

HORIZON EUROPE

STATE-OF-THE-ART

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European R&D & Innovation Team





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INTRODUCTION

The European Framework programmes offer funding opportunities for the best in class research and innovation. Their *raison d'être* is to produce excellent science and technology and remove barriers to innovation, so contributing to European economic prosperity and competitiveness.

The advantages of participating to such a programme go beyond simply money; it is about prestige, networking, working with the best players on the field, career development, impact on European people's lives, future market opportunities. That is why Luxinnovation encourages and supports the participation of Luxembourgish stakeholders.

However, Horizon 2020, as the name suggests, will come to an end in 2020. Nevertheless, the European Commission is working on the new Framework Programme, Horizon Europe. Even if there is not revolution, but an evolution, some novelties will be introduced in the structure and in the implementation.

Some highlights:

- Horizon Europe will be starting in just over 1 year
- Horizon Europe's key words are "Missions" and "Partnerships"
- Horizon Europe is going to gradually introduce "Lump Sum" grants with the aim to simplify the financial reporting required (see Luxinnovation's guidelines [here](#))

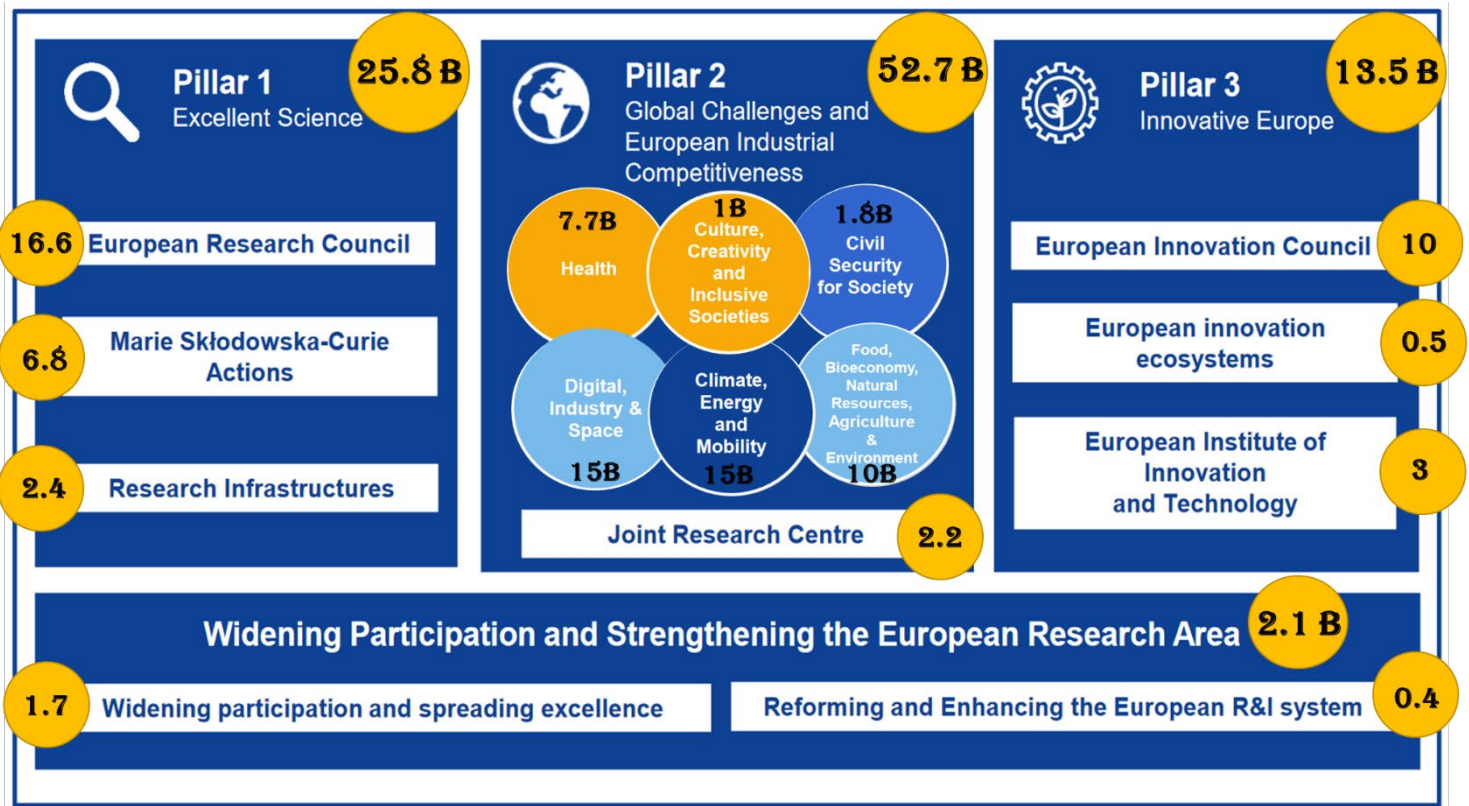
Horizon Europe is about climate, digitalisation, the transition to a circular economy, about delivering on the United Nations' Sustainable development Goals and about R&I as essential tools to strengthen European competitiveness.

This document summarising the main features of Horizon Europe publicly available so far. Keep in mind that the official legal document establishing the final version of the programme has still to be signed, so it can still undergo some changes and the elements described can evolve over time, especially regarding the budget.

The funding is indeed currently being debated by the Member States and currently the proposed amount for Horizon Europe stands at €94.1 billion. However, this might change during future negotiations.

The figure below displays the preliminary structure of Horizon Europe (HEU) and the tentative budget assigned to each sub-programme. Further, each part of the structure is described more in details trying to make some comparison with the previous programme where possible. Then, a description of missions and partnerships is given together with their main features, followed by a section listing some of the possible novelties in the implementation if they will be approved. Finally, a timeline is drawn to give the idea of the steps still to be done and their timing in order to have the Horizon Europe Framework programme launched.

PRELIMINARY HORIZON EUROPE STRUCTURE



First Pillar

The **first pillar** is dedicated to excellent science. It remains almost the same as in Horizon 2020 except for Future Emerging Technologies (FET) which are moved to the third pillar, to show also their enhanced industrial orientation.

Second Pillar

The **second pillar** gathers the industrial leadership and the societal challenges in Horizon 2020. This pillar is composed of six clusters with a new cross-sectoral approach. Individually and together, they are supposed to collaborate breaking the silos, fostering interdisciplinary and cross-fertilisation. The entire pillar is designed to be more impact oriented. Under this pillar, there is also the funding to the JRC, which provides the policy makers with scientific evidence and technical support.

Looking inside each cluster to spot their areas of intervention it is noticeable that these **clusters** are the result of a reshuffle of industrial leadership topics and societal challenge topics, with an important consideration: ICT and social sciences and humanities are setting the ground for all the six clusters.

1st cluster

The areas of intervention of health cluster are similar to SC1. Additionally, nano-medicine and med-tech are fully integrated into this cluster. Health cluster will be oriented towards the following six health-related challenges:

- Health throughout the life course in a rapidly changing society
- Living and working in a health-promoting environment
- Tackling diseases and reducing disease burden
- Unlocking the full potential of new tools, technologies and digital solutions for a healthy society exploring personalised medicine
- Ensuring access to innovative, sustainable and high-quality health care in the EU
- Maintaining an innovative, sustainable and globally competitive health-related industry

Biological transformations (application of knowledge from nature): gene tech & neuro tech & AI

2nd cluster

Culture creativity and inclusive societies, the areas of intervention remain the same as for the SC6, Europe in a changing world:

- Enhancing democratic governance
- Promoting culture, cultural heritage and creativity
- Management of social and economic transformations arising with globalisation and with rapid tech advancement that increase inequalities

- Preservation & promotion of tangible and intangible assets using digital tools
- Reverse inequalities with education and trainings

3rd cluster

Civil security is similar to SC7, Secure societies:

- Improve risk management, natural and human caused, building disaster-resilient societies
- Better protection of citizens from violent attacks in public spaces fighting crime and terrorism, guarantee security and resilience of infrastructure and vital societal functions, maritime security and EU external borders management
- Cybersecurity and a secure online environment

4th cluster

Here a major change will take place: ICT, materials and space will be gathered together into a single, large cluster. The idea is to push for more digitalisation of the industry, ensuring the competitive edge and autonomy of EU industry and fostering climate-neutral, circular and clean industry, always with a special attention to inclusiveness fostering a human-centred approach of technology (Industry 5.0). The areas of intervention of this cluster are the following:

- Manufacturing technologies
- Key digital technologies, including quantum technologies
- Emerging enabling technologies
- Advanced materials
- Artificial intelligence and robotics
- Next generation internet
- Advanced computing and Big Data
- Circular industries
- Low carbon and clean industries
- A globally competitive Space sector
- New services from Space for the EU society and economy

- An economy that works for people
- Human-machine interaction

- Data transmission through low energy consumption: smart dust & optics -> **green ICT**

- Autonomy in critical raw materials (recycling)
- New services from space

COMPETITIVENESS AND AUTONOMY	CLIMATE-NEUTRAL, CIRCULAR AND CLEAN INDUSTRY	INCLUSIVENESS
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5th cluster

Other big merge of climate, energy and mobility together. The areas of intervention are the following:

- Advanced knowledge base in climate science
- New cross-sectoral energy/transport solutions to support decarbonisation
- Develop cost-efficient, net zero-greenhouse gas emissions energy system centred on renewables
- Develop demand side solutions to decarbonise the energy system
- Develop low-carbon and competitive transport solutions across all modes
- Develop seamless, smart, safe, accessible and inclusive mobility systems

- Smart materials circular by design: renewable plastics & smart nanomaterials

- Electrification of chemical industry, e.g. Power to X: hydrogen fuel & carbon capture and storage

6th cluster

Part of climate programme related to environment is moved into this cluster. The areas of intervention are the following:

- Environmental Observation-based information and data to help reduction of greenhouse gas emissions for climate neutrality
- Biodiversity and Natural Capital: halt of biodiversity decline and restoration of ecosystems
- Agriculture, forestry and rural areas: sustainable and circular management and use of natural resources & prevention and removal of pollution
- Seas, Oceans and Inland Waters: healthy soils and clean water and air for all
- Food systems and bio-based innovation systems based on sustainability, inclusiveness, health and safety
- Circular Systems: establishment of governance models enabling sustainability
- Behavioural, socio-economic and demographic changes lead to sustainability and a balanced development of vibrant rural, coastal, peri-urban and urban areas

Smart farming

Marine Technologies: digital fish & fresh water under the sea

Third Pillar

The **third pillar** is more market innovation oriented. The **European Innovation Council (EIC)** is meant to fill the gap between research and innovation. It covers innovation from TRL1 to TRL9 mainly with two instruments: **pathfinder** and **accelerator**. The pathfinder incorporates FET supporting consortia to develop technologies of the future through grants-only. The accelerator incorporates the SME-instrument phase 2 (SME-instrument phase 1 is discontinued). The EIC accelerator supports market-creating innovation through grants-only, blended finance, or equity-only up to 15M per company, with minority stakes (10-25%). The exit strategy consists in attracting private investors to whom the European Commission can sell the stakes, with previous consent of the firm. Equity and blended operations will be implemented in accordance with the **InvestEU** programme to which Horizon Europe contributes with 3.5B. The InvestEU Programme brings together under one roof the multitude of EU financial instruments currently available and expand the successful model of the Investment Plan for Europe, the Juncker Plan, with which the Commission wants to further boost investment, innovation and job creation, triggering at least €650 billion in additional investment.

Then there is the European Innovation ecosystem aiming at improving the environment within which innovation can flourish. In particular via the **European Institute of Innovation and Technology (EIT)**, which will promote sustainable innovation ecosystems and develop entrepreneurial and innovation skills in priority areas through

its Knowledge and Innovation Communities, the **KICs**. EIT supports the already existing 8 KICs (Climate-KIC, Digital, Food, Health, InnoEnergy, Manufacturing, Raw Materials, and Urban Mobility) and will launch 2 new KICs: one on cultural and creative industries in 2022, and one on Water and maritime in 2025.

Finally, there are two specific objectives dedicated to fertilise the ground for cross-country collaboration: widening participation and spreading excellence, strengthening the European Research area. They support gender equality, responsible research and innovation, monitoring and evaluating the programme and supporting international collaboration.

Furthermore, in order to allow a faster access to funds for small collaborative consortia, a **Fast Track to Research and Innovation Procedure (FTRI)** may be proposed under some of the calls for proposals dedicated to select research and/or innovation actions Under the Global Challenges and European Industrial Competitiveness and the European Innovation Council Pathfinder parts of the Framework Programme. A call under the FTRI Procedure will have the following cumulative characteristics:

- bottom-up calls for proposals
- a shorter time-to-grant, not exceeding 6 months;
- a support provided only to small collaborative consortia composed of maximum 6 different and independent eligible legal entities;
- a maximum financial support per consortium not exceeding EUR 2.5 million;

The work programme will identify the calls using the FTRI Procedure. Horizon Europe activities will be primarily delivered through open, competitive calls for proposals, including within missions and European Partnerships.

MISSIONS

A big novelty of Horizon Europe is the **missions**. Inspired by the Apollo 11 mission to put a man on the moon, the European research and innovation missions aim at delivering solutions to some of the greatest challenges facing our world and ordinary people. Missions are portfolios of actions conceived to achieve measurable goals within a set time frame with relevant impact for EU citizens.

There are five **mission areas**:

- 1. Adaptation to climate change including societal transformation:** its focus will be on solutions and preparedness for the impact of climate change to protect lives and assets. It will include behavioural changes and social aspects by addressing new communities beyond usual stakeholders, which help lead to a societal transformation.
- 2. Cancer:** the mission will help set common goals aiming to reverse frightening trends in cancer. By joining efforts across Europe, more people would live without cancer, more cancer patients would be diagnosed earlier, would suffer less and have a better quality of life after treatment.
- 3. Healthy oceans, seas, coastal and inland waters:** the mission will be a powerful tool to raise awareness of their importance among citizens and help develop solutions on a range of issues. These include systemic solutions for the prevention, reduction, mitigation and removal of marine pollution including plastics; transition to a circular and blue economy; adaption to and mitigation of pollution and climate change in the ocean; development of new materials including biodegradable plastic substitutes, new feed and food, and urban, coastal, and maritime spatial planning.
- 4. Climate-neutral and smart cities:** the mission will help meet the goals and targets set out by international policy frameworks such as the COP21 Paris Agreement, the UN's Sustainable Development Goals (notably SDG11), the Urban Agenda for the EU and the Habitat III New Urban Agenda as cities play a key role in all of them.
- 5. Soil health and food:** the mission will provide a powerful tool to raise awareness on the importance of soils, engage with citizens, create knowledge and develop solutions for restoring soil health and soil functions. This will allow full use of the potential of soils to mitigate the effects of climate change. Results will have a direct impact on the success of the new European Commission's Green Deal and its ambition to progress on climate, biodiversity and sustainable food.

Missions set the direction for a solution, but do not specify how to achieve it. The specific missions, their objectives, budget, targets, scope, indicators and milestones and time frame will be identified through specific calls within pillar II Work Programmes. A maximum of 10% of the annual budget of the 'Global challenges and European Industrial Competitiveness Pillar' will be dedicated to specific calls related to missions. However, missions may benefit also from other parts of the Programme given that they are cross-sectoral by nature, because tackling a specific mission goes beyond funding research and innovation to overcome a societal problem. A mission can encompass setting new framework conditions (such as standards, regulations), developing new instruments to target market failure or to overcome a specific societal uptake issue, etc. A mission incorporates a portfolio of actions including R&I and will last as long as is needed to deliver the target which has been identified. A monitoring system, with the appropriate key performance indicators, will be in place for each mission. Tracking and monitoring performance will be key for the missions approach.

Missions are to be identified from the five Mission Areas with the help of *Mission Boards* and support by *Mission Assemblies*.

Mission Boards, one for each Mission Area, are composed of 15 independent experts each and their role is to provide advice to the European Commission on potential missions and how to implement these. The Boards will be required to deliver a communication and engagement strategy for each mission and Board members are asked to actively seek and gather input from all stakeholders and citizens in particular, by travelling to the Member States and Associated States.

The *Mission Assemblies*, one for each Mission Area, will provide a wider source of reference, advice and ideas, on the design and implementation of the possible missions. The Assembly is composed of top-level expertise, supporting the broader process of identifying specific missions and on outreach issues.

Key criteria for identifying missions:

- cover areas of common European relevance, be inclusive, encourage broad engagement and active participation of various types of stakeholders from public and private sectors, including citizens and end-users, and deliver R&I results that could benefit all Member States;
- be bold and inspirational, hence have wide, scientific, technological, societal, economic, environmental or policy relevance and impact;
- indicate a clear direction and objectives and be targeted, measurable, time-bound and have a clear budget frame;
- be selected in a transparent manner and be centred on ambitious, excellence-based and impact-driven but realistic goals and research, development and innovation activities;
- have the necessary scope, scale and mobilization of the resources and leverage of additional public and private funds required to deliver the mission outcome;
- stimulate activity across disciplines (including Social Sciences and Humanities) and encompassing activities from a broad range of TRLs, including lower TRLs;
- be open to multiple, bottom-up approaches and solutions taking into account human and societal needs and benefits and recognizing the importance of diverse contributions to achieve these missions;

To support discussions with Member States on missions, five sub groups of the strategic configuration of the shadow Programme Committee have been created, one for each Mission Area composed of experts proposed by Member States. These groups met briefly for the first time during the R&I Days event in September. Further meetings will take place, aligned with the meetings of the Mission Boards, with the aim to have in-depth discussion on possible specific missions identified by Mission Boards, in a co-creation and co-design approach. Members of the expert groups are also asked to support the efforts to secure citizen engagement of the future missions by identifying suitable events in their own countries or suggesting new events.

Are there examples of mission like activities in the current Horizon 2020 programme? There are some mission-like elements in Horizon 2020, such as the FET Flagships and the focus areas of the work programmes, both of which aim at large scale highly integrated activities, crossing research and innovation boundaries. The missions however bring new features such as the strong engagement with citizens and the portfolio approach to R&I. Missions are also much more encompassing than the R&I, and include other areas of policy, regulatory change, etc. to secure the success of the mission.

PARTNERSHIPS

Other big novelty in Horizon Europe regards **partnerships**. Horizon Europe will support European Partnerships to deliver on global challenges encapsulated in the United Nations' Sustainable Development Goals and industrial modernisation through concerted R&I effort with the Member States, private sector, foundations and other stakeholders.

With the idea of restructuring and rationalising European Partnerships, from several types and large number, they will be brought back to three types:

- **co-programmed** partnership between the European Commission and EU stakeholders
- **co-funded** partnership with a blending of EU and national public funding
- **institutionalised** partnerships (based on Article 185 or 187 of the TFEU, as well as the EIT Knowledge and Innovation Communities (KICs)): new legal entities responding to strategic objectives not achievable otherwise under other parts of Horizon Europe

As a result, Horizon Europe introduces a more **strategic** and **impact-driven approach** to partnerships. These partnerships need to have a clear life-cycle approach since their constitution, defining the measures of phasing-out in absence of renewal once their objectives will be reached. Key element for all partnerships will be a Strategic Research and Innovation Agenda and/or roadmap that builds the basis for a partnership proposal. Since up to half of the budget of Pillar II will be invested into European Partnerships, these need to demonstrate a concrete impact of R&I on society, climate and economy.

The European Commission proposed a consolidated partnership portfolio of 48 candidates (120 partnerships are supported under Horizon 2020). The Commission is currently engaged in the discussion on the portfolio with Member States in the 'Shadow' Strategic configuration of the Horizon Europe Programme Committee. The results of this discussion will feed into the Strategic Plan.

Partnerships will operate under the clusters of Pillar II. Some of them are new, some are the result of a merge of old partnerships, and some others are just the old ones with new names. A complete list of all the European Partnerships can be found at the bottom of this document.

Among these, the Commission is currently assessing the overall need for and focus of 13 candidates for institutionalised partnerships (based on Articles 185 and 187 TFEU), following the political agreement with the European Parliament and the Council on Horizon Europe. The proposed partnerships cover the following priorities:

1. EU-Africa research partnership on health security to tackle infectious diseases
2. Innovative Health Initiative
3. Key Digital Technologies
4. Smart Networks and Services
5. European Metrology
6. Transforming Europe's rail system
7. Integrated Air Traffic Management
8. Clean Aviation
9. Circular bio-based Europe
10. Clean Hydrogen
11. Safe and Automated Road Transport
12. Innovative SMEs
13. European High Performance Computing

They are currently undergoing impact assessment preceding the legislative proposals. The decision on whether to proceed with Commission proposals or not will be informed by the outcome of the Impact Assessment work. The timing depends on progress made in the negotiations for the Multiannual Financial Framework 2021-2027 and Horizon Europe.



What is the key difference between missions and partnerships? Partnerships are designed to support research and innovation in situations when the normal forms of calls and topics through the work programme are not appropriate. Partnerships deliver additional benefits, notably synergies with other programmes or for structuring communities of research and innovation practitioners. Missions are potentially more targeted than partnerships, but may also engage with a broader range of instruments, actors and policy areas for their execution. As such, in principle some missions may be supported by partnerships.

IMPLEMENTATION NOVELTIES

Some proposed changes in the system for proposal submission and evaluation (these might be not approved, they are just proposed):

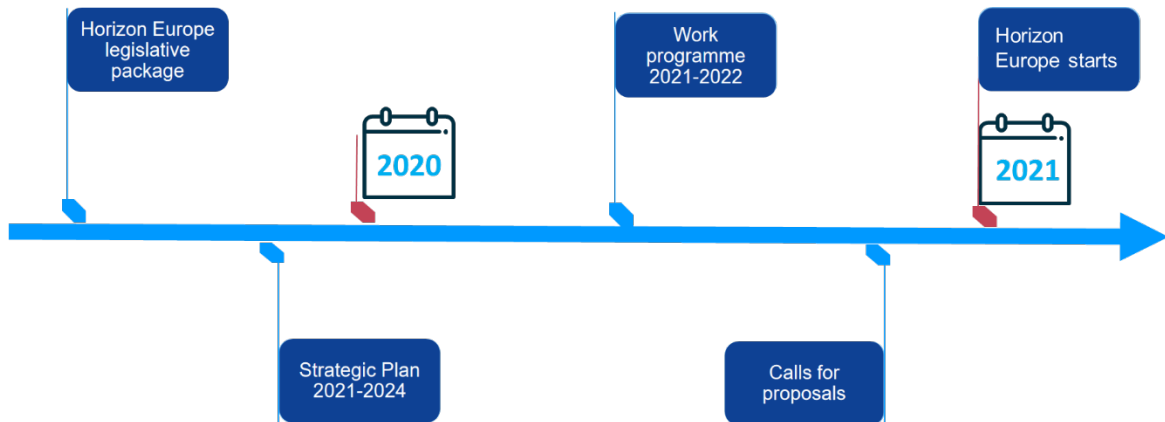
- notably in relation to missions and to the EIC: proposals may be ranked according to the evaluation score **and** their contribution to the achievement of specific policy objectives, including the constitution of a consistent portfolio of projects;
- simplify and reduce the number of evaluation sub-criteria where possible, ensuring that these are not assessed twice; provide the list of sub-criteria to be better understandable;
- multi-step evaluations: first stage blind evaluation; abolish first stage ESR for successful first stage applicants (while maintaining system of generalised feedback); abolish 'substantial change' rule for second stage proposals (or at least define it with a very low bar);
- interaction with applicants: right to react and rebuttal, more interviews to improve feedback;
- proposals template: reduce length of proposals to 50 or 30 pages where possible and ask for more standard information in Part A;

The major change regards extended use of simplified forms of costs, in particular of **lump sum** project funding, in appropriate areas and taking account of the lessons from the pilot under Horizon 2020. This implies the following:

- reinforcing appropriate guidance with target beneficiaries, evaluators as well as NCPs so enabling them to understand the specificities of lump sum funding;
- reinforcing the harmonized implementation of the lump sum pilots, in particular reviewing the templates and further improving the specific support tools for beneficiaries to present the detailed cost estimate of their project;
- further assessing the impact of lump sum specificities on consortium building;
- learning through project monitoring about the consequences of the split of lump sum share per work package and per beneficiary, especially regarding payments;

More information and guidelines for Lump sums redacted by Luxinnovation can be found [here](#).

Timeline



- By the end of the year: Horizon Europe legislative package defining the structure and the rules of participation will be finalised
- By the end of the year/the beginning of 2020: the Commission will adopt the Strategic Plan targeting impact and priorities for the first four years. The Strategic Plan is an implementing act defining orientation and priorities of Horizon Europe
- Beginning of 2020: the drafting of the first Work Programmes for 2021-2022 based on the Strategic Plan
- Second half 2020: publication of the first calls for proposals
- January 2021: Horizon Europe officially starts

Preliminary list of candidates for European Partnerships in Pillar II, III and cross-pillar, and short description of what the partnership stands and aims for		Currently envisaged implementation mode(s)	Predecessors	Composition of partners	Relevance for clusters/pillars
Health	1. EU-Africa Global Health Partnership Increase health security in sub-Saharan Africa and Europe, by accelerating the clinical development of effective, safe, accessible, suitable and affordable health technologies as well as health systems interventions for infectious diseases in partnership with Africa and international funders.	Article 185 or Article 187 or Co-programmed or co-funded	EDCTP2 (Art.185)	MS/AC and 3 rd countries (i.e. sub-Saharan African countries) Foundations/industry on an ad-hoc basis	Cl.1
	2. Innovative Health Initiative A collaborative platform bringing the pharmaceuticals, diagnostics, medical devices, imaging and digital sectors together for precompetitive R&I in areas of unmet public health need, to accelerate the development and uptake of people-centred health care innovations.	Article 187 or Co-programmed	IMI2 (Art.187)	Industry, other organisations on an ad hoc basis	Cl.1
	3. European partnership for chemicals risk assessment Bring together the European risk assessment and regulatory agencies to implement a joint research agenda, to ensure their capacity to deal with persistent or emerging challenges. It will promote the uptake of new methods, tools, technologies and information in chemical hazard identification and risk assessment and as part of this, sustain the development and use of human biomonitoring capacities in Europe.	Co-funded	Human Bio-monitoring and a number of other actions	MS/AC, National agencies, tbd the role of the corresponding EU agencies	Cl.1, 4, 6
	4. ERA Health The partnerships aims for establishing and implementing a strategic research agenda and joint funding strategy between major European public funders in health research.	Co-funded	Around 10 previous and current ERA-NET actions	MS / AC / 3rd countries	Cl.1, 6
	5. Large-scale innovation and transformation of health systems in a digital and ageing society Improving health and care models in an ageing, data-driven and digital society, shifting to holistic health promotion and person-centred care approaches through health policy and health systems research.	Co-funded	AAL2 (Art.185), JPI 'More Years, Better Lives' and others	MS / AC Civil Society organisations	Cl.1
	6. Personalised Medicine To align national research strategies, promote excellence, reinforce the competitiveness of European players in Personalised Medicine and enhance the European collaboration with non-EU countries	Co-funded	ERA-PerMed and actions in support of ICPeMed	MS / AC	Cl.1
	7. Rare Diseases To improve the integration, the effectiveness, the production and the social impact of research on rare diseases through the development, demonstration	Co-funded	EJP Rare diseases (until 2023)	MS/AC /3 rd countries, civil society	Cl.1

	and promotion of Europe/ world-wide production, sharing and exploitation of research and clinical data, materials, processes, knowledge and know-hows.			organisations, EU research infrastructures	
Health	8. One Health AMR The proposed partnership aims to bring together the many aspects of antimicrobial resistance (AMR) to overcome the fragmentation of the AMR research landscape, and integrate the various different research fields (addressing human health, animal health, food safety and environment). It will contribute to the EU One health action plan against AMR that provides the framework within which action should be taken.	Co-funded	ERA-Net EXEDRA, JPI AMR, One Health EJP	MS/AC	Cl.1, 4, 6
Digital, Industry and Space	9. High Performance Computing The EuroHPC Joint Undertaking has as its mission to establish an integrated world-class supercomputing & data infrastructure and support a highly competitive and innovative HPC and Big Data ecosystem.	Article 187 or Co-programmed	EuroHPC (Article 187)	Industry and MS/AC	Cl.4
	10. Key Digital Technologies Maintain the European Electronics Components and Systems industry at the technological forefront and contribute to boosting the EU's competitiveness, including that of its industries by providing essential components and software as well as the related manufacturing infrastructure in Europe and national strategies.	Article 187 or Co-programmed	ECSEL (Article 187), part of Photonics cPPP	Industry and MS/AC (research funders)	Cl.1,2,4,5
	11. Smart Networks and Services Enabling the infrastructure basis in terms of key technologies and deployment for Next-Generation Internet services used by citizens and for "smart" services required by vertical sectors such as transport, energy, manufacturing, health and media.	Article 187 or Co-programmed	cPPP 5G	Industry and academia in the field of connectivity	Cl.1,4,5
	12. AI, data and robotics The partnership on AI will help structuring the European AI community, develop a strategic research agenda and federate efforts around a topic that holds great potential to benefit our society and economy	Co-programmed	cPPPs on Big Data and robotics	Industry, academia, end- users, and civil society	Cl.3
	13. Photonics Europe Photonics is one of the key drivers for tomorrow's digital markets and the development of the digital European society as a whole. Photons will replace electrons in many of our most important technologies and digital products.	Co-programmed	cPPP Photonics21	Industry	Cl.1,2,4,5,6

Digital, Industry and Space	14. Clean Steel - Low Carbon Steelmaking The partnership on clean steel will provide a EU critical mass to ensure and in particular to upscale breakthrough technology, facilitate joint vision development, agenda setting and synergies of EU different funds. It will also contribute to the evolution to a programming approach in R&I in the energy intensive industry.	Co-programmed	Fuel cell and Hydrogen (Article 187) cPPP Spire	Industry	Cl.4, 5
	15. European Metrology Accelerating the global lead in metrology research that Europe currently holds, and creating sustainable metrology networks for highly competitive and emerging metrology areas, while incorporating a wide range of stakeholders.	Article 185 or co-funded	EMPIR (Article 185)	MS/AC (National Metrology Institutes)	Cl.1,2,4,5,6
	16. Made in Europe Towards a competitive discrete manufacturing industry with a world-leading reduction of the environmental footprint whilst guaranteeing the highest level of well-being for workers, consumers and society.	Co-programmed	cPPPs Factories of the Future, part of Robotics and Photonics	Industry	Cl.1,5,6
	17. Carbon Neutral and Circular Industry Transforming European process industries to make them carbon neutral by 2050, to turn them into circular industries together with material and recycling industries, and to enhance their technological leadership at global level and international competitiveness.	Co-programmed	cPPP SPIRE	Industry CSO/NGOs	Cl.4,5, 6
	18. Global competitive space systems Perform fast and structured advances on selected innovative critical space systems R&I roadmaps such as for example reusability, in orbit demonstration, assembly and manufacturing, so as to acquire global industrial leadership	Co-programmed	n.a.	Industry MS/AC	Cl.4
	19. Geological Service for Europe Further integrate national services to provide key advice and data services to the EU on sustainable subsurface management, integrating geo-resources and environmental conditions across all relevant economic and societal clusters, supported by a world leading subsurface information platform. A coordinated approach to geoscientific research and innovation will help improve pan-European harmonisation, standardisation, knowledge sharing and cutting-edge developments in 3D and 4D modelling and geological mapping.	Co-funded	GeoERA ERA-NET	MS/AC	Cl.3, 4, 5, 6

Climate, energy and mobility	20. Transforming Europe's rail system Define, design and implement the full spectrum of rail research and innovation activities – from fundamental research to large-scale demos – to trigger a major transformation of the railway system as the backbone of an integrated and sustainable mobility in Europe, maximising socio-economic benefits	Article 187 or Co-programmed	Shift to Rail (Article 187)	Industry, Railway Operators and Infrastructure Managers	Cl.5
	21. Integrated Air Traffic Management Enhance the performance of the Union's air traffic management system as technological pillar of the Single European Sky (SES) and more broadly of the air transport sector as a whole.	Article 187 or Co-programmed	SESAR (Article 187)	Industry, Eurocontrol	Cl.4, 5
	22. Clean Aviation To accelerate and amplify the impact of the European aviation research and innovation on Energy Union, Mobility Package, renewed industrial policy strategy and EU GHG and air pollution emissions, including for the 2050 horizon and noise regulations, tackling energy and climate-change challenges, European industry competitiveness, "first mover advantage" on international markets, as well as a sustainable mobility for society.	Article 187 or Co-programmed	Clean Sky 2 (Article 187)	Industry	Cl.4, 5
Climate, energy and mobility	23. Clean Hydrogen Accelerating the market entry of nearly-zero GHG-emission hydrogen-based technologies across energy, transport & industrial end-users, covering the full value chain for competitive hydrogen and fuel cells technologies, ensuring pole position for Europe to realise the potential of hydrogen technologies at scale.	Article 187 or Co-programmed	Fuel Cell and Hydrogen (Article 187)	Industry	Cl.4, 5
	24. Built environment and construction Generate the necessary technology and socio-economic breakthroughs for an improved built environment to support the achievement of EU 2050 decarbonisation goals and the transition to clean energy and circular economy, while improving quality of living, health and wellbeing for people, ensuring a high degree of mobility and creating competitive ecosystems for business.	Co-programmed	Energy-efficient Buildings cPPP	Industry	Cl.4, 5
	25. Towards zero-emission road transport (2ZERO) Accelerating the transformation of the road transport system into zero-emission mobility through a world-class European R&I and industrial system, with a competitive new generation of light weight, energy efficient and affordable road transport vehicles and support measures to facilitate their rapid deployment	Co-programmed	European Green vehicle initiative (cPPP)	Industry	Cl.4, 5

	26. Mobility and Safety for Automated Road Transport Long-term framework to the strategic planning of research and pre-deployment programmes for connected and automated driving on roads at EU and national levels in a systemic approach (vehicle, interactions, infrastructure, technical and non-technical enablers and societal impact)	Article 187 or Co-programmed	n.a. related: 5G, Big Data, ECSEL, S2R, SESAR, batteries, 2ZERO	Industry	Cl.4, 5
	27. Zero-emission waterborne transport To radically transform inland and maritime waterborne transport, develop knowledge, technologies and demonstrate solutions that will enable zero-emission shipping for all ship types and services. It will contribute to maintaining and further reinforcing Europe's global leadership in green shipping technologies. This will create a foundation for shipping to underpin a carbon neutral future with the demonstration of deployable zero-emission solutions suitable for all main ship types and services by 2030.	Co- programmed	n.a.	Industry	Cl. 4, 5
	28. Batteries: Towards a competitive European industrial battery value chain Development of a world-class European R&I system on batteries, with a view towards European industrial leadership. It will bring together all Horizon Europe activities to develop a coherent strategic programme, in cooperation with industrial players and research community, making a substantial contribution to fulfilling the Paris Agreement, and enhance the competitiveness of current and emerging European industries along the battery value chain.	Co-programmed	n.a.	Industry	Cl.4, 5
	29. Sustainable, Smart and Inclusive Cities and Communities It drives research and innovation on urban transitions and provides scientific evidence for urban actors on sustainable urban development with a cross-sectoral, inter- and transdisciplinary approach, implemented through activities beyond joint calls.	Co- programmed, Co-funded	JPI Urban Europe	MS/AC	Cl .3, 4, 5
	30. Clean Energy Transition Respond to the call for decarbonisation in medium- and long-term in a holistic way, synthesizing all fragmented actions to allow for greater integration of relevant research & innovation areas and provide greater impact.	Co-funded	Around 10 existing ERA-NET Cofund actions	MS/AC (RFOs and RPOs)	Cl.5

Food, Bioeconomy, Natural Resources, Agriculture and Environment	31. Accelerating farming systems transition: agro-ecology living labs and research infrastructures The partnership will enable to grasp short to long-term agroecological processes at landscape level and accelerate the transition towards sustainable climate and environment-friendly farming practices by boosting place-based innovation in a co-creative environment accelerating the adoption of innovation by farmers and other actors.	Co-funded	n.a.	MS/AC (RFOs/regional authorities)	Cl.1,5,6
	32. Animal health: Fighting infectious diseases The partnership aims to bring sustainable and innovative solutions to tackle infectious animal diseases, including those transmitted between animals and humans (zoonoses) and to contribute to the fight against anti-microbial resistance, implementing the One Health concept. It will support sustainable animal production, reduce trade barriers, and protect consumers.	Co-programmed, Co-funded	A small number of current ERA-NETs	Either MS/AC or Industry, and regulatory agencies	Cl.1,6
	33. Environmental Observations for a sustainable EU agriculture The objective of the initiative is to support the delivery of a sustainable CAP. This will be done through the improvement of agricultural practices and farm profitability, by using the possibilities the current digital/data technics in the field of EO offer. In line with the digitalisation of the EU's farming sector, new services and applications will be developed enabling more efficient, environmentally friendly and profitable production systems.	Co-funded	EuroGEOSS	MS/AC (research funders, national/regional authorities)	Cl.4,6
	34. Rescuing biodiversity to safeguard life on Earth Halting biodiversity loss, maintaining and restoring natural capital is essential for the transition towards sustainability, climate neutrality and for respecting the planetary boundaries. The partnership aims to deploy solutions to stop the ongoing mass extinction of species caused by human activity by upscaling, aligning and integrating European R&I efforts and investment, guiding actions to protect, restore and sustainably manage ecosystems and natural capital.	Co-funded	ERA-NET Biodiversity, EKLIPSE, ESMERALDA	MS/AC (RFOs, national/regional authorities)	Cl.1,2,5,6
	35. A climate neutral, sustainable and productive Blue Economy The objective is to sustainably unlock, demonstrate and harvest the full potential of Europe's Oceans and Seas through a well-structured, sustained and simplified joint effort in this borderless domain with the aim to support the transition to a strong, climate neutral and sustainable blue economy by 2050.	Co-programmed or Co-funded	BONUS, MARTERA, JPI Oceans, ERA_NET Cofund BlueBio	MS/AC (research funders, national/regional authorities), EU Agencies	Cl.1,2,4,5,6

Food, Bioeconomy, Natural Resources, Agriculture and Environment	<p>36. Safe and Sustainable Food System for People, Planet & Climate Fixing our food system is central to the transition to a 'Sustainable Europe by 2030', and key to meeting the IPCC climate targets and operating within key planetary boundaries. This partnership will deploy FOOD 2030 and deliver the Food Safety System of the future, ensuring consumer trust, safety, quality and traceability; (and) Sustainable Food Systems, providing alternative proteins sources, dietary shifts, the halving of food waste, and exploit the potential of microbiomes for sustainable and healthy food systems.</p>	Co-programmed or Co-funded	FACCE Surplus, ICT Agri2, Core-Organic, ERA GAS, SUSAN, ERA HDL, SusFood2	MS/AC (research funders, national/regional authorities), EU Agencies	Cl.6
	<p>37. Circular bio-based Europe: sustainable innovation for new local value from waste and biomass (Sustainable, inclusive and circular bio-based solutions) The goal is to drive sustainable and climate-neutral solutions accelerating the transition to a healthy planet, where renewable products and nutrients will be produced from biomass and waste instead of non-renewable fossil and mineral resources. The partnership will create awareness, capacities and appropriate structures in a systemic approach extending beyond industry partners, also mobilising producers of biological resources and end users.</p>	Art.187 or Co-programmed	BBI JU	MS/AC (research funders, national/regional authorities)	Cl.4,5,6
	<p>38. Water4All: Water security for the planet The partnership aims at securing all water demands in terms of quality and quantity, and that both economic and natural systems, as well as people are protected from water-related hazards. This is essential to support the transition to a healthy planet and to ensure a resilient Energy Union, EU climate neutral policy and respect of planetary boundaries.</p>	Co-programmed or Co-funded	Water JPI	MS/AC (research funders, national/regional authorities)	Cl.1,2,4,5,6
	<p>31. Accelerating farming systems transition: agro-ecology living labs and research infrastructures The partnership will enable to grasp short to long-term agroecological processes at landscape level and accelerate the transition towards sustainable climate and environment-friendly farming practices by boosting place-based innovation in a co-creative environment accelerating the adoption of innovation by farmers and other actors.</p>	Co-funded	n.a.	MS/AC (RFOs/regional authorities)	Cl.1,5,6
Partnership candidates	<p>39. Innovative SMEs The initiative aims to provide financial support to transnational market-oriented research projects initiated and driven by innovative SMEs. Innovative</p>	Art.185 or co-funded	Eurostars-2	MS/AC (SMEs)	Pillar III

	SMEs shall take the lead and should be able to exploit commercially the project results, thus improving their competitive position. Research organisations, universities, other SMEs, large companies and others actors of the innovation chain can also participate in Eurostars projects.				
	40. European Science Cloud (EOSC) The EOSC 2.0 partnership is aimed at facilitating the EOSC implementation activities in its second phase. After 2020 the EOSC will become more stakeholder-driven, with a permanent governance structure in place, and would benefit from a co-programmed financing mechanism.	Co-programmed or co-funded	n.a	MS/AC, Academia	Cross-Pillar
	41. EIT Climate-KIC EIT Climate-KIC is a network of universities, businesses and research organisations delivering solutions mitigate or adapt to climate change and accelerate the deployment of new solutions to market.	EIT-KIC	n.a	MS/AC, Industry, Academia	Pillar III Cl.5

Partnership candidates: Other Pillars	42. EIT InnoEnergy-KIC It aims at building a sustainable, long-lasting operational framework among the knowledge triangle actors in the energy sector, with the goal of fostering the generation of new talents, the emergence and deployment of new innovative solutions and the creation and development of companies.	EIT-KIC	n.a	MS/AC, Industry, Academia	Pillar III Cl.5
	43. EIT Digital-KIC EIT Digital's mission is to drive digital innovation and develop entrepreneurial talent in order to enhance both economic growth and quality of life across Europe.	EIT-KIC	n.a	MS/AC, Industry, Academia	Pillar III Cl.4
	44. EIT Health-KIC EIT Health is a network of universities, businesses and research organisations delivering solutions to enable European citizens to live longer, healthier lives by promoting innovation.	EIT-KIC	n.a	MS/AC, Industry, Academia	Pillar III Cl.1
	45. EIT Food-KIC EIT Food is a network of universities, businesses and research organisations delivering solutions to develop a highly skilled food sector. EIT Food collaborates with consumers to provide products, services and new technologies, which deliver a healthier lifestyle for all European citizens.	EIT-KIC	n.a	MS/AC, Industry, Academia	Pillar III Cl.5
	46. EIT Manufacturing-KIC	EIT-KIC	n.a	MS/AC, Industry, Academia	Pillar III Cl.4

	<p>EIT Manufacturing will be a network of universities, businesses and research organisations delivering solutions to transform today's industrial forms of production towards more knowledge intensive, sustainable, low-emission, trans-sectoral manufacturing and processing technologies, to realise innovative products, processes and services.</p>				
	<p>47. EIT Raw materials-KIC EIT RawMaterials is a network of universities, businesses and research organisations delivering solutions to boost competitiveness, growth and attractiveness of the European raw materials sector via radical innovation, new educational approaches and guided entrepreneurship.</p>	EIT-KIC	n.a	MS/AC, Industry, Academia	Pillar III Cl.4
	<p>48. EIT Urban Mobility-KIC EIT Urban Mobility will be a network of universities, businesses and research organisations delivering solutions to develop a greener, more inclusive, safer and smarter urban transport system.</p>	EIT-KIC	n.a	MS/AC, Industry, Academia	Pillar III Cl.5