the Community funding through coherent, effective and proportionate targeted information to multiple audiences, including the media and the public.

(14) It is necessary to amend Decision2007/198/Euratom to allow the financing of the activities of the Joint Undertaking and the related activities of the Commission for the period 2021-2027 from the general budget of the European Union.

(15) Decision2007/198/Euratom should therefore be amended accordingly,

HAS ADOPTED THIS DECISION:

Article 1

Decision 2007/198/Euratom is amended as follows:

(1) In Article 4, paragraph 3 is replaced by the following:

3. The indicative Euratom contribution to the Joint Undertaking for the period 2021-2027 and the related supporting expenditure for the same period as referred to in paragraph 4 are set at EUR 6.070.000.000 (in current values) [14].

(2) The following paragraph 4 is added:

4. The amount referred to in paragraph 3 may also cover expenses for preparation, monitoring, control, audit, evaluation and other activities and expenditures necessary for managing and implementing this Decision, including administrative expenditure, as well as evaluating the achievement of its objectives. It may moreover cover expenses relating to the studies, meetings of experts, as well as expenses linked to information technology networks focusing on information processing and exchange, including corporate information technology tools and other technical and administrative assistance needed in connection with the management of this Decision.

(3) Article 5b is deleted.

[14] Considering the specificity of the activities of Fusion for Energy, Article 86.5 of the Regulation (EU, Euratom) N° 966/2012 of the European Parliament and of the Council of 25 October 2012 on the financial rules applicable to the general budget of the Union shall not apply.

(4) The following Article 5c is inserted:

Article 5c
Evaluation

1. Evaluations shall be carried out in a timely manner to feed into the decision-making process.

2. An interim evaluation shall be performed once there is sufficient information available about the implementation of the Decision in the period 2021 - 2027, but no later than 2024.

3. At the end of the implementation of this Decision, but no later than four years after the end of the period specified in Article 4, a final evaluation of the Decision shall be carried out by the Commission.

4. The Commission shall communicate the conclusions of the evaluations accompanied by its observations, to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions.

(5) The following Article 5d is inserted:

Article 5d
Communication, visibility and publicity

1. The recipients of Community funding shall acknowledge the origin and ensure the visibility of the Community funding (in particular when promoting the actions and their results) by providing coherent, effective and proportionate targeted information to multiple audiences, including the media and the public.

2. The Commission shall implement information and communication actions relating to this Decision, and its actions and results. Financial resources allocated to the implementation of this Decision shall also contribute to the corporate communication of the political priorities of the Union, as far as they are related to the objectives referred to in Article 1.

Article 2

This Decision shall enter into force on the twentieth day following that of its publication in the *Official Journal of the European Union*.

It shall apply from 1 January 2021.

This Decision is addressed to the Member States.

Done at Brussels,

For the Council
The President

LEGISLATIVE FINANCIAL STATEMENT

1. FRAMEWORK OF THE PROPOSAL/INITIATIVE

1.1. Title of the proposal/initiative

1.2. Policy area(s) concerned (programme cluster)

1.3. Nature of the proposal/initiative

1.4. Grounds for the proposal/initiative

1.5. Duration and financial impact

1.6. Management mode(s) planned

2. MANAGEMENT MEASURES

2.1. Monitoring and reporting rules

2.2. Management and control system

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3. ESTIMATED FINANCIAL IMPACT OF THE PROPOSAL/INITIATIVE

3.1. Heading(s) of the multiannual financial framework and expenditure budget line(s) affected

3.2. Estimated impact on expenditure

3.2.1. Summary of estimated impact on expenditure

3.2.2. Estimated impact on appropriations of an administrative nature

3.2.3. Third-party contributions

3.3. Estimated impact on revenue

LEGISLATIVE FINANCIAL STATEMENT

1. FRAMEWORK OF THE PROPOSAL/INITIATIVE

1.1. Title of the proposal/initiative

Council Decision amending Decision 2007/198/Euratom establishing the European Joint Undertaking for ITER and the Development of Fusion Energy and conferring advantages upon it.

1.2. Policy area(s) concerned *(Programme cluster)*

1 – Research and Innovation

1.3. The proposal/initiative relates to:

☐ a new action

☐ a new action following a pilot project/preparatory action[15]

☒ the extension of an existing action

☐ a merger or redirection of one or more actions towards another/a new action

1.4. Grounds for the proposal/initiative

1.4.1. Requirement(s) to be met in the short or long term including a detailed timeline for roll-out of the implementation of the initiative

This Council Decision will allow the contribution of funds to Fusion for Energy to carry out the tasks assigned to it. This Decision will result in Europe making its contributions to the construction of ITER during the period 2021-2027 where the ITER project will reach first plasma in 2025. Europe is making the largest contribution to the project (about 45% of the construction costs) and the impacts of this Decision will be greatest in Europe, both at near term (benefits to European industry) and at long term (a leading role in the commercial exploitation of fusion energy).

1.4.2. Added value of Union involvement (it may result from different factors, e.g. coordination gains, legal certainty, greater effectiveness or complementarities). For the purposes of this point 'added value of Union involvement' is the value resulting from Union intervention which is additional to the value that would have been otherwise created by Member States alone.

The initiative falls under the exclusive competence of the EU according to Article 101 of the Euratom Treaty. Therefore, the subsidiarity principle does not apply.

ITER is a unique, first-of-a-kind, long-term project which greatly contributes to the long-term EU strategy for clean energy, security of supply and competitiveness. As such, it cannot be executed through industry initiative at this stage of the technology development and public intervention is warranted. This investment offers European high-tech industries and small and medium enterprises (SMEs) a valuable opportunity to innovate and develop “spin off” products for exploitation outside fusion (such as the broader energy sector, aviation, medical, and hi-tech instruments).

[15] As referred to in Article 58(2)(a) or (b) of the Financial Regulation.

As ITER's legal basis is an international agreement to which Euratom is a Party, action at EU level is more effective (less fragmentation) and efficient (better value for money/economies of scale), and offers coordination of actions (e.g. in addressing externalities) for meeting EU obligations. Pooling of resources and expertise is paramount to the construction of ITER and EU action is particularly needed to achieve the critical mass of resources and knowledge across different fields, technologies, and research infrastructures and industries required for the construction of this first-of-a-kind project. This has also been recognized explicitly in the "Reflection Paper on the Future of EU Finances" of June 2017, which puts forward clear value added when action at European level goes further than national efforts could –this includes "big projects and key enabling technologies, such as […] ITER (which) can only be financed by pooling resources at EU level because of their very high financing needs".

Accordingly, action at EU level delivers results that uncoordinated national spending could not achieve in terms of a number of strategic priorities: i.) security of supply; ii.) opportunities for long-term growth and development of European science, technology and industry, and structuring of the EU R&D fabric; iii.) improvements in quality and innovation through exposure to EU-wide and global competition, and iv.) mobilizing the EU potential/negotiating power at global level.

1.4.3. Lessons learned from similar experiences in the past

The Joint European Torus (JET) project has demonstrated that building and operating a large fusion research infrastructure under the Euratom coordination is efficient and maximises the scientific and industrial benefits. However, the scale required for the ITER construction is unprecedented and requires a collaboration at global level for which there is no example to be found in the past.

1.4.4. Compatibility and possible synergy with other appropriate instruments

This Decision will allow synergies and complementarities with fusion research activities with the Euratom research and training programme. The fusion activities under this framework will provide important scientific contribution to the construction and operation of ITER.

1.5. Duration and financial impact

☒ limited duration

– ☒ in effect from 01/01/2021 to 31/12/2027

– ☒ Financial impact from 2021 to 2027

☐ unlimited duration

– Implementation with a start-up period from YYYY to YYYY,

– followed by full-scale operation.

1.6. Management mode(s) planned[16]

☐ **Direct management** by the Commission

16 Details of management modes and references to the Financial Regulation may be found on the BudgWeb site: https://myintracomm.ec.europa.eu/budgweb/EN/man/budgmanag/Pages/budgmanag.aspx

– ☐ by its departments, including by its staff in the Union delegations;

– ☐ by the executive agencies

☐ **Shared management** with the Member States

☒ **Indirect management** by entrusting budget implementation tasks to:

– ☐ third countries or the bodies they have designated;

– ☐ international organisations and their agencies (to be specified);

– ☐the EIB and the European Investment Fund;

– ☒ bodies referred to in Articles 70 and 71 of the Financial Regulation;

– ☐ public law bodies;

– ☐ bodies governed by private law with a public service mission to the extent that they provide adequate financial guarantees;

– ☐ bodies governed by the private law of a Member State that are entrusted with the implementation of a public-private partnership and that provide adequate financial guarantees;

– ☐ persons entrusted with the implementation of specific actions in the CFSP pursuant to Title V of the TEU, and identified in the relevant basic act.

– If more than one management mode is indicated, please provide details in the 'Comments' section.

Comments

Management will be carried out by F4E under the supervision of the Commission . The Commission represents Euratom in the governing bodies of both the ITER Organization (IO) and F4E. While Euratom provides about 80% of the F4E budget it has under the current F4E Statutes 5 voting rights out of 72. F4E is a Joint Underatking established according to Chapter 5 of the Euratom Treaty. Pusuant to its Statutes, F4E has its own budgetary discharge procedure by the European Parliament, following a recommendation of the Council of the EU.

2. MANAGEMENT MEASURES

2.1. Monitoring and reporting rules

Specify frequency and conditions.

This Decision will be implemented by the Commission and F4E, which channels the Euratom contribution to the ITER Project and to other activities related to ITER, such as the Broader Approach activities with Japan.

This Decision provides for an interim and final evaluation of its implementation. The conclusions of these evaluations and the observations of the Commission will be communicated to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. The Commission, on behalf of Euratom, participates in the decision-making bodies the ITER Organization and F4E: 1) The Commisison participates in the the ITER Council, and in the Committees established by the Council; 2) as member of F4E, the Commission participates in the Governing Board and in Committees established by the Board. These governance structures are used for monitoring the progress of the project and the performance of its implementation, on the basis of reporting and disclosure from the ITER Organization and F4E, respectively.

In particular:

a) Pursuant to Article 6.d. of the F4E Statutes, the Governing Board of F4E adopts the project plan, the work programme, the resource estimates plan, the establishment plan and the staff policy plan. According to Article 6.e, the Governing Board adopts also the annual budget. It is to be noted that these documents are part of the programming document that, pursuant to Article 32 of its Financial Regulation, F4E draws up each year and has to submit a draft to the Governing Board, the Commission, the European Parliament and the Council no later than 31 January. The Commission is requested to issue an opinion on this draft that should be taken into account by F4E to produce the final version of the programming document.

b) Pursuant to Article 14 of its Statutes, the F4E Director prepares an annual report that records the implementation of the F4E work programme. This report is assessed by the Governing Board and sent by the Governing Board, together with its assessment, to the F4E Members, the European Parliament, the Council and the Commission. F4E reports also to the Council each year on the progress achieved in implementing the cost containment and saving plans as well as on the F4E performance and management and on the ITER project. F4E reports also once a year to the Council on the fulfilment of the scheduled activities within its annual budget.

c) In-between the formal reports, F4E provides in monthly intervals information on the implementation of its budget and on the progress on key milestones established to monitor the construction and procurement activities under F4E's responsibility.

d) At the level of the overall project monitoring, the Director-General of the ITER Organization presents twice a year to the ITER Council and its Management Advisory Committee a report on the progress of the project, its implementation and on the execution of his risk and cost management action plan. In-between these reports, the ITER Organization reports every two months through a set of dashboards monitoring budget implementation, risk management, procurement activities and progress on milestones for key components on the project's critical path.

2.2. Management and control system(s)

2.2.1. Justification of the management mode(s), the funding implementation mechanism(s), the payment modalities and the control strategy proposed

The overall architecture of the ITER project calls for contracting parties to operate through Domestic Agencies.

The establishment of a Joint Undertaking under Chapter 5 of the Euratom Treaty was considered in 2007 as the most appropriate solution to operate this role of Domestic Agency and to discharge the Euratom obligations towards the ITER Organization pursuant to the conclusion of the ITER Agreement. This adequacy has been confirmed by several independent reviews and assessment since then.

On the basis of this Council Decision each year the Commission adopts a financing decision to transfer the funds of the year n+1 from the EU budget to F4E. F4E sends call for funds for its administrative and operational budgets. The Commission required justifications for each call for funds related to the operational budget, in particular a cash-flow forecast for running costs and operational costs, covering the period of the payment request and a situation of the Fusion for Energy Treasury, a reference to the commitment(s) in the budget to which the payment relates, a comprehensive planning for each project on which a payment is to be made and the relevant justification.

The Joint Undertaking has the necessary expertise, resources and experience to implement the required ex-ante checks and ex-post controls on procurements. Risks are assessed regularly and progress in the execution of work and the consumption of resources is monitored regularly, based on defined objectives and indicators.

A supervision strategy has been developed by the Commission over the F4E activities. As part of this strategy a new Administrative Agreement is being negotiated that will take into account the changes in the legal framework (F4E statutes were amended in 2015, a new F4E financial regulation was adopted; the responsibility for ITER, and therefore F4E, supervision was transferred from DG RTD to DG ENER.) These modifications in the F4E legal framework and in the division of responsibilities within the Commission entail changes in the modalities of F4E's interaction with the Commission as covered in the Administrative Agreement with F4E.

2.2.2. Information concerning the risks identified and the internal control system(s) set up to mitigate them

There are inherent financial and operational performance risks in F4E due to the nature of its activities (large and complex in-kind procurements with high technical risks) and to the nature and architecture of the underlying project (involvement of 7 contracting parties, development of the single largest energy experiment to date) . Measures to monitor and better control the functioning of F4E have been put in place to alleviate this situation. The Commission together with F4E will continue to identify the risks related to the implementation of this project, notably in terms of costs, and will take the most appropriate measures to manage and mitigate these risks.

DG ENER (D4) has developed a comprehensive risk assessment methodology with the creation of a risk register updated every 3 months and a risk management plan to monitor the key risks that can hamper the achievement of the First Plasma by 2025..

Such risk monitoring should prompt the Commission to react proactively to delays, cost overruns or other negative events that can delay the Euratom contribution.

F4E will revise in 2018 its internal control framework to take into account fo the changes intervened at Commission level.

2.2.3. Estimation and justification of the cost-effectiveness of the controls (ratio of "control costs ÷ value of the related funds managed"), and assessment of the expected levels of risk of error (at payment & at closure)

At Commission level, the cost of control attached to the oversight of the ITER project and of the operations of F4E remains low compared to the value of the the funds managed. This cost was estimated at 0,31% in 2016 and 0,28% in 2017, including the cost of maintaining a dedicated unit in DG ENER , management oversight, and the support received from horizontal functions. This cost may increase slightly in the coming years to reflect increased oversight, improved risk management and the evolution of the tasks as the project progress furthers. The risk of error associated to the administration of the EU contribution to the Joint Undertaking is minimal.

At delegated entity level, F4E has not yet developped a methodology to carry out the assessment of costs and benefits of controls or the expected level of error. Even though, it is worth to mention that the European Court of Auditors has always delivered unqualified opinion to F4E on the true and fair view of accounts and on the regularity of underlying transactions. When DG BUDG will deliver the newer methodology at the end of 2018, DG ENER will ensure that F4E carries out the necessary assessments.

2.3. Measures to prevent fraud and irregularities

Specify existing or envisaged prevention and protection measures, e.g. from the Anti-Fraud Strategy.

The Commission's Directorate General charged with the implementation of the ITER project and budget is committed to fight against fraud in line with the Commission Anti-fraud strategy COM(2011)376 of 24 June 2011 and with the fortchoming revision of this antifraud strategy

At Commission level, DG ENER develops and maintains its own antifraud strategy, based on a specific risk assessment process. The necessary measures are taken as regard awareness, risks assessment, information of staff, cooperation with entrusted entities and cooperation with OLAF. This strategy is revised every 2 to 3 years, the last time in December 2017.

The administrative monitoring of the contracts, grants and related payments is under the responsibility of F4E.

The Commission and F4E take into account the financial interests of the European Union notably in compliance with Council Regulation (EC, Euratom) No 2988/95 of 18 December 1995 on the protection of the European Communities' financial interests and Article 53(a) of the Financial Regulation.

F4E develops ex-post audit strategies to assess the legality and regularity of the underlying transactions.

The European Anti-Fraud Office (OLAF) enjoys the same powers with respect to F4E and its staff, as it enjoys in respect of Commission departments. It is worth to mention that among the measures to prevent fraud and irregularities:

- F4E has an internal auditor that reviews on a permanent basis different features of the internal control system;

- F4E internal control system is regularly reviewed by the Commission's Internal Audit Service;

- F4E is yearly subject to the European Court of Auditors audit on the true and fair view of accounts and legality and regularity of the underlying transactions (income and expenditure);

- F4E is yearly subject to the discharge procedures of the European Parliament and the Council of the EU.

F4E has developed an Anti-Fraud Straegy that was approved by its Governing Board in June 2015. The overall objective is to improve prevention, detection and the conditions for investigations of fraud, and to pursue adequate deterrence and reparation, with proportionate and dissuasive sanctions. The F4E Anti-Fraud Strategy reinforces the adopted measures preventing and managing conflicts of interests within F4E and is integrated into the broader legal framework of F4E protecting the financial interests of the EU and combating fraud, as stipulated in Articles 5a and 5aa of the Council Decision 2007/198/Euratom establishing F4E.

3. ESTIMATED FINANCIAL IMPACT OF THE PROPOSAL/INITIATIVE

3.1. Heading of the multiannual financial framework and new expenditure budget line(s) proposed

Heading of multiannual financial framework	Budget line	Type of expenditure	Contribution			
	Number 1 Single Market, Innovation and Digital	Diff./Non-diff.[17]	from EFTA countries[18]	from candidate countries[19]	from third countries	within the meaning of Article [21(2)(b)] of the Financial Regulation
	01 01 04 01 01 04 01 Expenditure related to officials and temporary agents implementing ITER programme 01 01 04 02 External personnel implementing ITER programme 01 01 04 03 Other management expenditure ITER programme **01 04** 01 04 01 European Joint Undertaking for ITER – Fusion for Energy (F4E) – Expenditure on administrative management 01 04 02 European Joint Undertaking for ITER – Fusion for Energy (F4E) - Operational expenditure	Non-diff. Non-diff. Non-diff Diff. Diff.	NO	NO	YES	YES

[17] Diff. = Differentiated appropriations / Non-diff. = Non-differentiated appropriations.
[18] EFTA: European Free Trade Association.
[19] Candidate countries and, where applicable, potential candidates from the Western Balkans.

3.2. Estimated impact on expenditure

3.2.1. Summary of estimated impact on expenditure[20]

EUR million (to three decimal places)

Heading of multiannual financial framework [21]	**1**	Single Market, Innovation and Digital

			2021	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	***Post 2027***	**TOTAL**
01 01 04 01 Expenditure related to officials and temporary agents implementing ITER programme	Commitments = Payments	(1)	9,257	9,442	9,631	9,824	10,020	10,220	10,425		**68,819**
01 01 04 02 External personnel implementing ITER programme	Commitments = Payments	(1)	0,314	0,320	0,327	0,333	0,340	0,347	0,354		**2,335**
01 01 04 03 Other management expenditure ITER programme	Commitments = Payments	(1)	1,500	1,530	1,560	1,592	1,624	1,656	1,689		**11,151**
01 04 01 European Joint Undertaking for ITER – Expenditure on administrative management	Commitments = Payments	(1)	65,000	66,000	67,000	69,000	70,000	71,000	73,000		**481,000**
01 04 02 European Joint Undertaking for ITER – Fusion for Energy (F4E) - Operational expenditure	Commitments	(2)	858,081	690,463	1,024,144	791,024	664,205	842,685	636,093		**5,506,695**
	Payments	(3)	209,304	520,061	538,856	647,466	697,841	800,512	811,667	1,280,987	**5,506,695**
TOTAL appropriations for the envelop of the programme	Commitments	=1+2	934,152	767,755	1 102,662	871,773	746,189	925,908	721,561		**6,070,000**
	Payments	=1+3	285,375	597,353	617,374	728,215	779,825	883,735	897,135	1,280,987	**6,070,000**

[20] Totals may not tally due to rounding

[21] Article 01 01 04 includes technical and/or administrative assistance and expenditure in support of the implementation of EU programmes and/or actions (former 'BA' lines), indirect research, direct research.

EUR million (to three decimal places)

Heading of multiannual financial framework	**7**	European Public Administration

			2021	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	***Post 2027***	**TOTAL**
Operational appropriations (split according to the budget lines listed under 3.1)	Commitments	(1)									
	Payments	(2)									
Appropriations of an administrative nature financed from the envelope of the programme[22]	Commitments = Payments	(3)									
TOTAL appropriations for the envelope of the programme	Commitments	=1+3									
	Payments	=2+3									

[22] Technical and/or administrative assistance and expenditure in support of the implementation of EU programmes and/or actions (former 'BA' lines), indirect research, direct research.

Heading of multiannual financial framework	7	European Public Administration

EUR million (to three decimal places)

		2021	2022	2023	2024	2025	2026	2027	*Post 2027*	TOTAL
Human resources										
Other administrative expenditure										
TOTAL appropriations under HEADING 7 of the multiannual financial framework	(Total commitments = Total payments)									

EUR million (to three decimal places)

		2021	2022	2023	2024	2025	2026	2027	*Post 2027*	TOTAL
TOTAL appropriations across HEADINGS of the multiannual financial framework	Commitments	934,152	767,755	1 102,662	871,773	746,189	925,908	721,561		**6,070,000**
	Payments	285,375	597,353	617,374	728,215	779,825	883,735	897,135	1,280,988	**6,070,000**

3.2.2. Summary of estimated impact on appropriations of an administrative nature

– ☐ The proposal/initiative does not require the use of appropriations of an administrative nature

– ☒ The proposal/initiative requires the use of appropriations of an administrative nature, as explained below:

EUR million (to three decimal places)

Years	2021	2022	2023	2024	2025	2026	2027	TOTAL
HEADING 7 of the multiannual financial framework								
Human resources								
Other administrative expenditure								
Subtotal HEADING 7 of the multiannual financial framework								
Outside HEADING 7[23] of the multiannual financial framework								
Human resources	9,571	9,762	9,958	10,157	10,360	10,567	10,779	**71,154**
Other expenditure of an administrative nature	1,500	1,530	1,560	1,592	1,624	1,656	1,689	**11,151**
Subtotal outside HEADING 7 of the multiannual financial framework	**11,071**	**11,292**	**11,518**	**11,749**	**11,984**	**12,223**	**12,468**	**82,305**
TOTAL	**11,071**	**11,292**	**11,518**	**11,749**	**11,984**	**12,223**	**12,468**	**82,305**

[23] Technical and/or administrative assistance and expenditure in support of the implementation of EU programmes and/or actions (former 'BA' lines), indirect research, direct research.

3.2.2.1. Estimated requirements of human resources

– ☐ The proposal/initiative does not require the use of human resources.

– ☐ The proposal/initiative requires the use of human resources, as explained below:

Estimate to be expressed in full time equivalent units

Years		2021	2022	2023	2024	2025	2026	2027
• Establishment plan posts (officials and temporary staff)								
Headquarters and Commission's Representation Offices								
Delegations								
Research		61	61	61	61	61	61	61
• External staff (in Full Time Equivalent unit: FTE) - AC, AL, END, INT and JED [24] Heading 7								
Financed from HEADING 7 of the multiannual financial framework	- at Headquarters							
	- in Delegations							
Financed from the envelope of the programme [25]	- at Headquarters							
	- in Delegations							
Research		4	4	4	4	4	4	4
Other (specify)								
TOTAL								

The human resources required will be met by staff from the DG who are already assigned to management of the action and/or have been redeployed within the DG, together if necessary with any additional allocation which may be granted to the managing DG under the annual allocation procedure and in the light of budgetary constraints. Staff numbers required for F4E Joint undertaking including officials are presented under point 3.2.2.2

Description of tasks to be carried out:

Officials and temporary staff	Staff working in the headquarters are in charge of the definition and subsequent follow-up of the activities both from the domestic agency in Barcelona (F4E) and the ITER project where the Commission is a representative of the European partnership.
External staff	Staff working in the headquarters are in charge of the definition and subsequent follow-up of the activities both from the domestic agency in Barcelona (F4E) and the ITER project where the Commission is a representative of the European partnership

3.2.2.2. Estimated requirements of human resources in F4E

	2021	2022	2023	2024	2025	2026	2027
Permanent staff	51	51	51	51	51	51	51
Of which AD	40	40	40	40	40	40	40

[24] AC= Contract Staff; AL = Local Staff; END = Seconded National Expert; INT = agency staff; JPD= Junior Professionals in Delegations.

[25] Sub-ceiling for external staff covered by operational appropriations (former 'BA' lines).

Of which Ast	11	11	11	11	11	11	11
Of which Ast-sc							
Temporary Agents	229	229	229	221	213	211	211
Of which AD	202	202	202	194	186	184	184
Of which Ast	27	27	27	27	27	27	27
Of which Ast-sc							
Contract Agents	172	172	172	165	159	157	157
Total	**452**	**452**	**452**	**437**	**423**	**419**	**419**

3.2.2.3 – F4E JU – breakdown of function group of Contractual agents 2021-2027

Contract agents	2021	2022	2023	2024	2025	2026	2027
Function group IV	98	98	98	91	85	83	83
Function group III	55	55	55	55	55	55	55
Function group II	19	19	19	19	19	19	19
Function group I							
Total	**172**	**172**	**172**	**165**	**159**	**157**	**157**

3.2.3. Third-party contributions

The proposal/initiative:

– ☐ does not provide for co-financing by third parties

– ☑ provides for the co-financing by third parties estimated below:

Appropriations in EUR million (to three decimal places)

Years	2021	2022	2023	2024	2025	2026	2027	TOTAL
Specify the co-financing body[26]	p.m.	p.m.	p.m.	p.m.	p.m.	p.m.	p.m.	p.m.
TOTAL appropriations co-financed	p.m.	p.m.	p.m.	p.m.	p.m.	p.m.	p.m.	p.m.

3.3. Estimated impact on revenue

– ☐ The proposal/initiative has no financial impact on revenue.

– ☑ The proposal/initiative has the following financial impact:

– ☐ on own resources

– ☑ on other revenue

please indicate, if the revenue is assigned to expenditure lines ☑

EUR million (to three decimal places)

Budget revenue line:	Impact of the proposal/initiative[27]						
	2021	2022	2023	2024	2025	2026	2027
Article 6XXX[28]	p.m.	p.m.	p.m.	p.m.	p.m.	p.m.	p.m.

For assigned revenue, specify the budget expenditure line(s) affected.

Budget lines 01 01 04, 01 04 01 and 01 04 02

Other remarks (e.g. method/formula used for calculating the impact on revenue or any other information).

Not yet known. It depends on a new agreement to be established with Switzerland for the period 2021-2027. In case Brexit gets confirmed and the United Kingdom will remain as a partner of the ITER programme, its eventual contribution should also be recorded as earmarked revenue (from third countries).

[26] In addition to the funding from EU budget, France as Host State of the project contributes at present directly to F4E budget in about 20% of the Euratom contribution. Furthermore, each year F4E Members pay a membership contribution to the Joint Undertaking. These co-financing revenues are recorded directly in F4E accounts and are not included in the EU budget revenue and expenditure.

[27] As regards traditional own resources (customs duties, sugar levies), the amounts indicated must be net amounts, i.e. gross amounts after deduction of 20 % for collection costs.

[28] Switzerland and eventually the United Kingdom.

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