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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

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