European Commission

Co-funded and co-programmed European Partnerships under the second Horizon Europe Strategic Plan

Draft concept papers for proposed candidate partnerships

Research and Innovation

Co-funded and co-programmed European Partnerships under the second Horizon Europe Strategic Plan: Draft concept papers for proposed candidate partnerships

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EUROPEAN COMMISSION

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The proposed partnership portfolio and individual concept papers are subject to further changes that are being published for transparency purposes only, and can thus not be regarded as final or endorsed.

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Directorate-General for Research and Innovation
Horizon Europe European Partnerships

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BRAIN HEALTH

General Information	
Proposed title of the European Partnership	**European Partnership on Brain Health**
Short description of the candidate partnership	Accelerating the delivery of preventive, diagnostic, therapeutic and care solutions to foster brain health[1] in citizens and patients, including through a better understanding of the functioning of the brain and by strengthening the alignment and synergies across European and global brain health research initiatives.
Services directly involved	DGs RTD, SANTE, CNECT, GROW, JRC, EAC, EMPL, ENV
Context and problem definition	**Brain disorders are a leading cause of disability** in Europe and globally, putting a great burden on patients, families, caregivers and healthcare systems. **More research and innovation are needed** to develop effective disease-modifying treatments or cures, improved preventive measures, better diagnostics, but also evidence for policymakers, and this also implies a better understanding of the functioning of the brain. The total cost of brain disorders in Europe was estimated at €798 billion in 2010. Neurodegenerative diseases and dementia affect one third of the ageing population over 85 years. Mental disorders, including addictions, affect 12% of the entire population, while neurodevelopmental disorders affect 15% of children. The COVID-19 crisis, Russia's war of aggression against Ukraine, the energy crisis and inflation have further aggravated mental health, including for the most vulnerable. National efforts to address these challenges are insufficient, and enhanced coordination and collaboration among all stakeholders in Europe and globally are needed to tackle them collectively. Several initiatives have already been established in Europe aimed at achieving a concerted alignment and a strategic and financial defragmentation of research in brain health. These include the EU Joint Programme for Neurodegenerative Disease Research (**JPND**), the Network of European Funding for Neuroscience Research (**NEURON**), and the Human Brain Project (**HBP**), which is also putting in place the **EBRAINS** research infrastructure. At global level, collaborative work is ongoing with the World Health Organization and Organisation for Economic Co-operation and Development on strengthening the knowledge base for interventions

[1] In the context of the partnership, '**brain health**' should be interpreted as a concept that encompasses neural development, neuroplasticity, brain functioning, and recovery across the life course, **including mental health** and wellbeing elements.

	on mental health and supporting countries to improve their capacity to address mental health challenges. The initiatives have addressed research questions related to determinants of mental health, neurodegenerative diseases, and neurodevelopmental disorders. They have identified major drivers, including genetic susceptibility, environmental risk factors, and limits of existing care and health systems. The improved understanding, however, needs to translate better into the development of new treatments. Simultaneously, prevention strategies have been identified as the most promising way to reduce the high personal, familial, societal, clinical, and economic costs of brain disorders. In 2019, and under the Coordination and Support Action (CSA) 'European Brain Research Area' (**EBRA**), the three initiatives JPND, NEURON and HBP/EBRAINS started discussing ways to find operational synergies, identify gaps, and foster alignment across European and global brain initiatives. In 2022, EBRA delivered a common research agenda, as input for a future strategic research and innovation agenda in brain health. Additionally, HBP initiated a discussion in the international community to formulate the scientific vision for the next decade of digital brain research, with particular focus on digital tools enabling progress in brain medicine. These **initiatives have now acquired an invaluable experience and trust, strongly supported by the European Commission and Member States, and encompassing significant non-European international partners**. Already in 2019, Member States (MS) and Associated Countries (AC) expressed strong interest to develop a European partnership on Brain Health, to be included in the 1st Strategic Plan (2021-24). With several initiatives still running, and other priority partnerships in the field of health to be launched, it was agreed to postpone the brain health partnership to the 2nd Strategic Plan[2]. In 2022, interest for such a partnership was restated and a preparatory CSA was requested in the Health cluster 2023-24 work programme. The CSA, expected to start in Q4 2023, should notably develop a strategic research and innovation agenda, paving the way to the brain partnership. The CSA will also be tasked with ensuring a broad geographical representation of European countries and to further pursue efforts already undertaken to strengthen the participation of widening countries. **Seizing the momentum and capitalising on cutting-edge research will unleash a powerful innovation force and create a new ecosystem for brain research, to be consolidated in an ambitious partnership on brain health, strengthening the position of European brain health research.**
Objectives and expected impacts	The objectives are to i) find cures for brain disorders, ii) enable early diagnosis for early, personalised treatments that are affordable and accessible to everyone, iii) promote evidence-based prevention at

[2] Recorded in the minutes of the Shadow PC meeting (12-09-2019)

	individual and community level, and iv) optimise the clinical management of affected persons, including the identification and diffusion of best practices and standards, structures and care. These are framed within the wider context of the United Nation's **Sustainable Developmental Goal** target 3.4 on non-communicable diseases and mental health; the World Health Organization's response to the burden posed by neurological and mental disorders; the **Healthier Together - EU Non-Communicable Diseases Initiative**, which includes a focus area on 'Mental health and neurological disorders'; and the Commission Communication on a **comprehensive approach to mental health,** adopted on 7 June 2023[3]**.** By further structuring the brain research and innovation area in Europe, major **expected impacts** of the partnership are the translation of research results into innovative products for earlier, more accurate diagnosis and more effective treatments, more adapted and successful prevention and care strategies, including the identification of best practices, and better implementable public health policies. The partnership will thereby also contribute to the **European Health Union** by supporting one important goal of the revision of the pharmaceutical legislation: addressing unmet medical needs. It will also feed into the **European Care Strategy for caregivers and care receivers** that aims to ensure high quality, affordable and accessible care services for all ages. Steps include: • establishment of a common roadmap with all stakeholders • delivery of efficient strategies for industry-academia collaborations • facilitation of data sharing and access to unique infrastructures • integrating MS that do not yet have a specific brain health agenda • strengthened collaboration with international initiatives[4,5] • further internationalisation, especially towards American and Asian countries • better consideration of sex and gender aspects in research.
Necessity test: rationale for a	The extent of the challenges, including the rapidly growing impact of the ageing European population or its declining mental health[6] and the

[3] This communication draws on 3 guiding principles: to (i) have access to adequate and effective prevention, (ii) have access to high quality and affordable mental healthcare and treatment, and (iii) be able to reintegrate society after recovery. One of its flagships is to strengthen research on brain health, including on mental health by working closely with Member States to create an ecosystem, to maximise EU and Member States' research investments. An ambitious partnership on brain health would support the implementation of this Communication.

[4] World Health Organization, Organisation for Economic Co-operation and Development, Global Alliance for Chronic Diseases

[5] Entities include the global brain initiatives & the International Initiative for Traumatic Brain Injury Research (InTBIR)

[6] As also recognised in the Report on the final outcome of the Conference on the Future of Europe, calling to dedicate more attention to mental health

European Partnership	complexity of brain health, require a highly coordinated support. A sustainable, holistic research and innovation strategy in brain health is necessary, which goes beyond traditional calls from the EU Framework Programmes and national programmes. The existing brain research initiatives have clearly demonstrated that bringing together all stakeholders (including Ministries of Research, research organisations, councils to Ministries of Health, health agencies, patient associations and health economists) to address the same specific issue of improving brain health can bring tremendous momentum and added value, leading to progress in research and adaptation of care. The ERANET programmes co-funded by the EC have significantly boosted the funding commitments of the participating MS and AC. It is paramount to ensure much-needed overall coordination, to prevent the deconstruction of the existing ecosystems, while there are still so many unmet brain health needs to answer. Cross-fertilisation and synergies between existing initiatives supported by the EU Framework Programmes and MS would be best ensured by bringing them under one single umbrella, also ensuring economies of scale. **This new partnership will seize the unique momentum and accelerate the creation of the largest competitive European and global collaboration, essential to improve brain health by motivating and mobilising all the stakeholders under a common and strong transnational banner.**
Relevant for the following parts of Horizon Europe	Pillar II 'Global Challenges and European Industrial Competitiveness' ☒ Cluster Health
Currently identified links with other partnership candidates / Union programmes	Under Cluster 1 (Health) links include the **public-public (co-funded) partnerships:** Rare diseases; Personalised medicine; Transforming health and care systems; ERA for Health; and the **public-private institutionalised partnership** Innovative Health Initiative (IHI) and the EIT Health. Under Cluster 2, links relate to socio-economic transformations that contribute to inclusion and growth, as well as to how culture and arts can contribute to mental health and wellbeing. There are also links with the Cancer Mission e.g. regarding how to ensure good mental health and wellbeing of cancer patients and survivors. Relevant Union programmes include ● **EU4Health**, which supports the Healthier Together – EU Non-Communicable Diseases Initiative (with a focus area on 'Mental health and neurological disorders'), or the European Health Data Space (with EBRAINS research infrastructure participating as a partner in a pilot project); or the ● **Digital Europe Programme**, which contributes to the deployment of a European common health data space.
Does the proposed partnership build on currently active ones?	The constant improvement and growth of brain health research has been catalysed by several EU funded projects and initiatives, of which the following are currently active: **ERA-NETs:** JPcofuND2 (ending 31/12/24); NEURON Cofund2 (ending 31/12/25); **FET Flagship:** Human Brain Project (HBP; ending 30/09/23) These initiatives have paved the way for an ambitious partnership,

	building trust and attracting new participants. They also facilitated the initiatives management, complementing national "virtual common funding pots" with a real common pot, allowing gap-filling and national budget mobilisation.
Expected type and composition of partners	This partnership will benefit from the partners already participating in the existing brain research initiatives, and will be primarily composed of institutions and agencies that fund brain research in Europe. It will also involve other stakeholders such as patient organisations, policy makers, researchers, health care providers and practitioners, citizens, regulators and industry representatives. The governance of the partnership aims to be light, efficient, and flexible to accommodate all participants. At **country level**, the existing partnerships have already enrolled many MS, AC and 3rd countries. JPND has 30 participating countries, while NEURON has 23, with many countries participating in both initiatives. The new partnership should further enlarge to additional **national research funding agencies**. Collaborations with the USA are being strengthened, while further extension to EU13 and Asian countries is in progress. At **researchers' level**, the existing initiatives have gained recognition, establishing a visible European brain research area. This unique experience and recognition have allowed **institutional organisation and agencies** to yearly earmark funding to participate in these initiatives. Several initiatives have enrolled **patient groups, carers, and the general public** in the prioritisation and the evaluation of their actions, and this will be strengthened. The partnership also aims to increase the participation of **private and industry stakeholders** through other existing initiatives like the **IHI**, but also by attracting **SMEs** involved in care and treatment innovation. **Regulators** from European and state agencies, OECD and other major players in the field of policy regulations will also be encouraged to participate. Collaboration with **non-profit and non-governmental organisations** will also be sought. Additionally, efforts will be made to boost the exploitation of research and innovation results by reaching out to **other national ministries, in charge of e.g. health, industry or employment policies**.
Contributions and commitments expected from partners	Using the overall contributions (national + EU funding) of the main partnerships (JPND, NEURON, HBP) under Horizon 2020, a sum of €77 million/year is currently observed: ● JPND: €66 million over 7 years = €9 million/year ● NEURON: €49 million over 7 years = €7 million/year ●HBP: €607 million over 10 years = ~€ 61 million/year A rough 25% increase of brain research investments for the new partnership would allow Europe to remain competitive on the global scene.
Currently envisaged implementation mode(s).	☐ Co-programmed European Partnership ☒ Co-funded European Partnership ☐ Institutionalised European Partnership ☐ Article 185 ☐ Article 187 ☐ EIT-KIC

Justification of the implementation mode	The co-funded mode of collaboration with the EC will offer a high and attractive European and global visibility. An invaluable leverage effect in the amount of funds mobilised by the participants is to be expected, as illustrated in the Horizon 2020 co-funded partnerships.
Proposed starting year	2025

FORESTS AND FORESTRY FOR A SUSTAINABLE FUTURE

General Information	
Preliminary title of the European Partnership	**Forests and Forestry for a Sustainable Future**
Short description of the partnership	The partnership aim is to promote healthy, biodiverse and resilient forests that are sustainably managed and able to provide a wide range of key-ecosystem services, including climate change mitigation through carbon removals and a continuing supply of materials and services for the development of the bioeconomy. It will be the main instrument of public organisations from EU countries and beyond to join forces in the forest-based sectors through concerted research and innovation together with a wide range of other stakeholders.
Services directly involved	DGs AGRI, RTD, ENV, GROW, CLIMA, JRC
Context and problem definition	As stated in the European Green Deal, addressing global changes and limiting their impacts requires a **transformative change** of our European societies towards a **resource-efficient and competitive economy**, without net emissions of greenhouse gases by 2050 and with a decoupling of economic growth from resource use. Forests are at the intersection of global challenges such as climate change, biodiversity loss and land degradation. Forests in the EU are a **major reservoir of carbon and sequester 10% of EU gross greenhouse gas emissions** (Forest Europe 2020). They host the **largest share of terrestrial biodiversity**. They provide **ecosystem services that are key for people and the planet. They regulate** the climate, ensure soil and water quality and provide **renewable materials like wood and non-wood forest products and services** such as social recreational services (in particular urban and peri-urban forests), health and well-being. Challenges are set to increase with human population growth and a growing demand for natural resources and ecosystem services. As highlighted in the 2019 Commission Communication on stepping up EU action to protect and restore the world's forests, socio-economic resource dependencies mean that EU actions to address EU citizens' needs for food and natural resources also have an impact on forests globally. At the same time, societal **demand for forest restoration, conservation and sustainable use** is increasing. As regards specifically climate change, the final report of the High-Level Panel of the European Decarbonisation Pathways Initiative (EDPI) emphasised that a window of opportunity still exists to take in action and limit the impacts of global changes. **Forests are part of the solution to face global challenges.** They play an essential role in climate change mitigation, safeguarding biodiversity, protecting human living space, maintaining hydrological cycles, providing wood and non-wood forest products and recreational environments. In

particular, forests are key to reach the EU target of carbon removals by natural sinks of 310 million tonnes of CO_2 equivalent set out in the revised LULUCF Regulation[7] (Land-Use, Land-Use Change and Forestry), climate neutrality by 2050, and to generate negative emissions thereafter. With the proposed Regulation on carbon removal certification (CRC)[8], forests and forest-based industries have the opportunity to **strengthen carbon removals**, including through carbon farming practices, improved sustainable forest management and an increased use of long-lived and other climate-smart wood products. The forest sector has a crucial role in ensuring forest sustainability for the transition of our societies towards a resource-efficient and green economy. The forest-based sector in Europe consists of a multitude of value chains, both commercial and non-commercial, representing **over € 117 billion manufacturing added value and creating 2.6 million jobs** and it is vital for regions less developed and in transition. Yet, the potential total value created could be optimised by integrating forest ecosystem services into payment schemes, diversifying and developing value chains.

To help the transformation of our society we must enable our forests to adapt to climate change. Thus, there is an urgent need for adaptive forest restoration and sustainable management approaches that strengthen the resilience of EU forests. Also, re- and afforestation and restoration of degraded forests are needed to increase absorption of CO_2. Current EU forestry practices dominated by single coniferous tree species are vulnerable in a changing climate when tens of millions m3 of wood are affected by bark beetles yearly, and even more by droughts. On the other hand, the EU Forest Strategy for 2030 sets a vision and concrete actions to improve the protection, restoration and resilience of the EU forest, increasing them in quality and quantity, and promoting a sustainable circular bioeconomy. These changes are a precondition for forests to be able to deliver on their socio-economic and environmental functions for future generations, and enable a flourishing forest-based bioeconomy for decades to come. But they are also to avoid escalating socio-economic costs from forest disasters caused by pests and diseases, protect people, land and houses from floods, storms, fires and landslides, and preserve the carbon stock and sink function and other ecosystem services provided by forests that are vital for human health and wellbeing, such as clean air, water regulation, and habitat for the variety of living species they host.

An enabling prerequisite to make forests fully part of the solutions to tackle global challenges and transform our society is **reliable and timely available information on forest ecosystems and resources, their condition and trends**. Forests must be monitored over time to drive management practices towards enhanced forest resilience. Forest monitoring systems and precise information sources on forests are required to monitor forest attributes dynamics, detect disruptive events that may be the early warnings of tipping points in forest changes, and ensure targeted and effective measures to improve forest resilience and to track progress in forest contributions to the achievement of climate

[7] https://ec.europa.eu/commission/presscorner/detail/en/ip_22_6784
[8] https://climate.ec.europa.eu/eu-action/sustainable-carbon-cycles/carbon-removal-certification_en

	neutrality and other sustainability objectives. Combined with ground-based data, forest monitoring can benefit greatly from advances in digital tools and technological innovation (remote sensing, LiDAR, statistical inventories, crowdsourcing) but can also be a driver of this digital innovation. Addressing the challenges that we face regarding forests and **seizing the sustainable opportunities that forests can offer** requires us to consider forests holistically as a socio-ecological and economic system, where **complementary actions** can be implemented and **strong synergies** achieved, but where **trade-offs** between competing actions will also have to be balanced. European investment into forest research has been conducted through the challenge "Food security, sustainable agriculture and forestry, marine, maritime and inland water research and the bioeconomy" of Horizon 2020 with a total budget of around € 155 million for 2014-2020. In Horizon Europe, forest related research and innovation activities are supported through the thematic cluster on "Food, Bioeconomy, Natural Resources, Agriculture and Environment".
Objectives and expected impacts	The candidate Partnership will support the ambition of the new EU Forest Strategy for 2030 that recognises the **central and multi-functional role of forests**, and the contribution of foresters and the entire forest-based value chain for achieving by 2050 a **sustainable and climate-neutral economy** while ensuring that all of ecosystems are **restored, resilient, and adequately protected**. The European Partnership on forests will be the main research and innovation-oriented instrument to reach these objectives. Addressing forest challenges by separate domains of action like biodiversity, climate change, or industry puts us at risk of opposing solutions rather than optimising synergies and trade-offs. We therefore need research and innovation approaches to **address multiple goals simultaneously**, which often requires **transdisciplinary approaches** to properly define relevant research questions. Innovative approaches and improved knowledge are needed to create a solid foundation for sound decision making and action to reach the most optimal trajectory for forests to contribute to a sustainable green transition. The **expected impact** of the Partnership is **coordinated forest research and innovation at European level** to provide a shared and robust knowledge base to make this transition a success. The main objective of the Partnership is to promote sustainable European **forest ecosystem management** that is adapted to **future environmental conditions and risks**, have a strong weight in the **bioeconomy value chains**, and meet **societal expectations**. **Expected outcomes** of the European Partnership on forests are the following: ● **Stronger consistency between social, environmental and economic dimensions of forests and forestry**, and improved knowledge of their interplay. Knowledge can facilitate the convergence of views between different stakeholders, thus responding to societal expectations while supporting the forest

	industry in a transition towards a greener and circular bioeconomy. ● **Better understanding of the pivotal importance of the time perspective** and of the accelerating changes in climatic conditions and weather extremes in the role that forests can play with respect to climate benefits and biodiversity objectives, emphasising the need for modelling approaches of various management strategies. ● **Improved guidelines on innovative and adaptive forestry regimes in European regions** to reach climate and biodiversity objectives, embracing the multifunctional role and the sustainable management of forests as well as the interplay between forestry regimes and genetic diversity and resilience to climate change (drought, fire, pests and diseases, etc.). ● Development of new knowledge, methods, and processes to **support major transitions (including increased carbon removals and the restoration of forest ecosystems) and innovations in the forest-based bioeconomy towards cascading use of forest products and higher added value**, supporting business development (creating employment and job opportunities) in rural areas and industrial development in crucial sectors such as forest-based industries (traditional and emerging branches), construction, transport and energy. ● **Improved, consistent, comprehensive and timely monitoring** of forest condition, biodiversity, resilience and productivity, related experiments to better anticipate future developments, provide early alert on disturbances (e.g. pest outbreaks and climate change driven impacts), and assess the impact of forestry practices on forest health and conservation. Better understanding of the trends and bottlenecks in the emergence of **new green forestry business models**, including carbon farming, ecotourism and payments for environmental services.
Necessity test: rationale for a European Partnership	The European Partnership is an objective of the EU Forest Strategy and will **build a strong forest research and innovation community** that **interconnects people/entities** and a wide **spectrum of scientific disciplines** to reinforce the work on the **European priorities** such **as nature restoration, climate change mitigation and adaptation**. Despite its growing importance, the forest R&I capacity is still underdeveloped in comparison to other fields (e.g., agriculture) and the scientific knowledge base needs to be significantly enhanced to overcome the challenges faced by forests and to unlock their full potential. An ambitious partnership would allow to speed up the scientific progress, underpin the implementation of relevant EU policies, increase efficiency (e.g., division of labour) and foster knowledge exchange in the whole forest domain. A European Partnership is required **to ensure a holistic and balanced approach regarding the multiple uses and benefits of forests and forestry in all parts of Europe while considering changing climate, environmental and socio-economic conditions.** Without such a holistic approach, there is a risk for forest questions and forest research to be scattered among different domains such as climate change, biodiversity, societal expectations, industrial development or economy. Each of these

domains is important but even more important and crucial is the design of synergies (when forest actions are complementary) and the balance of trade-offs (when actions are competing) between these domains. Such a holistic approach is all the more important as the bottlenecks in forest questions today precisely lie at the interface between different domains (e.g. reinforcing logging and biomass production vs. reinforcing protection with respect to climate objectives in different timelines; bringing societal expectations and forest industry into the same line; etc.). **The need for striking an optimal balance in a range of forest functions and related societal values is a primary reason for considering a European Partnership on forests.**

Another reason for a European Partnership is that **forest research questions are inherently relevant at a much larger geographical scale than that of individual countries/Member States as ecological forest biomes** (Mediterranean, temperate, boreal) **span across Europe**. In a context of a changing climate, it means that for the adaptation of forests to climate change, countries will depend on exchanges with neighbouring countries. For instance, the management of tree genetic resources and forest reproductive material, that are key for the adaptation to climate change (for assisted migration, etc.), require a European approach in the context of a changing climate. The management of risks related to forests (wildfires, pest outbreaks, etc.) also require both European and regional approaches, as does forest monitoring and nature positive actions, including connectivity. When it comes to global forest issues like imported deforestation, research on the role of Europe in this development is also needed. Similarly, joint research and coordination is needed in the invention of new and even more climate-beneficial wood-based materials and products and the penetration of products from renewable forest resources to other sectors (housing, packaging, pharmacy, textile industry, agroforestry, etc.). Therefore, **a European Partnership on forests would allow European countries to get more benefits than the sum of countries' separate efforts would bring**.

Specific justifications of a European Partnership on forests are the following:

- **Improved cross-coordination of the European R&I landscape.** Research in forestry and the forest-based sector is mostly done by small (public and/or private) institutions which are not well equipped to perform large (Horizon Europe) projects and therefore need smaller manageable projects (main reason for the success of the preceding forest-based ERA-NETs).
- **Improved coordination across different areas and sectors.** Multifunctionality and social-ecological approaches and analyses (integrated with social sciences and humanities) of forests become more and more important with respect to climate mitigation and adaptation, resilience, and other broader societal aspects. Appropriate research and innovation activities require an EU rather than local or Member States approach.
- **Stronger focus on the processes that lead to transformations toward sustainability in the forest-based and bioeconomy sector at EU level**, which will also be key to the forest industry´s long-term competitiveness, in the EU and globally.

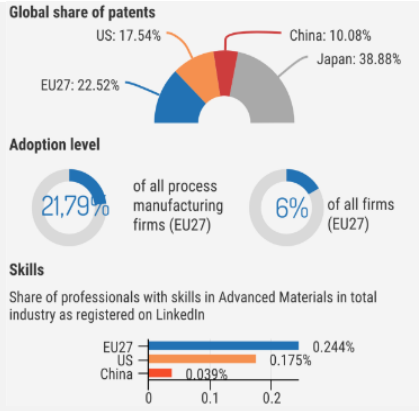
	• **Building of capacities, education and training, and a better connection of these with research** are required to position Europe as a leader on the global scale. Mutualised benefits from the **greater diversity of forest-related experiences** and forest conditions at the European level than at the Member State level.
Relevant for the following parts of Horizon Europe	Pillar II 'Global Challenges and European Industrial Competitiveness' ☒ Cluster Health ☒ Cluster Culture, creativity and inclusive society ☒ Cluster Civil Security for Society ☒ Cluster Digital, Industry and Space ☒ Cluster Climate, Energy and Mobility ☒ Cluster Food, Bioeconomy Natural Resources, Agriculture and Environment ☐ Cross-cluster ☐ Pillar III 'Innovative Europe'
Currently identified links with other partnership candidates / Union programmes	Forests and forestry span across many sectors and synergies can be established with other partnerships. The following European Partnerships are complementary and could be linked to the proposed partnership: Agriculture of data; Biodiversa +; Accelerating farming systems transition: agroecology living labs and research infrastructures; Safe and sustainable food systems; Circular bio-based Europe; Water4all. The proposed partnership will be complementary to other relevant partnership candidates or EU programmes, and will provide a holistic approach that would contribute to the targets of the aforementioned partnerships. Partnership objectives are directly linked to other forest dedicated platforms and initiatives under the European Green Deal, including the EU Forest Strategy and its 3 billion tree initiatives, the Bioeconomy Strategy, the revised LULUCF Regulation and the proposed Regulation on Carbon Removals Certification, the Nature Restoration Law, forest monitoring and data collection supporting the Forest Information System for Europe (FISE) and New European Bauhaus initiative. There are also links with CAP Strategic Plans, COST, Erasmus+, EIPs (AGRI, Raw Materials), EIT Raw Materials and EIT Climate-KIC, PPPs (BIC/ BBI JU), ERA-NET Cofund ForestValue, AnaEE, ICOS, EEA, EU Observatory for deforestation, forest degradation and associated drivers, ENFIN, ICP Forest, Interreg, LIFE, EU Missions 'A Soil Deal for Europe', 'Adaptation to Climate Change' and 'Climate-neutral and smart cities'
Does the proposed partnership build on currently active ones?	The proposed partnership builds on ERA-NET Cofund ForestValue (and former ERA-NETs WoodWisdom-Net, Foresterra, Sumforest) and on SCAR SWG Forest activities.

Expected type and composition of partners	The diversity of forestry challenges at local, regional, national, European and international level requires wide participation in the Partnership: (i) National and regional agencies, universities, research organisations and national forest inventories supporting research and innovation developments of forests and the forest-based sector; (ii) EC DGs in link with the sector, (iii) MS/AC ministries of more than 20 countries, FOREST EUROPE and BIOEAST; (iv) platforms such as the European Forest-Based Sector Technology Platform (FTP), the European Forest Institute (EFI), InnovaWood, EHIA (European Hardwoods Innovation Alliance), EEA, ENFIN (European National Forest Inventory Network), ERICs (European Research Infrastructure Consortium), NetworkNature; (v) collaboration with industry (esp. SMEs), regions and other economic actors (incl. forest owner associations); (vi) collaboration with biodiversity and conservation actors; (vii) collaboration with non-research organisations including NGOs that are producing knowledge on forests and society.
Contributions and commitments expected from partners	Both financial and in-kind contributions (well beyond ad-hoc ERA-NETs) are foreseen from EU MS (RDI funding agencies, sectoral agencies, regions, research organisations, industry; to be further detailed later by all foreseen partners). The engagement of partners with diverse competences, responsibilities and affiliations will mobilise the best expertise and enough funds to effectively drive R&D solutions to meet the set objectives. It is expected that the partnership will significantly and progressively increase the contributions in order to align them with the size of the challenges at stake.
Currently envisaged implementation mode(s).	☐Co-programmed European Partnership ☒ Co-funded European Partnership ☐ Institutionalised European Partnership ☐ Article 185 ☐ Article 187 ☐ EIT-KIC
Justification of the implementation mode	A co-funded European Partnership would allow MS/ACs to pool resources to joint activities with national funding bodies/ research organisations. It should provide the necessary longer-term flexibility to respond to all needed policy developments and their implementation to address the SDGs and to tackle climate change, while strengthening the circular (forest-based) bioeconomy. A strong and efficient cooperation is needed at least in the medium term, with continuity and simple functioning rules.
Proposed starting year	2025

INNOVATIVE MATERIALS FOR EU (I'M FOR EU)

General Information	
Proposed title of the European Partnership	**European Partnership "Innovative Materials for EU" ("I'M for EU")**
Short description of the candidate partnership	Innovative (or advanced) materials are engineered to have new or enhanced properties with superior performance relative to conventional (or raw) materials. They categorise as deep tech in line with the New European Innovation Agenda. These materials provide for new uses essential for the green and digital transition of a resilient Europe (70% the innovations depend on materials). They also include composite materials, nanomaterials and two-dimensional (2DM, one-atom thick) materials. The partnership focuses on research, development and uptake (integration into innovative products and technologies) of a new generation of 'safe and sustainable by design' innovative materials fit for the circular economy. It will bring together researchers, developers, upstream producers and downstream industrial users and continue opening-up these technologies to new (circular) value chains. The partnership will support the future Coordinated Plan on Advanced Materials with Member States, as announced in the Communication on Critical Raw Materials[9] and as proposed for the Commission WP 2024. It has a wide stakeholder support from both the Graphene Flagship as well as the Advanced Materials Initiative 2030 stakeholder groups.
Services directly involved	DGs RTD, CNECT, GROW, ENV, JRC, ENER, CLIMA

[9] COM(2023) 165 final

Context and problem definition	Innovative materials are key to achieve the ambitious policy objectives of the European Green Deal and Digital Strategy and to ensure EU's strategic autonomy. Technological advancements depend on materials science, for example in the digital, energy, transport, and aerospace sectors. In 2022, innovative materials have been forecasted[10] to generate a gross value added of about €70 billion by 2040. Europe has overall a strong global position in this field with 22.5% of global patents, only behind Japan, with a high adoption level among European firms and a solid share of skilled professionals[11]. However, the EU position is weakening as the number of new patents per year has been declining for more than the last five years. There is a risk that R&I and investments are exploited by competitors outside the EU in the absence of sufficient and coordinated public and private investments in the EU.  Source: Advanced Technologies for Industry – EU Report Since 2013, the EU has been supporting the Graphene Flagship in successfully pursuing the development of new technologies based on graphene and other 2DM establishing Europe as a globally leading innovator. In February 2022, a group of pivotal stakeholders called for a new strategic approach in the "Materials 2030 Manifesto"[12] that has led to the development of a 'Materials 2030 Roadmap' and a "Materials Strategic Agenda"[13]. In parallel, the 2DM community are currently developing an updated version of the technology and innovation roadmap published[14] in 2017 to set out a strategic research and innovation agenda for 2DM-based technologies until 2050. A joint statement between the two stakeholder communities -has been published[15] calling for a partnership The following major challenges have been identified: 1. **Vulnerable materials value chains.** The shortage of resources and its critical dependencies positions the EU in the needs for further research on material efficiency strategies for strengthening the circular economy (durability, reparability, recyclability, repurposing, re-manufacturing of materials), substitution of critical raw materials, innovative circular business models, production technologies and tracing schemes.

[10] McKinsey Global Institute, Securing Europe's competitiveness, Addressing its technology gap, 2022
[11] Advanced Technologies for Industry – EU Report
[12] https://www.ami2030.eu/who/
[13] https://www.ami2030.eu/2023/04/18/ami2030-just-released-the-strategic-materials-agenda/
[14] https://graphene-flagship.eu/innovation/industrialisation/roadmap/
[15] https://graphene-flagship.eu/graphene/news/graphene-flagship-and-ami2030-call-for-european-advanced-materials-partnership/

	2. **Support for R&I from TRL1 to TRL7.** There is a need for low TRL technology-oriented material research for the identification of new materials and demonstration of their new properties and physical phenomena and their implementation in proof-of-principle devices/prototypes. To continue the transition to higher TRL, R&I is needed to address scientific and technological challenges related amongst others to scalability, reliability and reproducibility of innovative materials and their integration along the value chains. 3. **Digitalisation of materials development.** Innovation in digital tools such as modelling, data spaces, data analytics and AI has the potential to exponentially accelerate the research and design of new innovative materials and thus strengthen Europe's competitiveness. Germany[16] and France[17] already launched major national initiatives offering data spaces to accelerate materials design by using AI and modelling techniques. Initiatives as national and EU level need coordination to exploit the full potential of digitalisation. 4. **Crossing the valley of death and accelerating innovation uptake.** The connection between "technology push" and "market pull" must be improved by enhancing collaborations between academia and industry. Start-ups and innovative SMEs are facing difficulties in bringing new materials from the lab to the market. Newly designed innovative materials are complex for upscaling and manufacturing and innovative SMEs lack opportunities to access testing facilities before entering the market. SMEs and start-up companies in high-tech R&I, further face the problem of lack of risk and seed financing. 5. **New skills and upskilling.** To be able to apply innovative methods and tools and new product requirements a new skills' set, notably in materials science, chemistry, engineering and information technologies, should become available in national education and training systems. In the same vein an upskilling of the current workforce in industries are needed. The partnership will work closely with Member States and the EIT/KIC.
Objectives and expected impacts	**Challenge 1. Vulnerable materials value chains** *Objective 1:* Develop innovative materials that are safe, sustainable, circular, and traceable, contributing to reduce dependencies on primary resources, such as critical raw materials. *Objective 2:* Integrate reusable or recycled advanced materials into the development of circular manufacturing processes and develop circular business models across value chains. *Expected Impact:* Resilient material value chains across sectors will help Europe to reach its targets for domestic supply of recycled materials. New design and assessment methods for 'safe and sustainable by design' innovative materials production will boost the confidence of industry and end-users.

[16] https://material-digital.de

[17] https://www.cnrs.fr/en/diadem-exploratory-priority-research-programme-and-infrastructure-linking-materials-and-ai

	Challenge 2. Support for R&I from TRL1 to TRL7 *Objective 3*: Provide a funding platform for low TRL technology-oriented material research for the identification and demonstration of new materials. *Objective 4:* Bring the innovative material-based technologies in key application areas to the point of technology maturity for industrial take-up. *Expected impact*: Europe has a thriving innovation pipeline with active input from exploratory research based on identified trends and needs and a robust supply chain in strategic fields contributing to European technological sovereignty and strategic autonomy. **Challenge 3. Digitalisation of materials' design** *Objective 5:* Create a trusted space "materials commons" and federated governance for materials data and tools to accelerate the design of innovative materials. *Expected impact*: A functional digital materials data marketplace throughout the European Union that reduces the time needed for the research, including the modelling of new materials and increases synergies across actors and sectors in the innovative materials value chain. **Challenge 4: Crossing the valley of death and accelerating innovation uptake** *Objective 6:* Launch sustainable technology infrastructures for testing and upscaling production of innovative materials and their integration into devices, systems and products in support of start-ups and SMEs. *Objective 7:* Empower industry in the uptake of innovative materials to make their processes and products aligned with EU policies. *Expected impact:* Boost the European's industry capacity for innovation based on the deployment of test beds, prototypes and use cases and a strong collaboration between academia, research institutes and industry, combining technology push and market pull. **Challenge 5: New skills and up-skilling** *Objective 8:* Identify the require skillsets for future researchers and in the current workforce and collaborate with Member States and the EIT KIC to implement training plans. Make best use of planned initiatives, such as the Net Zero Industry Academy to channel identified needs to universities and educational establishments *Expected impact:* Establish Europe as an attractive place for educating the next generation materials scientists and enable the current workforce to be the driver of innovation in the European materials ecosystem.
Necessity test: rationale for a European Partnership	To secure the Union's strategic autonomy, and its capacity to deliver on the Green Deal, an active eco-system for the development of innovative materials across value chains of strategic industrial sectors, needs to be maintained at EU level. The partnership will help to align industrial initiatives and will support Member States and EU strategies for innovative materials, thereby optimising the use of currently scattered resources.

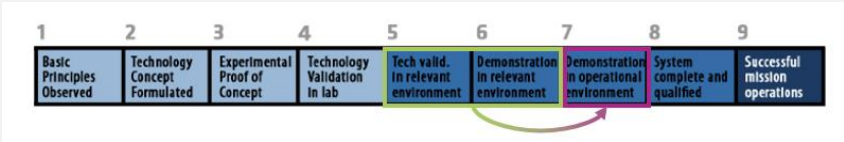
Relevant for the following parts of Horizon Europe	Pillar II 'Global Challenges and European Industrial Competitiveness' ☐ Cluster Health ☐ Cluster Culture, creativity and inclusive society ☐ Cluster Civil Security for Society ☒ Cluster Digital, Industry and Space ☐ Cluster Climate, Energy and Mobility ☐ Cluster Food, Bioeconomy, Natural Resources, Agriculture and Environment ☐ Cross-cluster ☒ Pillar III 'Innovative Europe' (Accelerator Program)
Currently identified links with other partnership candidates / Union programmes	The partnership will help to strategically coordinate and give focus to activities on materials research currently scattered between the different clusters of HE and raise the importance of innovative materials under HE pillar 3 (EIC). For maximum impact, cooperation is needed with the following partnerships: *Existing partnerships:* - Photonics Partnership; P4P (Processes for Planet),Clean Steel Partnership, MiE (Made in Europe) and EIT Manufacturing, EIT Raw Materials and the ERA-MIN, PARC (European Partnership for the Risk Assessment of Chemicals), BATT4EU (Batteries' Partnership), 2Zero Partnership, KDT Joint Undertaking (Chips Act Joint Undertaking); Clean Hydrogen Joint Undertaking, Clean Aviation Joint Undertaking *Candidate partnerships:* Photovoltaics Partnership, Textiles Partnership
Does the proposed partnership build on currently active ones?	The proposed partnership for Innovative Materials builds on the Graphene Flagship[18] and EMIRI, SUSCHEM, MANUFUTURE, EUMAT through the AMI2030[19] initiative. Experiences from six H2020 ERA-NETs co-funded with Member States (3 M-ERA.NET[20] and 3 FLAG-ERA[21]) is taken into account. The partnership however brings in new industrial players and has a completely new scale and ambition.
Expected type and composition of partners	Decisions on value chains will be made during the partnership development. • Industry associations and individual companies, covering different value chains, will ensure "market pull" of the advanced materials innovations. • Academia and Research and Technology Organisations will provide the "technology push" for innovative solutions for cross-sectorial

[18] https://graphene-flagship.eu/
[19] https://www.ami2030.eu/
[20] https://www.m-era.net/
[21] https://www.flagera.eu/

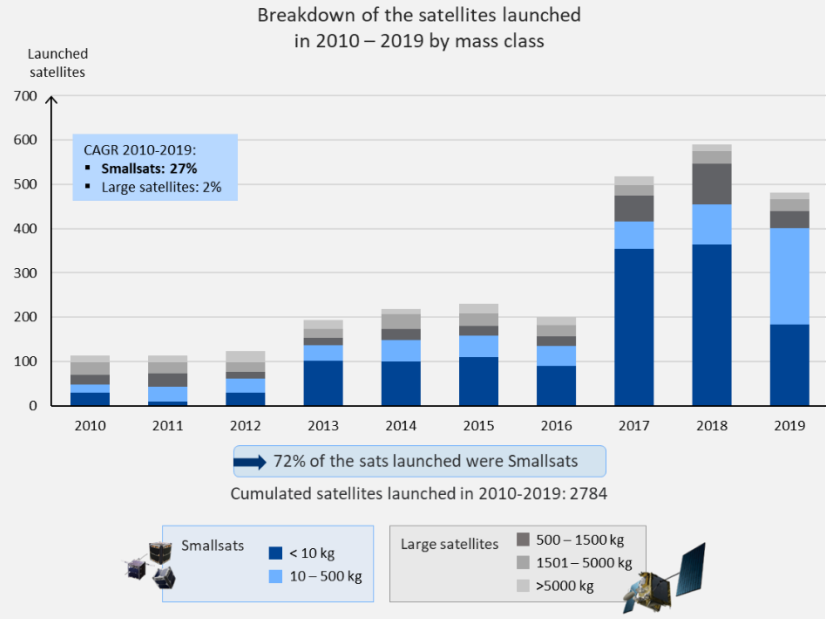
	applications.
Contributions and commitments expected from partners	Based on the strong dynamics triggered by the AMI 2030 initiative, the achievements of the Graphene Flagship[22] and of past projects, including M-ERA-NETs, there is strong industry commitment for financial contributions matching at least and probably substantially surpassing EU funding.
Envisaged implementation	☒ Co-programmed European Partnership ☐ Co-funded European Partnership ☐ Institutionalised European Partnership ☐ Article 185 ☐ Article 187 ☐ EIT-KIC
Justification of the implementation mode	This partnership will be a pillar of the future Coordinated Plan on Advanced Materials which aims at creating a European ecosystem on innovative materials. A key challenge will be to achieve scale and speed. A co-programmed Partnership with industry offers the opportunity to unlock private capital and join resources with EU R&I priorities. Alignment with national investment agendas will also be crucial. This will be supported by the governance with Member States to be put in place for the future Coordinated Plan.
Proposed starting year	2025 (first projects in 2026).

[22] https://graphene-flagship.eu/graphene/news/european-opportunities-for-research-and-innovation-with-layered-materials/

IN-ORBIT DEMONSTRATION AND VALIDATION

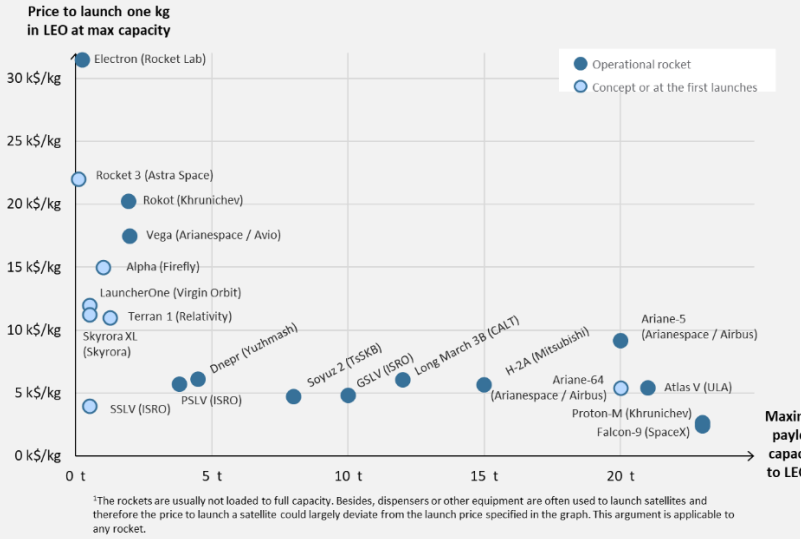
General Information	
Proposed title of the European Partnership	**Large-scale European Partnership on In-Orbit Demonstration and Validation**
Short description of the candidate partnership	Foster a globally competitive European space sector through a regular, sustainable, cost-effective and responsive In Orbit Demonstration/Validation (IOD/IOV) service that supports technological maturation of space innovations.
Services directly involved	DG DEFIS
Context and problem definition	To ensure European non-dependence and competitiveness in space systems, there is a clear need for a regular, sustainable, cost-effective and responsive **in-orbit demonstration and validation** (IOD/IOV) programme that will de-risk innovations, support technological maturity and reduce time to market. ▪ **IOD** refers to the spaceflight of a scaled version of a particular technology or critical technology subsystem, which would still need further steps to be ready for mission adoption ▪ **IOV** serves as a qualification flight for future mission implementation - a successful validation flight of a particular technology does not require additional space testing before it can be adopted for a specific mission *Technology Maturation Scale*  Testing in real conditions is the **true training ground to validate concepts**, innovative technologies, and performances and accelerate their entry into the market. Besides, space **flight heritage** in real conditions and environment is often required to de-risk innovations such as new technologies, products, concepts, architectures, and operations techniques. Flight heritage is a pre-requisite for commercial or institutional missions, including for EU space flagships. Although aggregation services and flight opportunities do exist, these are often difficult to find ad hoc at affordable cost and/or in the required timeframe, and at an acceptable risk for the main mission. Besides, a critical mass of experiments needing aggregation is needed in order to offer **regular and affordable flight opportunities to validate space technologies are key** to foster international competitiveness and innovation of EU space technologies.

Demand for in-orbit demonstration and validation services has been growing steadily as these are crucial steps for technologies to become market ready. Many of the technologies that require IOD/IOV services are compatible with Smallsats. However, small companies, academia and research organisations working on such technologies can rarely afford the associated cost for IOD/IOV services or the risk to develop their own full satellite. In parallel, the number of launches for commercial small satellites has been drastically increasing and this trend is expected to continue in the coming years.



In-orbit testing is a **costly and complex endeavour for space technologies. Many innovative ideas do not survive the** "**valley of death**" from the technology development through to commercialisation and operational use due to the limited IOD/IOV opportunities. For more than 15 years, the need for a permanent and regular in-orbit demonstration/validation programme in Europe has been clearly recognised as important by the entire European space community. However, no programme of this kind has seen the light of day so far, mainly because of the costs of satellites, launch services and the operations necessary for the implementation of these missions.

Validation happens on **small satellites**, suitable for rideshare missions. The benchmark cost per kg based on heavily government-subsidised SpaceX's Falcon 9 is around USD **6,000/kg.** Using European launchers such as Vega C brings the cost to around EUR **16,000/kg**. Therefore, launch for a standard 2U cubesat of ca. 2.5 kg would cost around EUR 15,000-40,000.



[1]The rockets are usually not loaded to full capacity. Besides, dispensers or other equipment are often used to launch satellites and therefore the price to launch a satellite could largely deviate from the launch price specified in the graph. This argument is applicable to any rocket.

For this purpose, the **European Commission introduced initial IOD/IOV activities** under Horizon 2020[23] to test the market demand and to draw lessons.

In April 2019 the European Commission issued a first Call for Expression of interest for IOD/IOV experiments. In less than two months, the call attracted 57 applications from various entities across Europe from small and medium-sized enterprises to large companies, universities and research organisations. There were 26 successful applications related to technology innovation for Earth Observation, telecommunication, space science, navigation and space environment. Among these retained experiments, 21 experiments required aggregation on a carrier (cubesat and smallsat) whilst 5 experiments were proposed as complete satellites which required only the flight ticket.

In September 2020, the first selected experiment, UPMSat-2, a complete satellite developed by the University Polytechnic of Madrid (UPM) together with some European SMEs, was successfully launched on board of the Vega launcher. This achievement marked the first success of the IOD/IOV service in its pilot phase. For the experiment providers, having access to the flight ticket through this Horizon 2020 initiative gave them the opportunity to validate two main elements related to education and technology. In fact, for the development of this project, students participated at all phases from design to manufacture, launch and operation, and thus enhancing collaboration between university and national/international space industry. To date, it has been demonstrated that the industry and UPM capacity have shown beneficial for integrating education and space technology to train the professionals of the future.

Activities for the preparation and launch of the IOD/IOV cubesat and smallsat missions as well as for the remaining complete satellites are on-

[23] Horizon 2020, Work Programme 2018 – 2020, Leadership in Enabling and Industrial Technologies – Space, (European Commission Decision C(2020)1862 of 25 March 2020)

	going. Additional launches are expected to take place in the upcoming months and years. **For the preparation of the Horizon Europe work programme, the IOD/IOV initiative received wide support by Member States** that urged the Commission to increase its support also under the new Multiannual Financial Framework period. Yet, the space research programme is under heavy budgetary constraints. The provisional budget allocated to the IOD/IOV Service under Cluster 4 is set at EUR 55 million for the period 2021 – 2027. As a benchmark, the budgetary need for the procurement of carriers can range from € 2 million for cubesat carriers (up to 25kg) to EUR 20 million for smallsat carriers (up to 200 kg), and for the launch service respectively EUR 1 to 8 million. This makes establishing a regular and sustainable service across Europe very challenging. At the same time, considering the growing need for IOD/IOV services, parallel and uncoordinated IOD/IOV initiatives at Member State level have been initiated and are being considered. As a result, in order to maximise IOD/IOV opportunities across Europe and prepare future IOD/IOV missions with shared objectives, there is the need to pool resources and establish joint priorities and roadmaps in a coordinated and programmed manner among European public institutions from the European Commission, to Member States and National Space Agencies to the European Space Agency and collectively generate a **large scale In-Orbit Demonstration and Validation programme across Europe**, that would benefit all stakeholders, facilitate cross-border cooperation, boost innovation and enhance the competitiveness of the EU space sector.
Objectives and expected impacts	Having a Large-scale European partnership on IOD/IOV would allow a significant step forward in the field of technological competitiveness of the European space industry while contributing to improving its strategic non-dependence. In addition, by supporting institutional missions, this initiative would enable the constant innovation of the EU space infrastructure technology maturation of components necessary for our Union Space Programme components (Copernicus, Galileo & European Geostationary Navigation Overlay Service, Space Situational Awareness) as well as the Secure Connectivity Programme and the European Quantum Communication Infrastructure. In particular, the **objectives** of the partnership are to: • **Foster global competitiveness of the European space sector:** IOD/IOV allows technologies to be effectively tested in orbit while reducing the time it would otherwise take to bring them to market. In doing so, the IOD/IOV initiative contributes to space entrepreneurship alongside the CASSINI initiative. In addition, it contributes to the maturation of technologies supported by the Union R&I programme and other national and European initiatives, thereby decreasing the valley of death of promising innovations; • **Enhance EU non-dependence:** IOD/IOV supports EU non-dependence by providing a cost-effective service based on EU solutions both for the spacecraft and for the launch services. This is in

	line with the Commission space policy priorities pursued under the R&I programme Horizon 2020 and Horizon Europe space part, as well as under the Union Space programme; In addition, the partnership will contribute to achieving the following **expected benefits:** • **Enable a European Higher Education system:** as demonstrated in its pilot phase, IOD/IOV contributes to the implementation of the European Skills Agenda by providing a generation of European engineers with hands-on experience in real-world space programmes thereby contributing to the next generation of skilled workforce across Europe. • **Foster cross-border cooperation and defragmentation of space industry:** EU space actors are located in traditional space powers, in particular France, Italy, Germany and to a lesser extent in Belgium, Spain, Sweden and Netherland. However, in recent years an increased number of space companies have been created in Luxemburg, Poland, Czechia, Romania, Slovenia, Hungary, Lithuania, Estonia, Slovakia, Bulgaria, also facilitated by an increased national budget expenditure in space activities[24]. A large-scale IOD/IOV partnership would encourage further collaboration and programming among EU actors and support innovation and the space industry across Europe and transfer of knowledge and best practices from more experienced actors to emerging ones; • **Enable the development of new commercial entrants (space tech start-ups and SMEs):** the EU space panorama has traditionally been dominated by big players. However, with the emergence of the NewSpace phenomenon, in recent years more and more small players have risen across Europe that are offering solutions and innovations that have shaken the traditional space market. This is particularly the case for SMEs and start-ups active in satellite manufacturing and micro launchers that are crucial for the implementation of IOD/IOV activities and that would greatly benefit from a large-scale IOD/IOV programme. Through this large-scale partnership, the regular IOD/IOV service, as a complement to EU R&I effort, will contribute to accelerate the pace of innovation and the emergence of disruptive technologies for satellites, launchers, services in orbit, in the end maximizing the benefits for society and the EU economy. The partnership could be foreseen under the Work Programme 2026 – 2027 and aim to be renewed throughout the course of the next MFF, with a view to have the first tangible benefits from 2030 onwards.
Necessity test: rationale for a European	The main **challenge** of IOD/IOV is to **provide regular and cost-effective services** (that can include spacecraft design, aggregation of experiments, assembly, integration and tests, launch and operations) **based on EU solutions** both for the spacecraft and for launch and operations services.

[24] SpaceTec Partners, *EU Space Economics in the Global Context*, October 2021.

Partnership	The first step for this initiative is to launch a Call for Expression of Interest to gather possible Experiments that can be considered for IOD/IOV services. This call is managed by the European Commission in consideration of available resources. The first call was issued in April 2018 and the second one was issued in March 2022. Having a large-scale partnership, would allow issuing recurrent and regular Calls for Expression of Interest with a view to achieving a critical mass of experiments needing IOD/IOV services. This would bring more opportunities and flexibility to launch whilst responding to R&I need for responsiveness necessary to faster innovation processes. The implementation of current IOD/IOV activities under Horizon 2020 and Horizon Europe is entrusted to the European Space Agency through a contribution agreement, given its longstanding experience in project and technical management of complex activities close to satellite development that entail high risks and uncertainties. The Agency manages technical aspects, such as technical specification covering interfaces, resources available (mass, volume, power…), deliverables and preliminary schedule. ESA also procures, through competitive tendering, the platform and associated tasks, the launch services and experiments in-orbit operations, necessary for the demonstration/ validation of space innovations. For this purpose, the use of traditional calls for proposals in the frame of Horizon Europe is not considered appropriate as it would not allow an effective tool to meet the objectives of the initiative. The Commission has already mobilised EUR 55 million of European R&I resources dedicated to the IOD/IOV Service under Cluster 4 of Horizon Europe, but this effort alone will not be sufficient to reach the expected benefits. Taking into consideration the lessons learned from the past and on-going IOD/IOV activities, the members of the partnership, notably the European Commission, Member States Ministries, National Space Agencies and the ESA, should pool resources and identify a common approach towards a European IOD/IOV initiative. They should jointly contribute to the implementation of relevant activities in support of a regular, sustainable cost-effective service across Europe. This would be facilitated/ organised through the establishment of a **Strategic Roadmap** setting up the main needs for IOD/IOV services both for institutional and for industrial needs. Such a roadmap would incorporate the technology maturation needs from a national and European perspective. To achieve this, a partnership is necessary to set up the Strategic Roadmap and implement it through regular Calls for Expression of Interest for IOD/IOV experiments and carry out actions for carrier, launch services and operations procurement. Finally, a large-scale partnership for IOD/IOV would avoid the proliferation of parallel national initiatives that would lead to national industrial silos. At the same time, considering that space is a booming sector across Europe, it is important to support and consolidate this trend by fostering innovation through a truly European initiative benefiting industry from all EU Member States.
Relevant for the following parts of	Pillar II 'Global Challenges and European Industrial Competitiveness' ☐ Cluster Health ☐ Cluster Culture, creativity and inclusive society

Horizon Europe	☐ Cluster Civil Security for Society ☒ Cluster Digital, Industry and Space ☐ Cluster Climate, Energy and Mobility ☐ Cluster Food, Bioeconomy Natural Resources, Agriculture and Environment ☐ Cross-cluster ☐ Pillar III 'Innovative Europe'
Currently identified links with other partnership candidates / Union programmes	Under Horizon Europe Cluster 4, the candidate co-programmed partnership on Global space systems offers a collaborating opportunity considering that the R&I outputs supported by this partnership will need to be tested in real conditions. In this context, having a dedicated large-scale partnership on IOD/IOV capable of offering this service would bridge the gap and accelerate commercialisation of innovations in space technology. This partnership would be complementary to the candidate partnership on Global space systems under Horizon Europe Cluster 4 focusing on technology maturation up to Technology Readiness Level (TRL) 6, which represents that the technology is mature enough for demonstration in relevant environment. The IOD/IOV partnership would complement and further increase maturation to reach TRL 7/8, which represent the qualification of the technology, in order to accelerate access to market and commercialisation. In addition, the EU flagships of the Union Space programme would also benefit from this new partnership through the testing and validation of new technologies, concepts or techniques. In the ongoing activities under Horizon 2020 and Horizon Europe, the IOD/IOV service is already supporting institutional missions for the Union Space programmes, notably: • The Galileo programme: by providing aggregation and launch services to the Gasper experiment, a GNSS receiver, the IOD/IOV initiative will contribute to the validation of mission requirements for the Galileo 2nd Generation space service, currently under definition. Further objectives of the mission include the characterization of Galileo satellites transmitting antennas at off-boresight angles above those typically visible from ground and the exploitation of the mission data for R&D and science; • The Secure Connectivity Programme: by providing the aggregation of the QKD payload of Eagle 1 on the satellite platform, the related launch services and initial in-orbit testing, the IOD/IOV initiative will accelerate the implementation of the EuroQCI space infrastructure integrated into the space and ground infrastructure of the Union Secure Connectivity Programme.
Does the proposed partnership build on currently active ones?	The ongoing IOD/IOV activities funded by Horizon 2020 and Horizon Europe contribute to build a solid base for the need for this partnership. At present, no partnership with similar objectives and framework to the proposed IOD/IOV partnership is in place.

Expected type and composition of partners	The core partners of the partnership are EU Member States represented by their respective competent ministries and/ or the National Space Agencies as well as the European Space Agency. These actors are expected to define the Strategic Roadmap of the partnership, fund and potentially implement relevant activities such as run regular calls for IOD/IOV experiments and perform procurement activities. Given the wide interest for IOD/IOV and the positive impacts on innovation, entrepreneurship and competitiveness, participation from FR, IT, DE, BE, LU, ES is expected. Participation could be expected also from SE, NL and other MS in Eastern Europe.
Contributions and commitments expected from partners	Member State partners are expected to contribute financially to achieve the common actions of the partnership. In addition, MS are expected to support the Commission to identify experiments and missions needing IOD/IOV services.
Currently envisaged implementation mode(s).	☐ Co-programmed European Partnership ☒ Co-funded European Partnership ☐ Institutionalised European Partnership ☐ Article 185 ☐ Article 187 ☐ EIT-KIC
Justification of the implementation mode	The co-funded mode of collaboration will offer to this large-scale IOD/IOV partnership a high and attractive European visibility, also on the global scene. It will represent a unique benchmark internationally. A leverage effect in the amount of funds mobilised by the participants is to be expected with progressive increased participation from EU MS. Procurement actions implemented by the entrusted entity(ies) as defined by the partnership are expected to be approved by all contributing partners.
Proposed starting year	2026

RAW MATERIALS FOR THE GREEN AND DIGITAL TRANSITION

General Information	
Proposed title of the European Partnership	**European Partnership on Raw Materials for the Green and Digital Transition**
Short description of the candidate partnership	The target focus are minerals and metals, especially critical and strategic raw materials. The thematic scope is exploration, extraction, processing, refining and recycling. The proposal for the Critical Raw Materials (CRM) Act stresses the need of synergies with Member States R&I programmes. Therefore, the partnership will serve as a tool to coordinate Member States' national R&I funding organisations through the development of a joint Strategic Research and Innovation Agenda and development of joint calls for proposals on raw materials, co-funded by the EU. Most of the topics will focus on basic research, not covered by classical topics in Cluster 4. Projects from the partnership would serve then as a basis for future uptake by Horizon projects or by EIT Raw Materials. This is a synergy with the CRM Act, which stresses the need to scale up projects from lab to commercialization. Finally, the partnership will serve as an instrument to involve third countries on joint work on R&I topics and involve their stakeholders in joint projects. This targets specifically countries with which the EU has established or will establish strategic partnerships on raw materials. In this respect, the proposal for the CRM Act stresses the importance to add local value, notably through R&I cooperation on raw materials.
Services directly involved	DGs GROW, RTD, ENV, CLIMA, ENER, JRC, HERA
Context and problem definition	Raw materials in scope are metals, minerals, bio-based materials and elementary gases used in manufacturing, with a focus on materials analysed in the context of the EU Critical Raw Materials assessment.[25] With the transition of Europe's industry to climate-neutrality, the reliance on available fossil fuels will progressively be replaced with reliance on non-energy raw materials. For many of them, the EU sources from abroad and global competition is fierce. Those raw materials that are very important economically and have a high supply risk are called critical raw materials. Critical raw materials are essential to the functioning and integrity of a wide range of industrial ecosystems. Access to raw materials has been identified as strategic security question

[25] CRM Act 2023, proposed.

to achieve the Green Deal objectives and ensure the green and digital transformation of the EU economy.[26] Critical raw materials are essential prerequisites for the development of strategic sectors such as renewable energy, electric mobility, defence and aerospace, medical devices and digital technologies.

Current supply risks, demand for multiple raw materials is expected to strongly increase across different sectors and technologies, especially renewables, e-mobility sectors, defence and aerospace as well as digitalisation (e.g. handheld devices use batteries, sensors and motors; data is stored on drives containing permanent magnets; etc.).

The EU's own production accounts for only 4% of the global supply chain of critical raw materials used in the production of digital equipment, such as palladium, tantalum, or neodymium.[27] At the same time, reaching our clean energy goals will require increasing amounts of various raw materials, e.g. a 3500% increase in the use of lithium, a key component for electric mobility. Chile currently holds 40% of lithium deposits, while China hosts 45% of its refining facilities worldwide.[28] In addition, a 330% increase in the use of cobalt, and a 30-35% increase in the use of aluminium and copper are expected.[29]

The Critical Raw Materials Act will introduce several measures to address these dependencies and supply risks.

1. Each MS will have to set up a national exploration programme for critical raw materials. This will require technologies for exploration, such as - mineral mapping, geochemical composition of soils, sediments, rocks, geoscientific surveys.
2. EU, domestic extraction at least 10% of annual consumption. Extraction technologies for Strategic Raw Materials.
3. EU, domestic processing at least 40% of annual consumption. Processing and refining of Strategic Raw Materials.
4. EU, domestic recycling of at least 15% of annual consumption. Recycling of Strategic Raw Materials. This is from electronic waste and mining waste. MS will have to develop a list of thousands of mining waste facilities with a goal of identifying economically recoverable amounts of raw materials from extractive waste.
5. Diversifying sourcing from third countries – no more than 65% of a

[26] COM(2019) 640 final

[27] China alone accounts for 86% of the global supply of neodymium. Palladium is mostly provided by Russia (40%), and tantalum by the Democratic Republic of the Congo (33%). European Commission (2020). Critical Raw Materials for Strategic Technologies and Sectors in the EU: a foresight study.

[28] European Commission (2020). Critical Raw Materials for Strategic Technologies and Sectors in the EU: a foresight study.

[29] Metals for Clean Energy: Pathways to solving Europe's raw materials challenge, KU Leuven and Eurometaux, 2022

strategic raw material should come from a single country.

Under the 2021 Industry Strategy, in-depth reviews of EU's strategic dependencies were performed.[30] They revealed EU's high dependency on raw materials, classified in the energy intensive ecosystem as well as with wider importance and implications across several other ecosystems. This was furthered analysed in the second in-depth review in 2022 with rare earths and magnesium as showcases.[31] Furthermore, the review states that developing domestic capacities and diversifying sources of supply along the value chain will be instrumental to significantly reduce the existing strategic dependencies and avert the risk of replacing them with new ones, particularly in the area of critical raw materials.[32]

The COVID-19 pandemic and Russian invasion of Ukraine resulted in several disruptions in supply chains, providing a need for more consideration of raw materials supplies for security, defence and aerospace. Therefore, the European Council stressed the need for more streamlined action on raw materials in March 2022.[33]

In the 2022 State of the Union speech, President von der Leyen announced the work on the Critical Raw Materials Act, underlining that soon, lithium and rare earths will become more important that oil and gas.[34] The Act will set a new scene for EU action to secure supplies of raw materials.

The Green Deal Investment Plan announces the need to massively increase the technological development, manufacturing production and installation of net-zero products and energy supply in the next decade. To make this happen access to relevant critical raw materials is required.[35]

The challenges related to Research and Innovation have been outlined in the CRM action plan[36]. The Partnership will serve as a tool of addressing them:

Under Action 3 of the action plan, research and innovation on waste processing, advanced materials and substitution will be undertaken. More research into waste reprocessing will help to avoid valuable materials ending up in landfill. Significant amounts of resources leave Europe in the form of wastes and scrap, which are potentially recyclable into secondary raw materials here. The extractive and processing industries must also become greener – reducing their planetary footprint, including greenhouse gas emissions. Many mining wastes are rich in critical raw materials and could be revisited to create new economic activity on existing or former mine sites. Replacing a critical raw material with a non-

[30] https://commission.europa.eu/system/files/2021-05/swd-strategic-dependencies-capacities_en.pdf

[31] https://ec.europa.eu/docsroom/documents/48878/attachments/2/translations/en/renditions/native

[32] COM(2022) 289 final

[33] https://www.consilium.europa.eu/media/54773/20220311-versailles-declaration-en.pdf, Informal meeting of the Heads of State or Government, Versailles Declaration, 11 March 2022

[34] https://ec.europa.eu/commission/presscorner/detail/ov/SPEECH_22_5493

[35] COM(2023) 62 final

[36] COM(2020) 474 final

critical raw material that offers similar performance (substitution) is another way to alleviate critical raw materials dependency.

Action 6 – Develop expertise and skills in mining, extraction and processing technologies. Europe needs to improve its capacity to teach, train, upskill researchers and workers in the raw materials area. R&I programmes give direct support to universities and allow involving students and researchers in meaningful activities, fostering their skills needed for developing new technologies and applying them in the industry.

Action 7 - Deploy Earth-observation programmes and remote sensing for resource exploration, operations and post-closure environmental management. The EU's earth-observation Copernicus Programme is a powerful tool to identify new critical raw material sites, monitor the environmental performance of mines during their operating life and after closure. New approaches to remote sensing and use of Earth Observation data are needed in order to optimize exploration, extraction, and post-closure activities, including safety of the operations, workers and local inhabitants.

Action 8 – Develop Horizon Europe R&I projects on processes for exploitation and processing of critical raw materials to reduce environmental impacts. Innovative technological solutions are transforming the mining and processing of critical raw materials. New technologies need to be developed for many raw materials, including critical raw materials. The EU needs to address all of them. Combining with digital technologies and solutions.

Action 9 – Develop strategic international partnerships and associated funding to secure a diversified and sustainable supply of critical raw materials. Working closely with like-minded countries is one of the priorities. R&I projects are one of the instruments that can foster the cooperation, giving access to new technologies for raw materials in third countries. Such cooperation will help reduce dependence from single countries and improve access to other 3rd country sources.

Action 10 - Promote responsible mining practices for critical raw materials through relevant international cooperation. The EU has the responsibility of promoting sustainable sourcing through technological development. Cooperation with researchers and industrial partners through R&I projects and initiatives increases the uptake of such technologies in third countries, enabling them to improve their operations and build scientific capacity to deliver those solutions.

Integration of R&I programmes for raw materials on international, EU, national and regional level is necessary to ensure access to novel technologies that will facilitate supply diversification from different sources. The EU needs to play a key role in coordinating joint efforts of Member States, Associated Countries and like-minded third countries.

The existing ERA-NET on raw materials (ERA MIN 3) will expire in 2025. It is crucial to ensure continuation of such an instrument and expand its activity building upon the expertise and coordination mechanism developed. This will support coordination of funding from national funding institutions in the entire raw materials value chain.

The European Technology Platform on Sustainable Mineral Resources

	(ETP SMR) issued a policy brief in December 2022 calling for R&I action in raw materials. The Platform announced developing a research agenda that will support evidenced-based planning of raw materials calls in 2025-2027.
Objectives and expected impacts	The objectives for this partnership are: 1. Cover the materials in scope, in particular focus on Critical and Strategic Raw Materials as defined in the proposal for the CRM Act.[37] 2. Develop sustainable and carbon neutral exploration, extraction and refining technologies that will enable improving domestic sourcing of raw materials for the EU industry and consumers. 3. Develop cost-effective recycling technologies (collection, sorting, refining, design, traceability), especially for emerging green and digital sectors that will contribute to creating an EU market for secondary raw materials. 4. Develop solutions for mining waste and tailings valorization, which will reduce the use of primary resources and maximize the output of extracting operations. Utilizing mining waste will also limit environmental impacts of tailings. 5. Develop skills among graduates and young researchers in raw materials research areas, resulting with a skilled workforce for the industry and academia. 6. Foster international cooperation in raw materials with like-minded countries, especially with representatives of national administrations and research organisations. Particularly, the following activities are in the scope: • Facilitating third countries participation in joint R&I projects on raw materials, with building stakeholders capacity and know how to participate in such activities. This will create bridges for future cooperation in HE projects and other initiatives. • Engaging relevant public institutions from third countries for joint programming of R&I calls for proposals. This will facilitate best practice sharing on R&I needs between EU and third and ways of creating adequate public support to R&I. 7. Coordinate EU and Member States' efforts in programming R&I calls for proposals and ensuring and/or boosting the commitment from national funding agencies among the whole raw materials value chain. 8. Widen the participation of EU Member States that were not yet in ERA-MIN and facilitate participation of less represented Member States. 9. The Partnership will facilitate participation of less represented 3rd countries in Horizon Europe projects, through mobilizing them to

[37] CRM Act 2023, proposed

	cooperate in international projects. This can be achieved much more effectively under the partnership than by individual countries and through classical Horizon calls which are much bigger in scope, rather than by acting alone. 10. Strong focus will be paid to attracting new partners, from not participating countries, regions less represented in Horizon projects so far and third countries. 11. To jointly support development and implementation of a programme of R&I activities. 12. Ensuring commitments from national authorities to fund R&I on raw materials and ensure consistency in research priorities that will facilitate implementation of the CRM Action Plan and objectives of the CRM Act. These objectives are based on the Critical Raw Materials Action plan from 2020 and the upcoming Critical Raw Materials package. Delivering these objectives will require coordinated R&I solutions from the R&I community on a European level, linking relevant raw materials deposits with know-how providers and economic operators. The main expected impacts are increasing access to primary raw materials and secondary raw materials, in particular critical raw materials, for EU industrial value chains and strategic sectors. The partnership will continue supporting SMEs, newcomers, widening countries and international cooperation with mining producing countries and technology advanced countries, and also small size projects that complement the classical Horizon projects.
Necessity test: rationale for a European Partnership	The European Green Deal objectives with the green and digital transition will require significant amounts of (critical raw materials) for the EU industry. European supply chains of raw materials have been facing multiple challenges in recent years that Europe was not prepared for. Among those challenges were the supply shortages caused by lockdowns all over the world, the subsequent prolonged delivery times due to overpacked ports, invasion of Ukraine by Russia, and protectionist policies of key global players. These challenges show a very clear need for stronger and systematic EU action. R&I is one of the key elements in improving access to raw materials and making the EU industry more resilient and competitive. In order to achieve this, apart from traditional calls for proposals from EU framework programmes, commitment from EU Member States/Associated Countries to fund R&I in raw materials is indispensable. Such research should be coordinated in order to create synergies between EU and national policies, researchers between countries and raise awareness about the importance of raw materials R&I contribution to sustainable sourcing. The existing ERA-MIN proved that such coordination is essential and supported by many Member States and stakeholders, both from the academia and industry. ERA-MIN successfully supported 79 R&I projects across 15 member states, three MS regions, Turkey, Brazil, South Africa, and Canada (Quebec). The existing ERA-MIN boosted research funding commitments and allowed the EU to also create international links that further strengthen cooperation in raw materials technologies, sourcing and business

	investments. ERA-MIN budget was EUR 70 million, out of which 10 million was directly provided by H2020. This new partnership comes at a moment where strong efforts from EU and national institutions are needed to develop feasible solutions in raw materials motivating and mobilising all the stakeholders under a common, strongly supported transnational banner. In addition, the new partnership will be able to harness the synergies of already-created networks to develop further research capabilities. The support to R&I can be extended to strategic third countries, in line with the CRM Action Plan, and supporting the EU strategic partnerships with third countries. This will allow ensuring access to knowledge, skills and markets and promote responsible sourcing with technological solutions allowing its achievement.
Relevant for the following parts of Horizon Europe	Pillar II 'Global Challenges and European Industrial Competitiveness' ☐ Cluster Health ☐ Cluster Culture, creativity and inclusive society ☐ Cluster Civil Security for Society ☒ Cluster Digital, Industry and Space ☐ Cluster Climate, Energy and Mobility ☐ Cluster Food, Bioeconomy, Natural Resources, Agriculture and Environment ☐ Cross-cluster ☐ Pillar III 'Innovative Europe'
Currently identified links with other partnership candidates / Union programmes	Under Horizon Europe, the candidate partnership fits under Cluster 4 (Digital, Industry and Space). Direct link is made with calls for proposals in raw materials and with existing co-programmed partnerships – Processes for Planet and Clean Steel. A link with Cluster 5 (Energy, Climate and Mobility) also exists, regarding raw materials used specifically for energy applications, particularly for batteries, wind turbines and solar panels. The co-funded partnership would complement the funding offer from the above clusters by filling the gap for low TRL research, mainly 1-3. Successful projects from this candidate partnership are intended to pave the way towards upscaling projects supported under the EIT Raw Materials and the European Raw Materials Alliance, where a (TRL) of at least 5 at the beginning of the project is required. Therefore, the partnership will be complementary to the EIT Raw Materials' activities. We have observed successful precedence of this uptake with the ongoing ERA-MIN projects. To ensure synergies with other Clusters and the EIT, the Commission together with Member States will organise dissemination events about the partnership's projects with EIT community and with Horizon projects consortia. One of the opportunities is the EU Raw Materials Week where successful Horizon projects in raw materials are being presented together with an overview of existing EU funding opportunities, including for further uptake, are being presented. A dedicated matchmaking session is part of the event. Further matchmaking events would be discussed with the partnership members and would also focus on third countries, particularly

	in PDAC, Mindaba and events related to strategic partnerships on raw materials with third countries. As stated in the Communication accompanying the CRM Act, the Commission will work on the uptake of R&I results by the European Innovation Council. In this regard, projects from the co-funded partnership will also be relevant for such uptake. The partnership does not duplicate the proposed candidate on Innovative Materials, which focuses on advanced materials, being in the higher stage of the value chain, with different stakeholders and funding opportunities. These partnerships do not to target integrating Member States research funding institutions for exploration, extraction, processing, refining and recycling.
Does the proposed partnership build on currently active ones?	The partnership builds on the existing ERA-NET ERA-MIN3 (2022 - 2025 and its predecessors ERA-MIN 2 (2016 – 2022) and ERA-MIN (2011-2015). ERA-MIN focused on low TRL innovative R&I projects of small scale in partnership with SMEs, as well as large industry. ERA-MIN3 covers the entire raw materials value chain, from sustainable exploration, extraction, and processing technologies to remining and recycling, as well as substitution of critical raw materials. These initiatives contributed substantially to filling the existing gap in multiple ways; they enabled cooperation between national funding institutions, attracting more researchers to work together on an international level, improved the research skills of young researchers, allowing to work on basic research in the raw materials area. This filled the gap of national funding complementarity and alignment with EU policy objectives. Moreover, the projects complemented high TRL projects supported by the EIT Raw Materials and Horizon Europe. Therefore, this partnership actively builds on the results and agenda of its predecessors. Exchange with Commission allowed to bring the national research closer to EU policy objectives, such as the CRM Action Plan and Battery Action Plan. The on-going ERA-MIN3 comprises a progressive, pan-European network of 25 public research funding organisations from 15 Member States countries (Bulgaria, Czech Republic, Estonia, Finland, France, Germany, Ireland, Italy, Poland, Portugal, Romania, Slovakia, Slovenia, Spain and Sweden), three MS regions (Spain-Navarra, Belgium- Flanders and BE-Wallonia), one Associated Country (Turkey), three third countries (Brazil, South Africa and the province of Québec in Canada).
Expected type and composition of partners	The partnership will build on existing ERA-MIN3 partners from EU Member States national funding organisations and third countries. These partners are national funding institutions covering the raw materials research area. The ERA-MIN3 partnership encompassed 31 projects with total combined investment of EUR 20 million. The partnership will put strong emphasis to expanding the existing ERA-MIN 3 participation to new Member States and third countries, especially for countries with which the EU has concluded strategic partnerships on raw materials but also other like-minded countries willing to cooperate with EU partners in the R&I on raw materials. This will be one of the EU

	proposals in roadmaps negotiated with partnership countries.
Contributions and commitments expected from partners	The existing ERA-MIN proved to successfully align the funding and thematic priorities, attract new countries and regions and increase constantly the financial input to the initiative. Expanding this network and better aligning to EU policy priorities is necessary to reach EU policy objectives.
Currently envisaged implementation mode(s).	☐ Co-programmed European Partnership ☒ Co-funded European Partnership ☐ Institutionalised European Partnership ☐ Article 185 ☐ Article 187 ☐ EIT-KIC
Justification of the implementation mode	The co-funded mode of collaboration with the EC will offer to this new partnership a high and attractive European visibility, also on the global scene. An invaluable leverage effect in the amount of funds mobilised by the participants is to be expected, as illustrated in the Horizon 2020 ERA-MIN instrument.
Proposed starting year	2025

RESILIENT CULTURAL HERITAGE

General Information	
Proposed title of the European Partnership	**European Partnership for Resilient Cultural Heritage**
Short description of the candidate partnership	The aim of the partnership is twofold: to strengthen the means of preserving Europe's cultural heritage (CH) and to contribute to climate neutrality in other sectors by bringing forward traditional and innovative practices, techniques and materials resulting from CH research. It is proposed to draw on traditional - as well as emerging - skills, techniques and materials to provide innovative solutions, assessment systems and mitigation strategies along with risk management models for cost-effective preservation of CH assets in times of climate change and related risks. The partnership will support CH needs-based research and innovation, and contribute to the European Green Deal by proposing to translate scientific outcomes into new policies for resilience and sustainability in various industries.
Services directly involved	DGs RTD, EAC, CLIMA, CNECT, EMPL, GROW, REGIO, ENV, ECHO, MARE, AGRI
Context and problem definition	The introduction of a specific Destination in Cluster 2 of Horizon Europe (HE) demonstrates the recognition of an outstanding value of CH[38] for Europe's societies, Europeans' sense of belonging and Europe's future. In the HE 1st strategic planning it was agreed to put forward a targeted partnership to secure the future of European CH, especially with regard to the most pressing needs. For several years, the international research community has been warning about the unprecedented speed and scale of cultural losses or damaging impacts of the climate crisis on tangible and intangible cultural heritage.[39] For example, in the Mediterranean region, there is a high

[38] Definition of cultural heritage mentioned in the Council conclusions of 21 May 2014 on cultural heritage as a strategic resource for a sustainable Europe (2014/C 183/08) and recalled in the European Framework for Action on CH: https://op.europa.eu/en/publication-detail/-/publication/5a9c3144-80f1-11e9-9f05-01aa75ed71a1

[39] Report of the Intergovernmental Panel on Climate Change of 27 February 2022, *Climate Change 2022: Impacts, Adaptation, and Vulnerability – Summary for Policymakers*, https://www.ipcc.ch/report/sixth-assessment-report-working-group-ii/ ; ICOMOS Climate Change and Cultural Heritage Working Group. 2019. *The Future of Our Pasts: Engaging Cultural Heritage in Climate Action*, July 1, 2019. Paris: ICOMOS; *Strengthening cultural heritage resilience for climate change* - Publications Office of the EU (europa.eu) prepared under the open method of co-ordination (OMC)

number of ancient cultural properties, including 49 World Heritage Sites (WHS), in coastal sites barely above sea level.[40] Adaptation methods and protection standards vary considerably from one country to another due to their socio-economic differences, which means that numerous cultural assets, even WHS, are not sufficiently protected against coastal hazards. Another example concerns the Carpathian mountain region: In this region with many manor houses, castles, sacred buildings and historic villages and towns, widespread landslides have occurred since the 1990s, because of the intensification of extreme rainfalls. The natural propensity for slope failure has often been overlooked, as has the potential risk of landslides.[41]

Yet, few studies have explored these aspects, leaving CH managers and policy makers in many regions with little information on potential adaptation options. More research is, therefore, needed to design and adapt CH planning and management to the emergence of specific threats progressively recognised as the new dramatic challenges for CH.[42] The current state of play and the identified gaps in knowledge and structural deficiencies at EU and MS levels strongly argue in favour of a common vision and targeted research investments that can also benefit other sectors.[43]

As put forward by the group of experts from 28 EU MS/AC working on the topic under the Work Plan for Culture 2019-2022, only 10 MS and one AC mention CH in their national climate-related policies. Meanwhile, CH can play a significant role in the green transition.[44] It should profit from further research to underpin the leading role of Europe in the CH field. By leveraging historical and economic information on climate change trends and by experimenting and seizing opportunities in terms of new and long-standing skills (including through prioritising upskilling and reskilling in the sector), materials, techniques and technologies, CH has the potential to provide affordable and accessible answers to the problems of climate change and to contribute to limiting its impact on our societies and living environment.

The proposed partnership will facilitate interactions and knowledge transfer with other economic sectors: cultural and creative sectors and industries (CCSIs), territorial planning and infrastructures, construction,

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[40] Reimann, L., Vafeidis, A.T., Brown, S. *et al. Mediterranean UNESCO World Heritage at risk from coastal flooding and erosion due to sea-level rise*. *Nat Commun* **9**, 4161 (2018). https://doi.org/10.1038/s41467-018-06645-9

[41] The landslide risk has threatened 445 historic sites in Poland, 12 of which are located on active landslides. See Laskowicz, Izabela & Mrozek, Teresa. (2019). Zagrożenie zabytków dziedzictwa kulturowego ruchami masowymi na obszarze Karpat (non-official title's translation: *Threats to cultural heritage monuments from mass movements in the Carpathian region*). Przegląd Geologiczny. 67. 369-376. 10.7306/2019.3

[42] See point 44 in the *Sharm el-Sheikh Implementation Plan* (Decision 1/CMA.4 (unfccc.int)

[43] *Strengthening cultural heritage resilience* …report underlines the lack of research on the impact of climate change on the indoor conditions and stability of museum collections and written heritage gathered in archives and libraries, the lack of knowledge of the intangible aspects of heritage at risk (p.18), the lack of research on the role of existing and non-new buildings in the low-carbon economy and embodied energy (p.21); see specific section of the report entitled *Research and innovation: indispensable drivers*

[44] See above

	agricultural and forestry policy, as well as blue economy sectors, regional growth and rural development.[45] CH can play a more decisive role in promoting innovation and sustainable solutions with science, economic, social and environmental impact in line with the European Green Deal objectives.[46]
Objectives and expected impacts	The partnership's general OBJECTIVES are to: 1. Increase the capacity-building by fostering new application-oriented research collaborations between the CH and climate research communities, to promote innovations in industries and to provide scaled-up solutions and policy strategies for climate change mitigation and prevention; 2. Strengthen and broaden the contribution of CH R&I in the context of the UN SDGs and EU policies on green and digital transitions, societal inclusion and resilience. The following specific objectives should be achieved by 2030: 3. Stimulate interdisciplinary research and knowledge exchanges between several European regions, which although geographically disparate, present common challenges; 4. Disseminate new knowledge, techniques, skills, strategies and materials for sustainable preservation, conservation, and management of climate-related risks in the CH field as well as preventing from other man-made related risks such as pillaging and illicit trafficking; 5. Contribute to the implementation of the European Framework for Action on Cultural Heritage.[47] In terms of expected IMPACT by 2030, the partnership will contribute to the development of evidence-based policy and/or legislation with a view to • building national and regional capacity to encourage the use of research-driven and innovative long-standing applications for sustainable CH assets, making a stronger and measurable contribution of tangible and intangible CH as well as natural heritage, to EU growth and social cohesion; and • better structuring the CH R&I system in Europe and co-ordinate common actions and strategies by all relevant players and decision-

[45] See above and *European Cultural Heritage Green Paper* produced by Europa Nostra in close cooperation with ICOMOS and the Climate Heritage Network, with the input of other members of the European Heritage Alliance, and supported by the European Investment Bank Institute and the Creative Europe EU programme. https://www.europanostra.org/our-work/policy/european-cultural-heritage-green-paper/

[46] See European Industrial Strategy; https://ec.europa.eu/info/strategy/priorities-2019-2024/europe-fit-digital-age/european-industrial-strategy_en; *Strengthening cultural heritage resilience …*report - 10 recommendations to EU and its MS

[47] See in particular selected actions under pillar 2 (Smart solutions for a cohesive and sustainable future) pillar 3 (Safeguarding endangered cultural heritage) and pillar 4 (Mobilising knowledge and research) at https://op.europa.eu/en/publication-detail/-/publication/5a9c3144-80f1-11e9-9f05-01aa75ed71a1

	makers from various levels and areas of responsibility. As long-term impact (by 2040), the partnership will seek to make CH play an active role in the transition to more sustainable socio-economic and governance models in EU MS.
Necessity test: rationale for a European Partnership	The candidate partnership is expected to develop a framework for a holistic and strategic approach to R&I in the field of CH and climate change responses on a scale that no MS or the European Commission (EC) could achieve alone. Researchers and MS/AC experts strongly call on the EU and its MS to propose new actions at European level, including R&I area to adapt CH to natural disasters and enable it to mitigate climate change.[48] CH research projects are the indispensable drivers for policies and implementation. The effort undertaken under HE Cluster 2 will not be sufficient on its own to reach the expected impacts. To overcome the current fragmentation along national contexts and make a European Research Area in the field of CH a reality, the partnership is necessary.
Relevant for the following parts of Horizon Europe	Pillar II 'Global Challenges and European Industrial Competitiveness' ☒ Cluster Culture, Creativity and Inclusive Society ☒ Cluster Civil Security for Society ☒ Cluster Digital, Industry and Space ☒ Cluster Climate, Energy and Mobility ☒ Cluster Food, Bioeconomy, Natural Resources, Agriculture and Environment
Currently identified links with other partnership candidates / Union programmes	Latest R&I FP have financed several projects on CH and climate change-related risks.[49] Past and on-going initiatives in various areas of the EU action also contribute to a solid base for the partnership.[50] Investments of approximately €600M under Horizon 2020 include contributions on which the partnership can be built, in particular the Joint Programming Initiative on Cultural Heritage and Global Change (JPI CH).[51] Its "Strategic Research and Innovation Agenda" adopted in 2020 has been designed to

[48] The OMC report *Strengthening cultural heritage resilience …* stresses the need for research on a wide range of topics, such as the economic costs of climate change adaptation/mitigation, specifically for cultural and natural heritage; data collection mechanisms; data analysis; capacity building and upskilling of experts (see also footnote 7 above); https://data.europa.eu/doi/10.2766/44688

[49] See FP7 - HERITAGE PLUS initiative and its three projects: PROTHEGO - PROTection of European Heritage from GEO-Hazards; HeAT - Heritage and Threat, and CLIMA - Cultural Landscape risk Identification, Management and Assessment

[50] ERA-NET CHANSE (Collaboration of Humanities and Social Sciences in Europe), HERA (Humanities in the European Research Area) and NORFACE (New Opportunities for Research Funding Agency Co-operation in Europe) as well as *Copernicus* for Earth observation or *common European data space for cultural heritage* for digital cultural heritage.

[51] See for example three projects: PERICLES - PrEseRvIng and sustainably governing Cultural heritage and Landscapes in European coastal and maritime regionS; HERACLES - Heritage Resilience Against Climate Events on Site, and STORM - Safeguarding cultural heritage through Technical and Organisational Resources Management as well as to as well as research infrastructures: DARIAH (Digital Research Infrastructure for the Arts and Humanities), E-RIHS (European Research Infrastructure for Heritage Science) and CLARIN (Common Language Resources and Technology Infrastructure).

	complement Horizon Europe to best address current CH research needs such as responses to climate change.[52] The partnership should explore synergies with the New European Bauhaus (NEB)[53] to which Horizon Europe contributes, including through its Cluster 2, as well as with the Partnership for a climate-neutral, sustainable and productive Blue Economy. In addition, there may be common objectives that cross over with the Mission on Adaptation to Climate Change[54] and with the Mission Restore Our Ocean and Waters. Moreover, the partnership will be strongly linked to the European Institute of Innovation and Technology's Knowledge and Innovation Community - EIT Culture & Creativity, which will gradually start its activities in 2023. Given the wider thematic scope of the EIT Culture & Creativity, there is no risk of overlap between its activities and this partnership. The common aim is to foment and widen to as many MS as possible a culture and creativity driven European innovation ecosystem. The ecosystem will be enriched in the future by the European Collaborative Cloud for Cultural Heritage (ECCCH) to be developed and implemented under Cluster 2 calls from 2023 onwards. The ECCCH will be a unique digital collaboration and co-creation platform for European CH professionals, expected to contribute decisively to make Europe a world leader in deploying digital technologies in CH preservation. An additional link will be established with the DIGITAL Europe Programme that aims *inter alia* to accelerate the digitisation and digital preservation of CH assets, both tangible and intangible, and their use in education, sustainable tourism and CCSIs.[55]
Does the proposed partnership build on currently active ones?	Many past and on-going initiatives help build the partnership's foundation, such as above-mentioned JPI CH and European infrastructures, as well as the ARCHE three-year CSA project (Alliance for Research on Cultural Heritage in Europe, 2022-2025).[56] There are currently no partnerships related to cultural heritage, nor any partnerships under Cluster 2 of HE Pillar 2.
Expected type and composition of partners	The core partners will be MS: their respective competent ministries, key CH institutions, universities and other research organisations. Further expected partners are representatives of research funding agencies as well as public enterprises that are active in the CH field.[57]

[52] WHITE PAPER *Cultural Heritage and Climate Change: New challenges and perspectives for research, JPI-CH and JPI Climate*, March 2022, https://www.heritageresearch-hub.eu/app/uploads/2022/03/White-Paper-March-2022-OK-revision-nm-18_05.pdf

[53] New European Bauhaus: beautiful, sustainable, together. (europa.eu)

[54] Adaptation to climate change (europa.eu)

[55] See Digital Decade objectives in https://ec.europa.eu/info/strategy/priorities-2019-2024/europe-fit-digital-age/europes-digital-decade-digital-targets-2030_en

[56] See HORIZON-CL2-2021-HERITAGE-02-02: Coordination of European cultural heritage research and innovation among MS

[57] The interest of non-academic, industrial partners will be essential to change the perception of CH from being a beneficiary rather than an active player in devising new and more human-centred technologies and strategies.

Contributions and commitments expected from partners	The EC expects a majority of MS to contribute financially and in-kind.
Currently envisaged implementation mode(s).	☒ Co-programmed European Partnership ☒ Co-funded European Partnership *(preference)* ☐ Institutionalised European Partnership ☐ Article 185 ☐ Article 187 ☐ EIT-KIC
Justification of the implementation mode	The core purpose of the partnership is to join forces and co-ordinate actions between different MS and the EC, with a view to achieving the kind of impacts, which are only possible when policies are co-ordinated and synergies fully exploited. Therefore, a co-funded European research partnership is considered the most suitable implementation model of the partnership.
Proposed starting year	2025

SOCIAL TRANSFORMATIONS AND RESILIENCE

General Information	
Proposed title of the European Partnership	**European Partnership on Social Transformations and Resilience**
Short description of the candidate partnership	The Partnership will create a transformative R&I programme between social sciences and humanities to enable inclusive sustainable development and social and economic resilience in the light of changes in climate, technology, demography and global trade patterns, and potential unexpected shocks. It will develop knowledge and tools to address contemporary multifaceted social challenges in a collaborative and systematic way.
Services directly involved	DGs EMPL, R&I, EAC, JRC, HOME, MARE, GROW, CNECT
Context and problem definition	Europe is undergoing critical social transformations driven by macro drivers of change, such as the green and digital transitions, global trade patterns, and demographic change. Recent events, such as the Covid-19 pandemic, and Russia's invasion of Ukraine are having wide-ranging impacts and have accelerated most of these trends. If not addressed properly, these developments pose structural challenges to the European social and economic model, which could widen existing inequalities, impede behavioural change and societal uptake of scientific solutions, erode trust and public support for the green and digital transitions and even damage the fabric of our democracies. For these reasons, it is paramount to leverage the wide range of social sciences and humanities (SSH) expertise to increase the resilience of our societies and strengthen their ability to respond to crises and face the challenges as well as seize the opportunities brought about by the macro drivers of change. Europe, with its diversity in institutional settings, welfare state regimes, labour market institutions, and cultures, is a natural laboratory for testing new solutions to live up to these challenges. A partnership focused on studying these social experiments and testing their chances of being transposed to different settings can prove to be an invaluable asset in helping to effectively modernise our social protection systems and education and training institutions. This, in turn, would contribute to protecting and strengthening the resilience of the European social model, based on fair working conditions and social dialogue, ensuring a smooth transition to the future of work and laying the groundwork for equal and cohesive societies. The SSH R&I community will also be tasked with imagining different scenarios, offering policy analysis, and issuing recommendations to help EU, national and regional authorities design policies with solid analytical underpinning and reach the ambitious target committed by the EU and the Member States (e.g. SDGs, Paris agreements, EU Green Deal,

	European Pillar of Social Rights). Results and outcomes should be presented in a multidimensional and interdisciplinary way, covering economic, employment, social, education, training and lifelong learning and other fair transition related actions, levers, and indicators. Distributional impact, behavioural change and gender differences should be considered as well. The proposed Partnership builds on activities undertaken under Horizon Europe, H2020 and previous Framework Programs, to further develop innovative and excellent interdisciplinary research and innovative methods addressing these multifaceted social challenges, in a collaborative and systematic way.
Objectives and expected impacts	The partnership's objectives are to: • Strengthen the knowledge base in Europe and develop innovative solutions to tackle critical social transformations driven by the green and digital transitions, global trade patterns, and demographic change; • Provide policymakers at European, national, and regional level with evidence-based recommendations that can inform new strategies and policies to address these social transformations; • Increase the resilience of EU societies to global crises; and • Build capacity among the R&I community and policymakers to respond to long-term socio-economic changes. Innovations and scientific results achieved will contribute to reaching EU priorities on the European Pillar of Social Rights, the EU Green Deal, including the Fit for 55 package (and notably the Council Recommendation on ensuring a fair transition towards climate neutrality), and strengthen the European Research Area and the European Education Area. Other relevant EU strategies and initiatives include: the European Skills Agenda, the Pact for Skills, Europe's Digital Decade, the Digital Education Action Plan, the Social Economy Action Plan, the European Care Strategy, the EU Gender Equality Strategy, the EU Strategy for the rights of persons with disabilities 2021-2030, the EU Strategy on the Rights of the Child and the European Child Guarantee, the Directive on Adequate Minimum Wages in the EU, the Commission proposal on Improving the working conditions of platform workers, and the Youth employment support. They will also contribute to the implementation of SDGs 1 (No Poverty), 4 (Quality Education), 5 (Gender Equality), 8 (Decent Work and Economic Growth), 10 (Reducing Inequalities), 11 (Sustainable Cities and Communities), and 16 (Peace, Justice and Strong Institutions). Furthermore, activities will add value through European collaborative and interdisciplinary research, exploring factors of institutional and behavioural change and stasis. Activities will develop innovative solutions to societal challenges and support policymakers, social partners and the R&I community with their successful implementation. In terms of expected impacts, the Partnership will inform evidence-based

	policy setting for: • Supporting the **modernisation of social protection** and inclusive access to essential services, particularly for groups at risk of poverty and social exclusion • **Future of work** (access to quality jobs, under decent working conditions, re-/up-skilling for the future workforce, innovative job transitions especially in green sectors, new forms of work organisation, gender-equal, inclusive workplaces). • Fostering **education and skills development** in the context of the green and digital transition (including EU mobility policies and help counter social, economic, and political inequalities; contributing to a comprehensive European strategy for inclusive growth and upward convergence). • **Contributing to a fair transition,** in line with the Council recommendation on ensuring a fair transition towards climate neutrality.
Necessity test: rationale for a European Partnership	The nature and magnitude of the social transformations that Europe is undergoing coupled with the heterogeneity in policies and institutional settings across Member State call for knowledge and resources sharing, and long-term, concerted actions (based on a joint strategy and vision) from R&I funders and national authorities. A partnership will allow for the necessary long-term coordination of funding strategies (by developing a strategic research agenda) and help avoid unnecessary duplication of research and innovation efforts. The leverage effect of a co-funded partnership would be very important in fostering European cooperation and breaking down fragmentation. This would be a strong contribution to the new ERA as well. Social transformations, inequalities and fair transitions are of shared competence and to a large extent policy fields in the remit of EU Member States. A co-funded partnership will therefore contribute to strong ownership and improved policy uptake of comparative and transdisciplinary European R&I results on the part of competent national authorities, stakeholders and social partners.
Relevant for the following parts of Horizon Europe	Pillar II 'Global Challenges and European Industrial Competitiveness' **☒ Cluster Culture, creativity and inclusive society (most relevant)** ☒ Cluster Health ☒ Cluster Civil Security for Society ☒ Cluster Digital, Industry and Space ☒ Cluster Climate, Energy and Mobility ☒ Cluster Food, Bioeconomy Natural Resources, Agriculture and Environment ☒ Cross-cluster ☐ Pillar I 'Excellent Science' (notably Research Infrastructures)

	☒ Pillar III 'Innovative Europe' (notably EIT, European Innovation Ecosystems (EIE))
Currently identified links with other partnership candidates / Union programmes	This Partnership would cooperate closely with the following partnerships to ensure SSH knowledge is taken up and better mainstreamed in existing partnerships: • Clean Energy Transition Partnership of Horizon Europe; • Made in Europe • processesr4planet • European partnership on transforming health and care systems • EIT Climate-KIC • EIT Digital • EIT InnoEnergy • EIT Manufacturing • EIT Urban Mobility The partnership can also help increasing the outreach of EU Missions, involving relevant stakeholders, such as social partners and civil society organisations, and integrating SSH expertise in their work. This is particularly relevant for the mission on Adaptation to Climate Change and the mission for Climate-Neutral and Smart Cities. The partnership would seek synergies in particular with the following programmes: • European Structural and Investments Funds, especially the European Social Fund+. This includes mainstreaming and scaling up R&I solutions to foster social integration of people at risk of poverty and social exclusion by equipping people with the skills and competences needed for evolving demands of the labour market. Synergies with the ESF+ can also be exploited to promote human capital development in R&I through up/reskilling to make the ERA fit for the green and digital transition (following annex IV of the Horizon Europe legislation). • Erasmus Plus: in line with the partnership's objectives on fostering inclusive education and training, synergies with the Erasmus Plus programme will aim at informing teaching and education policies with the latest findings from the SSH field on societal challenges, including demographic changes, global trade patterns, digitalisation, and climate change.
Does the proposed partnership build on currently active ones?	The candidate Partnerships builds on the following initiatives: • ERANET Co-fund – DIAL (Dynamics of Inequality Across the Life-Course structures and processes) – End date: 31/10/2021[58] • ERANET Co-fund – CHANCE (Collaboration of Humanities And Social Sciences in Europe) – End date: 28/02/2026[59] • ERANET Co-fund – HERA JRP PS (HERA Joint Research Programme Public Spaces: culture and integration in Europe) – End

[58] https://www.norface.net/program/dial/
[59] https://chanse.org/about-chanse/

	date: 31/07/2022[60]
Expected type and composition of partners	National and regional research and innovation funding agencies, governmental organisations, social partners, employment/education/R&I ministries and agencies. The geographical coverage should be representative and achieve a good geographical balance of the EU Member States and Horizon Europe associated countries.
Contributions and commitments expected from partners	Partners would contribute financially to fund joint calls for thematic and cross-thematic research and technological development domains. Partners should also provide administrative support to the Partnership, as well as support policy and societal uptake of results, regulatory responses, where appropriate and agreed.
Currently envisioned implementation mode(s)	☐ Co-programmed European Partnership ☒ Co-funded European Partnership ☐ Institutionalised European Partnership ☐ Article 185 ☐ Article 187 ☐ EIT-KIC
Justification of the implementation mode	A co-funded partnership would allow for optimal partner composition and contributions approach (research funding agencies; employment/education/R&I ministries; financial contributions, implementation by public organisations), a high and attractive European visibility and the increased R&I scale and capacity that is needed for R&I to deliver on addressing social transformations and inequalities.
Proposed starting year	2025

[60] https://heranet.info/projects/public-spaces-culture-and-integration-in-europe/

SOLAR PHOTOVOLTAICS

General Information	
Proposed title of the European Partnerships	**European Co-Programmed Partnership on Solar Photovoltaics (PV)**
Short description of the candidate partnership	The Partnership will promote **the industrial engagement in PV R&I** to **support the innovation ecosystem** across **the full PV value chain. It will** represent the **R&I pillar of the EU Solar PV Industry Alliance**.
Services directly involved	DGs CLIMA, RTD, ENER, GROW, JRC
Context and problem definition	• The **REPowerEU Plan**, published in May 2022, sets out the measures necessary to reduce Europe's dependency on fossil fuels, as well as to accelerate the green transition and to increase the resilience of the EU energy system – all of which relies on the massive and rapid deployment of renewable energy and especially **Photovoltaics** with a dedicated **EU Solar Energy Strategy**. • In 2020, solar PV delivered around 5% of total EU electricity generation. To meet the EU Solar Energy Strategy overall target of 320 GW of PV capacity to be achieved in the EU by 2025 (representing a doubling compared to 2020 levels of EU capacity) and almost 600 GW by 2030, the EU will need to install, on average, **45 GW of PV generation** capacity per year. • To meet the REPowerEU and the EU Solar Energy Strategy objectives — and avoid replacing a dependency on Russian fossil fuels with new dependencies — the EU Solar Energy Strategy announced the launch of an "Industrial Alliance" on PV solar energy. • The **"EU Solar PV Industry Alliance",** formally endorsed on 11 October 2022, will bring together industrial actors, research institutes, and other stakeholders with an interest in the solar PV sector. It will deliver an **action plan for the solar industrial value chain in Europe** and engage with the EU and Member States on issues ranging from research and innovation, technology, industrial supply chain, raw materials, access to finance, off-takers, international partnerships and global supply chain resilience, sustainability, circularity, and skills. With the alliance's support, the EU could reach **30 Gigawatt of annual solar energy manufacturing capacity by 2025** supported by a **boost in R&I** investments across the full PV value chain. • On 1st February 2023, the EC presented a **Green Deal Industrial Plan** to enhance the competitiveness of **Europe's net-zero industry** and support the fast transition to climate neutrality. As part of this Plan, the Commission has put forward a **Net-Zero Industry Act** to

	underpin **industrial manufacturing of key technologies in the EU** such as batteries, windmills, heat pumps, **solar PV**, electrolysers, carbon capture and storage technologies. • R&I in PV is supported under the Horizon Europe Cluster 5 Destination 3: Sustainable, Secure and Competitive Energy Supply. Today, the overall funding for PV in Work Programmes 2021-22 and 2023-24, stands at EUR ~280 million, across 17 topics at various TRL levels. The proposed co-programmed partnership will be funded by the Cluster 5 Destination 3 budget, in an analogous way that PV R&I is supported today by this part of the Horizon Europe programme. There are no Partnerships with industry in the RES area. There is only a co-funded partnership, the **Clean Energy Transition (CET) partnership** that brings together **EU national funding bodies** with the aim to boost and accelerate the energy transition and to support the implementation of the European Strategic Energy Technology Plan (SET Plan). The budget for the 7 years duration (EUR 210 million of EU commitments and expected commitments from national funding bodies of EUR 581 million) is covering the full renewable/clean energy scope.
Objectives and expected impacts	• **Reinforce and better coordinate** the EU R&I efforts across the whole solar PV value chain. • Invite an **enhanced involvement of EU industrial and research communities** in the co-creation and implementation of the EU R&I strategy in this area, to **amplify** the mobilisation and synergies **of the human capital and material resources** in this critical sector including by adequately re-skilling and upskilling the workforce as needed. • Support the R&I pillar of the **"EU Solar PV Industry Alliance"** and consequently facilitate the **build-up of large-scale PV manufacturing capacity** in Europe. • **Replicate** the successful example of **co-Programmed Partnership** and **Alliance** in the **batteries** sector. • Enable European leadership in an **innovative and value-creating** PV industry across the **entire value chain,** thus **tackling** its **vulnerabilities/dependencies/gaps** and leading to **job creation**, through **accelerating the deployment** of industrial projects. • Further promoting **Europe's competitive advantages**, for example in **circularity by design, recycling**, maintenance & end-of-life management of PV systems; by decreasing the dependence on imported materials and by anticipating the challenge of best use of planet resources, which will be implementing to all industries in the world, this partnership with contribute to the objectives of the **Critical Raw Materials Act** and the **Net-Zero Industry Act** of the **Green Deal Industrial Plan.** • Supporting **demand-driven elements** of the solar PV industry (such as social infrastructures, energy communities, cooperatives), whilst promoting **ethical aspects** (e.g., labour conditions, environmental footprint, raw material sourcing etc.).

	• Enable European industry to foster the **green and digital transitions** and at the same time defend its **open strategic autonomy**, preserve its **competitiveness on the global market**, maintain a **high level of employment** and **quality jobs in Europe** and strengthen its ability to **innovate and produce in Europe**. • Contribute to the overall Horizon Europe 35% Climate Action expenditure target, the **European Green Deal,** the **REPowerEU** and the **Green Deal Industrial Plan** policy objectives. • Contribute to making Europe the first climate-neutral continent by 2050 via the widespread deployment of PV. • In terms of technological focus, the Partnership is to cover: 1. *Next generation PV cells & module technologies (*e.g. crystalline Si-tech, thin-film, perovskites etc.) across the whole value chain: for example for c-Si technologies, from polysilicon to ingot to wafer to cell to modules advanced manufacturing. 2. *Emerging innovative PV deployment applications* (e.g. agri-PV, building-integrated PV, floating PV) for an optimal use of renewable energy potential in synergy with other economic sector needs and biodiversity. *3. Integration of PV in flexible energy generation systems.* *4. Circularity by design, recycling, maintenance & end-of-life management of PV systems.* 5. *Enabling technologies and tools for demonstrating and scaling up of next generation PV solutions.*
Necessity test: rationale for a European Partnership	The proposed Partnership would allow for a **stronger and synergistic involvement of EU industrial (and research) communities** in the **co-design/co-creation** of the EU R&I strategy in this area. As a co-programmed partnership between industry and the EC, it will be based on a memorandum of understanding. The agreement will specify **clear objectives** for the partnership, the **related commitments in terms of contributions** from the partners, **key performance** and **impact indicators,** as well as **outputs** to be delivered and **reporting modalities**. Such a coordinated, well framed, and long-lasting effort would **amplify the mobilisation and engagement** from **industry** in this critical sector by bringing **predictability** and **continuity** to the EU PV value-chain stakeholders. In addition, private partners would be committed to **support with their own funds additional activities**, not funded through Horizon Europe, on issues such as market deployment, skills development or regulatory aspects in line and coordination with the EU Solar PV Industry Alliance strategic priorities. This stronger and better framed R&I co-operation between PV stakeholders would hopefully **nurture the innovation ecosystem across the full PV value chain**. It will thus support the scale-up of innovative and competitive PV manufacturing capacity in Europe contributing to the **achievement of the EU energy, industrial** and

	climate policy objectives.
Relevant for the following parts of Horizon Europe	Pillar II 'Global Challenges and European Industrial Competitiveness' ☐ Cluster Health ☐ Cluster Culture, creativity and inclusive society ☐ Cluster Civil Security for Society ☐ Cluster Digital, Industry and Space ☒ Cluster Climate, Energy and Mobility ☐ Cluster Food, Bioeconomy Natural Resources, Agriculture and Environment ☐ Cross-cluster ☐ Pillar III 'Innovative Europe'
Currently identified links with other partnership candidates / Union programmes	The Partnership will build upon, and is fully complementary with, the existing initiatives in Europe in the Renewable Energy area, such the ongoing **co-fund** partnership (**Clean Energy Transition (CET) Partnership**) under the **SET Plan.** The **European Technology & Innovation Platform** (**ETIP) PV** is expected to engage and contribute. The Partnership would represent the **R&I pillar** of the new **EU Solar PV Industry Alliance.** Furthermore, potential **synergies** could be sought with the HE partnerships **Build4People** (e.g., for solar rooftop applications), **Clean Hydrogen**, **Made in Europe** and the **European Innovation Council (EIC)** and the **InnoEnergy KIC**.
Does the proposed partnership build on currently active ones?	N/A
Expected type and composition of partners	• The Partnership will be a **public-private** Partnership to promote the **collaboration between EU research and industry** in **Photovoltaics** as well as skills development throughout the value chain. • On the side of industry, this would involve **key stakeholders** from the **full solar PV value chain,** encompassing raw and advanced materials, advanced manufacturing, innovative applications (integration in agriculture, buildings, vehicles, etc.) and recycling. • Concretely, this would necessitate representation from industrial and research associations (such as **SolarPower Europe**, the **ETIP PV, etc.**). • Solar PV industry stakeholders represented by **SolarPower Europe and ETIP PV** have **confirmed their strong support and commitment** to the development of this Partnership. At this stage, the industry (and research) side in the partnership is represented by SolarPower Europe (SPA) and the ETIP PV. Still, other relevant associations might be interested and will be invited to join. The two major associations have partners from all over Europe, representing

	the entire solar PV value chain, from Lithuania to Portugal and from Ireland to Romania. As the aim of the partnership is to support the R&I pillar of the "EU Solar PV Industry Alliance" and consequently facilitate the build-up of large-scale PV manufacturing capacity in Europe (contributing to the objectives of the Net-Zero Industry Act), the international opening of this partnership needs to consider that the PV value chain in Europe is under the risk of a strategic dependence. The partnership should develop Europe's competitive advantage and strategic autonomy to develop capacities and attract private investors. The aim will be to re-create a sensitive PV ecosystem in an open, transparent manner that is fully compliant with competition rules while maintaining international collaborations for a resilient global supply chain.
Contributions and commitments expected from partners	Expected contributions from the private stakeholders include financial contributions, skills development/training, promotion of market/societal uptake, market deployment.
Currently envisaged implementation mode(s).	☒ Co-programmed European Partnership ☐ Co-funded European Partnership ☐ Institutionalised European Partnership ☐ Article 185 ☐ Article 187 ☐ EIT-KIC
Justification of the implementation mode	The current Horizon Europe investments (through dedicated topics) are clearly not enough for supporting the huge challenge of rebuilding an innovative, job-creating PV industry in its full value chain (including upstream advanced manufacturing) as required by the REPowerEU, EU Solar Energy Strategy and the Green Deal Industrial Plan. The co-funded Partnership model is not applicable as the goal is **to mobilise industrial resources**. Therefore, the partners need to belong to the private sector and not to the public sector. Furthermore, the public sector is sufficiently engaged (with help of the co-funded Clean Energy Transition Partnership) in the SET Plan implementation in the area of clean energy technologies, including solar PV. The establishment of an institutionalised Partnership in this area is disregarded at this stage due to the associated time- and resource-intensity. A **co-programmed Partnership** offers the required level of coordination, whilst simultaneously maintaining a high level of flexibility in its governance ensuring that the Commission maintains a substantial level of "control" and input in terms of priority programming under Horizon Europe.
Proposed starting year	2025

TEXTILES OF THE FUTURE

General Information	
Proposed title of the European Partnership	**European Partnership on Textiles of the Future**
Short description of the candidate partnership	The candidate partnership aims at boosting the innovation capacities in the textiles ecosystem by supporting emergence and deployment of innovative sustainable and circular solutions and fostering the generation of talents.
Services directly involved	DGs GROW, ENV, JRC
Context and problem definition	**The textiles ecosystem[61] has high potential to generate innovation, sustainable economic growth, and jobs.** The industry is an important pillar of the EU economy counting for 3.1% manufacturing value added and 6.2% of manufacturing employment. 99% of companies in the sector are SMEs. The textiles and clothing industry has seen strong export performance over the past decade (39% of EU turnover is sold on the global markets; during the period 2010-2019, exports increased by 58%). The sector covers a long supply chain: from production of fibres transformed into yarns, then into fabrics and then into final products in textiles and apparel, some of which are strategic for the European economy. It supplies other industries, including healthcare, agriculture, construction and automotive and is closely connected to the creative industries, in particular design, retail, and others. The sector also embraces textiles related services and labelling. The industry stands out on the global market with its quality and heritage, know-how, but also its creativity and innovation. Europe annually exports technically advanced high-quality textile-based products worth over € 50 billion to the rest of the world. Europe is also highly recognised for its innovative brands and high-end goods. Quality & innovation are the main drivers for the EU T&C competitiveness, as confirmed by the number of patents (1303, compared to 869 for China or 692 for the US) or industrial designs (over 200,000 for the EU; less than 50,000 for the US and 20,000 for China). To maintain the global innovation lead also in a future digital and sustainable world, we will need to massively increase efforts in research, sustainable and circular production and technology development, innovation, creativity, and skills development. **Textiles are the fourth highest-pressure category for primary raw materials and water and fifth for GHG emissions.** The share of synthetic fibres has grown massively reaching over 65%

[61] The textiles ecosystem includes the textiles, clothing, leather and footwear industries

percent of global annual fibre production today with the rest made up of natural fibres, mostly cotton (which has significant limitations in terms of land and water use) and a relatively small share of mostly wood-based man-made cellulosic fibres. Bio-based textile fibres are made of plants, most often leftovers of other industries, and may result in lower CO2 emissions, reduced water consumption and decreased use of toxic chemicals. Fast fashion impacts the environment considerably and it is linked to the growing use of fossil-fuel based synthetic fibres.

European consumption of textiles has the fourth highest impact on the environment and climate change (after food, housing, and mobility). The EU produces 5 kg of textile waste per capita. Data on textiles recycling at global level estimates that less than 1% of materials used to produce clothing is recycled into new clothing. **By 2025 Member States need to comply with the requirement to separately collect textile waste to prioritise re-use and scale up recycling. The Commission envisages to propose mandatory targets for preparing for re-use and recycling of textile waste as part of the review of the EU waste legislation foreseen for 2024.**

The industry has strong competition from third countries and a very high share of imports (73% of fashion products in the EU are imported).

The European Green Deal and the Circular Economy Action Plan for a cleaner and more competitive Europe, the 2021 update of the EU Industrial Strategy and the recently adopted EU Strategy for Sustainable and Circular Textiles stress the urgency of accelerating the European clothing and textiles sector towards sustainability and circularity. **The EU Strategy for Sustainable and Circular Textiles aims to ensure that by 2030, textile products have a longer life, are recyclable, made as much as possible from recyclable material, are free of hazardous substances and are produced respecting social rights. The New European Bauhaus has identified textiles as an area of huge potential for the transformation of our economy and supports the creatives of the sector to drive change towards a sustainable, beautiful, and inclusive future.** Innovation supporting the development of high-quality sustainable bio-based fibres, making textiles last longer and be upcyclable and recyclable and later making possible the circulation and uptake of recycled textile fibres is key to reduce the environmental footprint of the sector, but also given the current situation with energy soaring prices. There is significant potential to reduce textile waste and ensure that it creates further value by boosting its preparation for reuse and recycling. Moreover, the EU textile industry strives for sustainable fibres and fabrics with additional functionalities and superior performance in novel application areas at affordable costs.

To make all this possible, investments are necessary in circular and sustainable management, scaling up industrial upcycling, collection, assisted or automated sorting and recycling of textiles, and in innovative, sustainable, and techno-economically feasible production processes, including for fibres. The EU has a unique chance to become global pioneer in textile upcycling and recycling processes and innovative circular and sustainable production technologies, and ultimately become the exporter of the know-how and of sorting and recycling machinery. This also includes creative solutions to reduce waste and overproduction

from the design phase, with innovative production practices that take into account the repairability and recyclability of products once they reach their end of life. The Horizon Europe Work Programme 2023-2024 will support the design for recyclability in textiles and garments. However, this will continue to be an area which will need further scientific investigation and innovative technology, as the industry is currently lacking scalable and efficient circular solutions. Improving the quality of recycled fibres is a topic that has been addressed under the Work Programmes 2021-2022 and is planned for under the Work Programmes 2023-2024.

Nevertheless, the development of scalable innovative processes remains relevant particularly in light of the latest legislative revisions, as the EU will aim at increasing the use of recycled fibres. Finally, there is an urgent need for further practice-led research with respect to novel, circular and high-quality sustainable bio-based textiles. EU could be a global leader in developing innovative materials and products by using biomass or waste fibres. In this context, supporting partnerships of relevant actors in the value chains (for instance by setting recycling hubs) between collectors, sorters and processors of textile waste into secondary raw materials and producers of textiles are highly relevant. Digitalisation is important and can help companies in the ecosystem to grow and to implement innovative sustainable production processes. The impact of these developments on the requirements for skills, together with future eco-design rules, is enlarging the abilities needed to master new equipment and techniques, to drive innovation in the sector. Data indicates that the demand for digital and green skills is greater than the current supply.

Why a European Partnership on Textiles

To set up a more strategic, coherent and impact-oriented approach, contributing to the delivery of priorities defined under the EU Strategy for Sustainable and Circular Textiles, the Transition Pathway for the Textile Ecosystem and the EU Textile, Clothing, Leather and Footwear Pact for Skills, the New European Bauhaus and other EU related initiatives: implementation of the Ecodesign for sustainable products regulation, setting up the digital product passport, addressing the unintentional release of microplastics, revision of EU Textile Labelling Regulation and amendment of Waste Framework Directive to introduce an Extended Producer Responsibility scheme for textiles.

To co-design funding priorities on research and innovation with the industry in one of Europe's most pressing challenges - the circular and sustainable transition of the textile ecosystem – by defining a long-term vision that is agreed and committed to by the respective sectors, aligning research and innovation agendas, creating a critical mass of funding in strategic areas, and accelerating deployment and increasing the impact. The Partnership will bring together and directly involve all sectors of the textiles ecosystem across its value chain (producers, sorters, collectors, recyclers, and waste managers), including creatives and designers, also looking from the lifecycle perspective in defining what their priorities and needs for research and innovation are, addressing the complex set of challenges of the textile ecosystem with an integrated approach. **Unlike other major EU manufacturing sectors that benefitted from PPP's,**

	the textile sector and research community is impelled to search for fragmented small-scale funding opportunities across various parts of the EU Research and Innovation Framework Programme. This may lead to inconsistent research activities without overarching strategic orientation and partial retreat to more readily available national funding opportunities by many leading industrial and academic research players. **The launch of a dedicated research partnership at EU level can end this fragmentation and unite all players along the value chain.** It will give a boost to these urgently needed strategic research and innovation activities to successfully master the twin transition of the textile sector and to establish itself as global leader in the new circular, sustainable, smart, and digital textile economy of the future, and thus contributing to strengthening the EU's strategic autonomy. **A European Partnership on Textiles would complement the support provided by the European Textile Platform and Stakeholder associations like EURATEX, ECCIA[62] or the European Fashion Alliance that serve as coordinating bodies for the production sector bringing together stakeholders from the whole value chain.** Bottlenecks like education providers need urgently to be included in such a partnership to bridge the skills gap in the sector. Digital and greener skills will be an important factor to assure the survival of the European textile sector.
Objectives and expected impacts	**The strategic objectives of the partnership will be**: • to support creative solutions to reduce waste and overproduction (from the design phase), with innovative production practices that take into account the repairability and recyclability of products; • to increase textile-to-textile recycling capacity in the EU and to develop sorting and processing technologies and processes giving the emerging textile recycling industry competitive edge globally; • to improve the aesthetic and functionality of textiles to meet the needs of the modern consumer by boosting specific innovative segments of the ecosystem such as novel, smart textiles and high-performance materials, circular and sustainable bio-based textiles, and artisan textiles; • to support design as a driver for sustainable innovation in the textile/fashion industry and raise awareness about design's impact on i) research and development of high quality, sustainable bio-based fibres and their prospective use, ii) conceiving and processing sustainable fashion/textile products; iii) designing more sustainable services and business models iv) change the consumers' behaviour; • to enable digital transformation of the textiles ecosystem as a move towards circular and sustainable production methods and processes; • to stimulate skills development in the ecosystem to meet the needs for technological advancement for new approaches for digital and smart specialization, and to strengthen collaboration between education and businesses. The partnership will contribute to the implementation of actions and

[62] European Cultural and Creative Industries Alliance

	commitments agreed in the EU Strategy for Sustainable and Circular Textiles, the EU Pact for Skills large-scale skills partnerships in the Textiles ecosystem and in the Cultural and Creative Industries, the New European Bauhaus and the Transition Pathway for the Textiles Ecosystem co-created with the industry. As the above objectives are research-intensive, it is inevitable to have excellently functioning research coordination and knowledge transfer to the industry. **The following impacts are expected:** **Knowledge & innovation capacity***:* development of innovative, sustainable and techno-economically feasible production processes; development of textile sorting and recycling technologies at commercial scale; development of resource efficient textile processing technologies, development of new business models. **Sustainability***:* establishment of sufficient capacities for innovative fibre-to-fibre recycling; establishment of partnerships along the value chain, such as the existing textile recycling hubs across Europe; increased production capacity for textile products with recycled textile fibres. **Digital transformation***:* development and industry adoption of innovative sector specific digital solutions for greater efficiency and competitiveness; enabling SMEs in using digital technologies to respond to regulatory and market requirements related to sustainability and circularity, including mapping of consumers' needs to prevent overproduction (e.g. Digital Product Passport, use of digital technologies for stocks monitoring, opening up access to new business/revenue models, reaching consumers and raising their awareness about more sustainable textile consumption etc.). **Education & Human Capital:** job creation potential for sorting and recycling of textiles waste; new educational processes and tools responding to digital/green skills; digital/green reskilling and upskilling of the ecosystem; more attractive sector to skilled and young entrepreneurs and employees, new business models, trainings on eco-design, consumer engagement on slow fashion, modular more sustainable home furniture and overproduction reduction.
Necessity test: rationale for a European Partnership	**A partnership approach at EU level is more effective in achieving the aforementioned objectives than traditional Framework Programme regular calls because**: • the magnitude of the challenges that need to be addressed require knowledge sharing and long-term, concerted actions from a broad range of stakeholders across the whole value chain; • it ensures a systematic (not fragmented) approach to innovation, by aligning research and innovation agendas, creating a critical mass of funding in strategic areas and accelerating deployment and increasing the impact; • it sets up a more strategic, coherent and impact-oriented approach, contributing to the delivery of EU priorities and, where relevant, creating synergies with other European partnerships; • it can incentivise the commitment of innovation actors for a longer time, which may facilitate the continuation of activities once the EU earmarked financial support is phased-out; • it allows coordination with national programmes and permit to plan

	and synchronise the different calls and activities towards the achievement of the overall goal of the partnership, while each subsequent call would build on the results of previous calls. The partnership will strengthen ownership by industry, achieve scale by aggregating demand by researchers, designers and other users, and pool existing capacities and expertise at all levels.
Relevant for the following parts of Horizon Europe	Pillar II 'Global Challenges and European Industrial Competitiveness' ☐ Cluster Health ☒ Cluster Culture, creativity and inclusive society ☐ Cluster Civil Security for Society ☒ Cluster Digital, Industry and Space ☐ Cluster Climate, Energy and Mobility ☒ Cluster Food, Bioeconomy Natural Resources, Agriculture and Environment ☐ Cross-cluster ☐ Pillar III 'Innovative Europe'
Currently identified links with other partnership candidates / Union programmes	The Partnership will support the implementation of the Circular Industrial Technology Roadmap for Textiles and will create synergies with: **Made in Europe Partnership***:* The Partnership will exchange and align strategic concepts with the Made in Europe Partnership, which could complement the Partnership in technological foresight and in manufacturing-related job creation. The scope of the proposed Partnership will be broader, complementing with a focus on sustainability in relation to textile fibres and textile-to-textile recycling. **European Partnership Process4Planet**: The Partnership will exchange and align strategic concepts with the European Partnership Process4Planet which could complement the Partnership in developing and deploying innovation for circularity and decarbonisation of European process industries. Particular attention will be paid to Hubs for circularity. **Circular bio-based Europe**: The partnership will exchange and align strategic concepts with the Circular Bio-based Europe Partnership which could complement the Partnership in detecting renewable and bio-based sources able to play a key role in circularity and strategic raw-material autonomy. The Partnership calls can be nourished with research results from preceding work under these related Partnerships or under relevant clusters of Horizon Europe. Moreover, as the Partnership should be operational from 2025, it will allow a transition period to coordinate on synergies and align on funding priorities with other relevant partnerships/CBE as well as the **European Institute of Technology (EIT) Knowledge and Innovation Communities (KIC)** e.g. EIT Manufacturing, EIT Culture and Creativity, EIT Climate-KIC. Further cooperation between the Partnership and other initiatives, such as the New European Bauhaus, are envisaged and will be ensured[63].

[63] One of the thematic axes of the NEB is "The need for long-term, life-cycle thinking in the industrial ecosystem", which mentions among others the textile sector. One of the actions of

	The Partnership will engage intensively with both technology-focused initiatives and climate/circular-oriented initiatives. Synergies will be also ensured with the European Social Fund Plus, particularly as regards modernising education and training systems and providing flexible upskilling and reskilling opportunities for the industry. The Partnership would benefit from existing infrastructures in the textile stakeholder ecosystem like the Textile ETP and ReHub initiative and could therefore become active quickly after the respective necessary steps have been undertaken.
Does the proposed partnership build on currently active ones?	No.
Expected type and composition of partners	**The ambition of the partnership is to bring together representatives of the entire textiles life cycle.** Textiles, Clothing, Leather and Footwear industry leadership of this partnership will be guaranteed by EU industry associations such as EURATEX[64] representing the interests of the textiles and clothing sector. To take a broader perspective on the textile ecosystem and to cover leather and footwear a cooperation with respective stakeholders like COTANCE[65] and CEC[66] should be installed. The above-mentioned stakeholder are European umbrella organizations representing national associations for companies in the sector. Sectoral innovation clusters represented by EU-TEXTILE 2030 will ensure impact of the partnership at SME level in regional industrial ecosystems across Europe. The research and higher education community will be represented by European networks of RTOs (Research and Technology Organisations) such as TEXTRANET, AUTEX and NETFAS, TEXTILEINSTITUTE and EuroTeQ, to enable access to the research results to participants across the value chain. The European Fashion Alliance will represent the creative side of the sector including independent labels. Moreover, the Bureau of European Design Associations will promote design, educate companies about the benefits of design for them and its strategic role in redefining the industry's value change and raise the awareness of the impact of design in conceiving and processing more sustainable textile products. Contacts have been established with these stakeholders who have shown interest to contribute to the partnership. Altogether, they cover all segments of the textiles ecosystem and gather adequate knowledge and experience from the industry and research

the dedicated Commission Communication (adopted in Sept. 2021) refers to the co-creation of a transition pathway towards a green, digital and resilient textiles ecosystem, to complement the EU strategy on textiles. The first call of the Worth Partnership Project II was dedicated to the NEB, with 65 innovative business ideas selected to go through an incubation programme. The Worth Partnership project covers lifestyle industries, including fashion and textile, footwear, leather and fur, furniture/home decoration/interior design, jewellery and accessories.

[64] European Apparel and Textile Confederation

[65] Confederation of National Associations of Tanners and Dressers of the European Community

[66] European Footwear Confederation

	community required to address the partnership objectives. The ensemble of the confederations and research networks supporting this Partnership proposal ensures a broad coverage of EU Member States. Leading European fashion and design brands, waste management (sorting and recycling) industry representatives and environmental NGOs (such as ECOS[67]), including social enterprises active in reuse, repair and recycling should also be part of the Partnership. The partnership will have the ambition to remain inclusive and to recruit new members particularly with a view to expand its R&I expertise.
Contributions and commitments expected from partners	The formal contributions and commitments of the partners: in kind and/or financial contributions, and co-funding of the R&I activities will be provided by the private sector stakeholders in line with the general financing rules of Horizon Europe). Those are to be made explicit at the latest by the time the MoU with the Commission is signed. The Textile ETP, an established legal entity, could serve as Secretariat of the Partnership, supporting stakeholders in making effective use of the programme and funding opportunities through dissemination, brokerage, consortia development. The members should contribute to the partnership and its strategic research and innovation agenda with respective additional activities and share best practices as well as crucial information, which could contribute to achieving the partnership goals.
Currently envisaged implementation mode(s).	☒ Co-programmed European Partnership ☐ Co-funded European Partnership ☐ Institutionalised European Partnership ☐ Article 185 ☐ Article 187 ☐ EIT-KIC
Justification of the implementation mode	A Co-programmed European Partnership would be best suited. The ambition is to foster a strong engagement from industry who should be in the driving seat of the partnership. Other actors like RTOs and SMEs should benefit from the partnership in boosting their innovation competences. It will ensure a systematic approach to innovation, by generating commitment to common research and innovation agenda, accelerating deployment, and increasing the impact. The proposed governance is based on the assumption that EURATEX, ETP and other European Confederations representing the interests of the European TCLF industry and leading European fashion brands, sorting and recycling industry representatives and environmental NGOs can be the private partner in the partnership.
Proposed starting year	The partnership should start its activity in 2025.

[67] ECOS is the Environmental Coalition on Standards https://ecostandard.org/

VIRTUAL WORLDS

General Information	
Proposed title of the European Partnership	**European Partnership for Virtual Worlds**
Short description of the candidate partnership	The partnership will shape the next frontier of virtual worlds, including metaverses, reflecting the Digital Decade 2030 vision based on common European values, principles and strategic interests: virtual worlds and metaverses that are open, interoperable, trustful, secure, human-centric, preserving privacy, respecting our legislation, inclusive, and offering opportunities to everyone. The focus will also be on creating business opportunities for companies of all sizes and the value for people.
Services directly involved	DGs CNECT, EMPL, GROW, DEFIS, JRC, REGIO, ENV, RTD, JUST, SANTE, EAC
Context and problem definition	Physical and digital realities are blending, giving birth to numerous virtual worlds and metaverses and opening up a wide range of innovative possibilities across many industrial sectors (e.g., cars, manufacturing or logistics) as well as in societal areas (e.g., health and education), cultural sectors and entertainment (e.g. fashion, design, arts, video games, media, etc). The economic prospect is huge. The global market size forecast is 800 billion EUR by 2030 at 39.1% Compound Annual Growth Rate, directly creating employment for some 440,000 to 860,000 people [ECORYS]. Another study forecasts the impact on sectorial markets by 2030 to be of between $2 trillion and $2.6 trillion on e-commerce, $180 billion to $270 billion on the academic virtual learning market, a $144 billion to $206 billion impact on the advertising market, and a $108 billion to $125 billion impact on the gaming sector [MCKINSEY]. While it clearly offers beneficial new opportunities for EU businesses and individuals, it also poses significant societal and ethical challenges (such as safety, privacy, security and cybersecurity, health issues prevention, inclusiveness, accessibility). We want the next wave of the Internet and Web4.0 to be open and human-centric from the outset, offering opportunities to everyone, not only focusing on business opportunities but also on important societal challenges such as healthcare and fair green and digital transitions. We have in the last decades witnessed a largely uncoordinated and unregulated development of the Web that led to the prevalence of proprietary systems and gatekeepers, what we want to avoid when it comes to virtual worlds and metaverses. Openness, interoperability, standards, protocols and a performant infrastructure will be at the heart of it.

	We need a strong and multi-disciplinary Partnership to develop and promote a thriving industrial and end-user ecosystem in the EU, covering all the aspects of the virtual worlds value chain, while actively engaging with people and society at large and promoting active participation in these virtual worlds. Through this Partnership, the EU can be proactive and take the lead on various fronts, from developing the necessary technological building blocks (not to depend on other parts of the world); and mobilising and engaging with people, businesses, and all relevant stakeholders (to make sure we build useful, inclusive, diverse, trusted virtual worlds systems and applications); to exploring unanswered regulatory questions and setting new norms and standards (to protect people and businesses).
Objectives and expected impacts	The Partnership is essential for the successful implementation of the **Virtual Worlds initiative** laid out in the EC Work Programme 2023. It will directly contribute to the Commission's and Member States joint effort to deliver on targets under the **Digital Decade** by fostering the development of open human-centric and inclusive virtual worlds. It is also in line with the objectives of the Shaping Europe's Digital Future communication and the Declaration of Digital Rights and Principles and the European Pillar of Social Rights and The Partnership and the VR/AR Coalition, set up under the Commission's **Media and Audiovisual Action Plan**, will be key actors of the initiative. By 2030, the Partnership will have helped developing virtual worlds and metaverses that • are open and interoperable, based on widely accepted standards, preventing that only a few companies control them; • adequately feed the supply and demand ecosystem so that the EU can play a leading role in developing the future virtual worlds; • respect European rules (such as the General Data Protection Regulation, EU competition law or the EU labour law acquis) and values, in line with the Declaration on Digital Rights and Principles (human-centric, inclusive, trustworthy, safe and ethical, • offer significant business opportunities and new avenues for individual and collective creativity, arts and culture; and • focus on industrial and commercial applications and societal challenges such as the green and digital transition, the future of labour markets, smart cities, education and healthcare. The Partnership will support: ***1. Research and innovation in Technology building blocks*** • R&D&I in underlying innovative and emerging technologies including eXtended Reality, high-precision and affordable sensors, printable electronics, miniaturisation, optics including holographic and other displays, hyper-connected and low-power devices, privacy-enhancing technologies, 3D technologies, avatars, tools for development and testing and the integration of these technologies into a coherent whole.

- Digitalisation of European cultural content such as artistic creations, monuments and buildings.
- New and breakthrough ways of managing copyright, intellectual property and neighbouring rights using modern technologies such as blockchain and non-fungible tokens.
- Digital twins, their combination and interoperation, including advances in multi-scale and dynamic modelling and simulation, advanced data analytics, AI and machine learning techniques, transmission protocols and compression techniques, novel computational architectures, and enhanced visualisation techniques.
- Developing solutions and testing applications in real-world environments, in industrial and societal settings, covering in particular topics of Cluster 1, 2, 3, 5 and 6 (Health, Culture, creativity and inclusive society, Security, Industry and Space, Climate, Energy and Mobility, Food, Bio-economy Natural Resources, Agriculture and Environment).

2. Policies, human and ethical aspects

- Mobilise relevant and multidisciplinary stakeholders to address new ethical and regulatory questions, including the use of data generated and collected in virtual worlds environments, including virtual workplaces; blockchain-ready regulations; relevant cybersecurity rules; the effect on workers' labour and social protection rights; the legal and ethical aspects of inappropriate, harmful or illegal activities in metaverses; the notion of digital identity of avatars; the protection of children, the inclusion of disabled persons or with low digital skills, the protection of cultural and linguistic diversity.
- Help the community to exchange and collaborate on non-technical aspects such as awareness and social acceptance, opportunities, working force and users' skills (including up-skilling and re-skilling), impact on jobs markets, communication, dissemination and exploitation of research results
- Build a comprehensive and multi-disciplinary roadmap for virtual worlds in the EU by bringing together different technology communities and experts (e.g. XR, AI, Networks, Platforms, Blockchain, Connectivity, HPC, edge-computing, microelectronics, m, etc) and all relevant sectors of applications.
- Link to broader policy areas (such as people empowerment, ethical aspects, copyright and neighbouring rights protection and protection of ID and intellectual property rights (IPR), legal aspects, interoperability guidelines).

3. Applications - ecosystem

- Develop, innovative applications and services in different strategic economic sectors and sectors of public and private interest.
- Examples include solutions for novel collaborative working environments (e.g. collaborative meetings, design and social gathering), for simulations (e.g. for developing industrial prototypes), for nurturing creativity (such as in art, digital fashion, gaming,

	interactive entertainment, music, cultural heritage), for improving healthcare (remote controlled operations), for agriculture (growth monitoring), for education and training (creating immersive learning opportunities, such as field trips, interactive panels and more personalised means of assessment), for the green transition (digital twins for smart grids, smart cities, energy-efficient materials buildings, etc.), for tourism and cultural heritage, as well as supporting the New Bauhaus Initiative in particular when it comes to engaging all relevant stakeholders. ***4. Open Standards*** Contribute to establish the appropriate standards for the development of well-designed and functioning virtual worlds, where users can move between them and take full advantage of the services they offer, and where different types of economic players can interact and collaborate. The goal is to favour the flourishing of fully interoperable, inclusive and engaging virtual worlds and metaverses, based on open standards, accessibility and inclusivity standards, common metadata structures, as well as shared ontologies, protocols and APIs.
Necessity test: rationale for a European Partnership	Virtual worlds and metaverses are a highly multidisciplinary domain, not only because of the variety of technologies needed for their development and deployment, but also because of the wide range of sectors of applications in which they can be used. As virtual worlds can massively impact society and economy in the coming years, the EU has a crucial role to play in shaping and developing them. In addition, a partnership would help addressing all challenges and opportunities of the development of virtual world solutions, ensuring that all individuals can benefit from the digital transition and that no one is left behind. A partnership would guarantee better coordination and richer synergies between domains and disciplines. It would also mobilise the industry, academia and end-users in a coordinated effort towards the development and uptake of open human centric interoperable solutions, fostering a culture of innovation and knowledge-sharing. Overall, the EU is strong in R&D in relation to virtual worlds technologies for middleware and software development. In relation to hardware, a noteworthy number of SMEs are producing tailored hardware and maintaining a higher-than-anticipated share of the market. Moreover, Europe is a continent rich in artistic and cultural content with a thriving creative industry and a wealth of unique digitized heritage. These qualities are fundamental for the creation and exploitation of innovative virtual worlds. Europe is still lagging in access to finance (e.g., venture capital) for companies developing virtual world solutions compared with other regions. In the US, for instance, companies providing extended reality products and services have raised over EUR 25 billion from 2010 to 2020, roughly 14 times higher than the amount raised in Europe. A partnership would increase the competitiveness of the European ecosystem, not only by addressing its current fragmentation, but also by putting the EU in the lead regarding the development of virtual world solutions. It would help align the goals of different stakeholders and ensure that research and innovation efforts are focused on common

	objectives, avoiding duplication of efforts at EU level and promoting the development of relevant solutions. A Partnership would provide access to a broader range of resources, including funding, expertise and technology. This will enable the development of more comprehensive research and innovation programmes for virtual worlds technologies. A Partnership would accelerate the development of virtual worlds by facilitating communication between relevant actors and the transfer of research into practical applications, products and services, shortening the time to market and thus creating economic growth and job opportunities. The fast-paced growth of virtual worlds technologies, combined with their relative novelty, may generate an equally rapid skill gap that could widen if left unaddressed. To capitalise on the growth opportunities, it will be crucial to keep promoting the development of relevant skills, in terms of education, training and professional development, what can only be achieved by mobilising all stakeholders and guarantee. social standards.
Relevant for the following parts of Horizon Europe	Pillar II 'Global Challenges and European Industrial Competitiveness' ☒ Cluster Health ☒ Cluster Culture, creativity and inclusive society ☐ Cluster Civil Security for Society ☒ Cluster Digital, Industry and Space ☒ Cluster Climate, Energy and Mobility ☒ Cluster Food, Bioeconomy Natural Resources, Agriculture and Environment ☒ Cross-cluster Pillar III 'Innovative Europe'
Currently identified links with other partnership candidates / Union programmes	Complementarities can be found with the proposed Resilient Cultural Heritage proposal, where immersive technologies and virtual worlds can also be used to safeguard and protect. The Partnership will build on existing virtual worlds related investments under this MFF (Horizon Europe, Digital Europe Programme, Creative Europe): • Investments in the period 2021-2024: ~700 million Euros • Destination Earth and related Digital Twins: ~300 million Euros • The Human Brain Project Flagship and the digital twin of the body: ~ 50 million Euros • Extended Reality technologies: 150 million Euros • Creative and Content Industries: 60 million Euros (tbc) • Future Internet / next generation Internet technologies: ~100 million Euros • Additional Investments foreseen in the period 2025-2027: 800 million Euros Considering the large amount and the nature of the data that is expected to be generated and exchanged in virtual worlds, European Data Spaces will play an essential role in the development and governance of these virtual worlds in the EU. Data generated in European data spaces will be

	used to develop virtual worlds. Virtual Worlds data must benefit European businesses. In particular synergies exist with the Cultural heritage, Media and Tourism Data Spaces. The EIC could be used to mobilise additional resources to provide equity for virtual worlds -oriented start-ups.
Does the proposed partnership build on currently active ones?	The Partnership will not directly build on active partnerships but will have links with the current AI-Data-Robotics, Photonics and Smart Networks and Services PPPs.
Expected type and composition of partners	The partnership will involve all relevant stakeholders, industry and sectoral entities (from large companies to SMEs, start-ups, institutions and non-for-profit organisations), academia (universities, innovation and research organisations) and end-users (unions, customers associations, etc.) as well as policy makers (national, regional and local levels) and regulators. The governance of such a large partnership must be as light, efficient and reactive as possible. A high degree of flexibility in the participation to the actions will exist, to integrate at best each participant. The Partnership will naturally build on the AR/VR Coalition, a platform for structured dialogue between the European VR/AR ecosystem and policymakers launched in September 2022. It will also benefit from the XR4EUROPE association of more than 1250 XR actors in Europe from the New European Media initiative NEM, with more than 1200 media and industry actors. It will be open to any relevant stakeholders and aims at creating a vibrant European multi-disciplinary ecosystem, by mobilising current existing associations and initiatives (such as running coordination and support actions) to reach out to communities. Links with Member States will be guaranteed through cooperation with future European Digital Infrastructure Consortiums (EDICs) on virtual worlds such as for example those resulting from the CitiVerse call planned in the Digital Europe Work Programme for 2023. The geographical coverage should be representative and achieve a good geographical balance of the EU Member States and Horizon Europe associated countries. Links to non-European related initiatives and stakeholders will also happen through targeted actions, especially on legal, societal and ethical issues where international debates are of particularly interest.
Contributions and commitments expected from partners	To be possibly complemented by contributions from other Clusters, especially for non technological aspects. Expected contributions industry co-funding the R&I activities.
Currently envisaged implementation	☒ Co-programmed European Partnership ☐ Co-funded European Partnership

mode(s).	☐ Institutionalised European Partnership ☐ Article 185 ☐ Article 187 ☐ EIT-KIC
Justification of the implementation mode	To foster a strong engagement from industry, research and technology organisations (RTOs) and SMEs, a co-programmed European Partnership is proposed. Through commitments to common research and innovation agenda, this should accelerate the deployment of European solutions and devices and increase the impact of the action. It will tackle the current fragmentation of the ecosystem and cover all possible application areas, optimising cross-fertilisation and synergies.
Proposed starting year	2025

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In the context of the Horizon Europe Strategic Plan 2025-2027 preparations, the identification process for additional co-funded and co-programmed European Partnerships has been launched.

European Commission services prepared 10 concept papers for possible candidate European Partnerships to be launched during the second half of Horizon Europe. The proposed candidates have been prepared by Commission services in line with the new impact-driven policy approach set out in Horizon Europe. This includes partnerships' contributions to delivering on key political priorities regarding the twin green and digital transitions, and to the Union's reinforced open strategic autonomy.

The enclosed portfolio and individual concept notes may be subject to further changes. The final portfolio of additional European Partnerships will be formalised with the adoption of the Strategic Plan 2025-2027.

Research and Innovation policy