

DE LA RECHERCHE À L'INDUSTRIE

Horizon Europe

G.Decroix

FuSuMaTech 2021: annual meeting -21/04/2021

HORIZON EUROPE: PROGRAMME STRUCTURE

HORIZON EUROPE

EURATOM

Fusion

Fission

Joint

Research

Center

SPECIFIC PROGRAMME: EUROPEAN DEFENCE FUND

Exclusive focus on defence research & development

Research actions

Development actions

SPECIFIC PROGRAMME IMPLEMENTING HORIZON EUROPE & EIT* Exclusive focus on civil applications Pillar I Pillar II Pillar III **EXCELLENT SCIENCE GLOBAL CHALLENGES &** INNOVATIVE EUROPE **EUROPEAN INDUSTRIAL** COMPETITIVENESS European Research Council Health **European Innovation** · Culture, Creativity & Council Inclusive Society Marie Skłodowska-Curie · Civil Security for Society European Innovation · Digital, Industry & Space **Ecosystems** Research Infrastructures · Climate, Energy & Mobility · Food, Bioeconomy, Natural European Institute of Resources, Agriculture & Innovation & Technology* Environment Joint Research Centre WIDENING PARTICIPATION AND STRENGTHENING THE EUROPEAN RESEARCH AREA Widening participation & spreading excellence Reforming & Enhancing the European R&I system

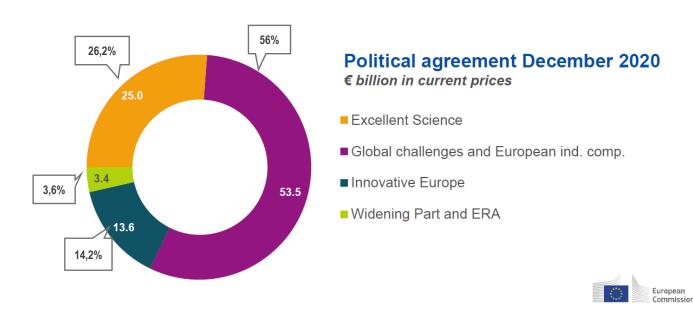


^{*} The European Institute of Innovation & Technology (EIT) is not part of the Specific Programme



€95.5 billion (2021-2027)

Including €5.4 billion from Next Generation Europe (NGEU), programme of EU recovery from COVID-19 crisis





Lessons Learned

from Horizon 2020 Interim Evaluation



Support breakthrough innovation



European Innovation Council

Key Novelties

in Horizon Europe



Create more impact through missionorientation and citizens' involvement



EU Missions



Rationalise partnerships' landscape



New approach to partnerships



Reinforce openness



Open science policy



Strengthen international cooperation



Extended association possibilities



Encourage participation



Spreading Excellence







European Innovation Council

Support to innovations with breakthrough and disruptive nature and scale up potential that are too risky for private investors (70% of the budget earmarked for SMEs)

European Innovation Council – a one-stop-shop

- Helping researchers and innovators create markets of the future, leverage private finance, scale up their companies
- Innovation centric, risk taking & agile, pro-active management and follow up
- Mostly 'bottom up', but also targeting strategic challenges
- EIC Programme Managers to develop visions for breakthroughs and steer portfolios

Complementary instruments bridging the gap from idea to market

PATHFINDER

R&I grants (from early technology to proof of concept)

TRANSITION

R&I grants (proof of concept to pre-commercial)

ACCELERATOR

Grants & investment (via EIC Fund) for single SMEs & start-ups (from pre-commercial to market & scale-up)







R&I Missions

Relating EU's research and innovation better to society and citizens' needs; with strong visibility and impact

A mission is a portfolio of actions across disciplines intended to achieve a **bold and inspirational and measurable goal** within a set timeframe, with **impact** for society and policy making as well as relevance for a significant part of the European population and wide range of European citizens.

Horizon Europe defines mission characteristics and elements of governance, and **5 missions areas**. Specific missions will be programmed within the Global Challenges and European Industrial Competitiveness pillar, but may also benefit from actions carried out within other parts of the Programme as well as complementary actions carried out under other Union programmes.

Five Missions Areas



Adaptation to climate change, including societal transformation



Cancer



Healthy oceans, seas, coastal & inland waters



Climate-neutral & smart cities



Soil health & food



HORIZON EUROPE: MISSIONS BOARD PROPOSALS, SEPT 2020



Conquering Cancer: Mission Possible

Targets by 2030: more than 3 million more lives saved, living longer and better, achieve a thorough understanding of cancer, prevent what is preventable, optimize diagnosis and treatment, support the quality of life of all people exposed to cancer, and ensure equitable access to the above across Europe.



A Climate Resilient Europe - Prepare Europe for climate disruptions and accelerate the transformation to a climate resilient and just Europe by 2030

Targets by 2030: prepare Europe to deal with climate disruptions, accelerate the transition to a healthy and prosperous future within safe planetary boundaries and scale up solutions for resilience that will trigger transformations in society.



Mission Starfish 2030: Restore our Ocean and Waters

Targets by 2030: cleaning marine and fresh waters, restoring degraded ecosystems and habitats, decarbonising the blue economy in order to sustainably harness the essential goods and services they provide.



100 Climate-Neutral Cities by 2030 -by and for the citizens

Targets by 2030: support, promote and showcase 100 European cities in their systemic transformation towards climate neutrality by 2030 and turn these cities into innovation hubs for all cities, benefiting quality of life and sustainability in Europe.



Caring for Soil is Caring for Life

Targets by 2030: at least 75% of all soils in the EU are healthy for food, people, nature and climate. The proposed mission combines research and innovation, education and training, investments and the demonstration of good practices using "Living labs" (experiments and innovation in a laboratory on the ground) and "Lighthouses" (places to showcase good practices).





New approach to European Partnerships

New generation of objective-driven and more ambitious partnerships in support of agreed EU policy objectives

Key Features

- Strategic orientation
- Systemic approach
- Simple architecture and toolbox
- Common set of criteria for the life-cycle

CO-PROGRAMMED

Based on Memoranda of Understanding/contractual arrangements; implemented independently by the partners and by Horizon Europe

CO-FUNDED

Based on a joint programme agreed and implemented by partners; commitment of partners for financial and inkind contributions

INSTITUTIONALISED

Based on long-term dimension and need for high integration; partnerships based on Art 185/187 of TFEU and the EIT legal acts for 2021-2027





HORIZON EUROPE : OVERVIEW OF 49 CANDIDATES OF EUROPEAN PARTNERSHIPS

HORIZON EUROPE PILLAR II - Global challenges & European industrial competitiveness

HORIZON EUROPE I	ILLAR II - Global Cliai	ilenges & European ind	ustrial competitiveriess		
CLUSTER 1: Health	CLUSTER 4: Digital, Industry & Space	CLUSTER 5: Climate, Energy & Mobility	CLUSTER 6: Food, Bioeconomy, Agriculture,		
Innovative Health Initiative	Key Digital Technologies	Clean Hydrogen	Circular Bio-based Europe		
Global Health Partnership	Smart Networks & Services	Clean Aviation	Rescuing Biodiversity to Safeguard Life on Earth		
Transformation of health systems	High Performance Computing	Single European Sky ATM Research 3	Climate Neutral, Sustainable & Productive		
Chemicals risk assessment	European Metrology	Europe's Rail	Blue Economy		
ERA for Health	(Art. 185)	Connected and Automated Mobility (CCAM)	Water4All		
	AI-Data-Robotics		Animal Health & Welfare*		
Rare diseases*	Photonics	Batteries Zero-emission waterborne transport	Accelerating Farming Systems Transitions*		
One-Health Anti Microbial Resistance*	Made in Europe				
		Zero-emission road transport	Agriculture of Data*		
Personalised Medicine*	Clean steel – low-carbon steelmaking		Safe & Sustainable Food		
Pandemic Preparedness* Co-funded or co-programmed	Processes4Planet	Built4People	System*		
	Global competitive space systems**	Clean Energy Transition			
had be discovered Deducation (A	4055	Driving Urban Transitions			
Institutionalised Partnerships (Art 185/7)					
Institutionalised Partnerships / EIT KICs					
Co-Programmed		* Calls with opening dates in 2023-24			
Co-Funded		** Calls with opening dates not before 2022			

PILLAR III - Innovative Europe

EIT (KNOWLEDGE & INNOVATION COMMUNITIES)

InnoEnergy

Climate

Digital

Food

Health

Raw Materials

Manufacturing

Urban Mobility

Cultural and Creative Industries

CROSS-PILLARS II & III

European Open Science Cloud



European partnerships webpage on europa.eu:

- Draft partnership proposals
- Report on coherence and synergies
- Infographics

Horizon Europe Strategic Plan: identification of co-programmed and co-funded European partnerships **Commission proposal for 185/7 initiatives**





Open Science across the programme

Open Science

Mainstreaming of open science practices for improved quality and efficiency of R&I, and active engagement of society

Mandatory immediate Open Access to publications: beneficiaries must retain sufficient IPRs to comply with open access requirements;

Data sharing as 'open as possible, as closed as necessary': mandatory Data Management Plan for FAIR (Findable, Accessible, Interoperable, Reusable) research data

- Work Programmes may incentivize or oblige to adhere to open science practices such as involvement of citizens, or to use the European Open Science Cloud
- Assessment of open science practices through the award criteria for proposal evaluation
- Dedicated support to open science policy actions
- Open Research Europe publishing platform







HORIZON EUROPE IN DETAILS



reinforcing and extending the excellence of the Union's science base

European Research Council

Frontier research by the best researchers and their teams

€16 billion

Competitive funding to support investifatordriven **frontier research** across all fields, on the basis of **scientific excellence**

- Starting Grant : 1 PI, 1,5M€, 5 years
- Consolidator Grant: 1 PI, 2M€, 5 years
- Advanced Grant: 1 PI? 2,5M€, 5 years
- Synergy Grant: 2-4 PI, 10M€, 6 years

Marie Skłodowska-Curie Actions

Equipping researchers with new knowledge and skills through mobility and training

€6.6 billion

- MSCA Doctoral Networks Industrial Doctorates help PhD candidates step outside academia and develop skills in industry and business
- MSCA Staff Exchanges
 Short-term exchanges of personnel between academic, industrial and commercial organisations throughout the world.

Research Infrastructures

Integrated and interconnected world-class research infrastructures

€2.4 billion

 HORIZON-INFRA-2022-TECH-01-01: R&D for the next generation of scientific instrumentation, tools and methods

Total budget : 120M€, Budget/project : 5-10M€



Structuration

Health

- Health throughout the life course
- Environmental and social health determinants
- Noncommunicable and rare diseases
- Infectious diseases
- Tools, technologies and digital solutions for health
- Health care systems

Culture, creativity and inclusive society

- Democracy and governance:
- Culture, cultural heritage and creativity;
- Social and economic transformations

Civil Security for Society

- Disasterresilient societies; Protection and security;
- Cybersecurity

Digital and Industry

- Manufacturing technologies
- •Key digital technologies -Advanced
- Artificial intelligence and robotics
- internet
- Advanced computing and Big Data
- Circular industries
- Low-carbon and clean industries
- Space

Climate, energy and Mobility

- •Climate science & solutions
- •Energy supply
- •Energy systems & grids
- Buildings and industrial facilities in energy transition
- Communities and cities
- Industrial competitiveness in transport
- Clean transport and mobility
- •Smart mobility
- •Energy storage

Food and Natural Resources

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



boosting **key technologies** and solutions underpinning **EU policies & Sustainable Development Goals** (6 clusters and JRC –non-nuclear direct actions)

in current prices

Cluster 1	Health	€8.246 billion (including €1.35 billion from NGEU)
Cluster 2	Culture, Creativity & Inclusive Societies	€2.280 billion
Cluster 3	Civil Security for Society	€1.596 billion
Cluster 4	Digital, Industry & Space	€15.349 billion (including €1.35 billion from NGEU)
Cluster 5	Climate, Energy & Mobility	€15.123 billion (including €1.35 billion from NGEU)
Cluster 6	Food, Bioeconomy, Natural Resources, Agriculture & Environment	€8.952 billion
	JRC (non-nuclear direct actions)	€1.970 billion

Clusters are including a budget for Partnerships and Missions NGEU is Next Generation EU programme – Recovery Fund





Horizon Europe legislation defines three types of impact tracked through **Key Impact Pathways**

- 1. Creating high-quality new knowledge
- 2. Strengthening human capital in R&I
- 3. Fostering diffusion of knowledge and Open Science

Scientific Impact



- 4. Addressing EU policy priorities & global challenges through R&I
- 5. Delivering benefits & impact via R&I missions
- 6. Strengthening the uptake of R&I in society

Societal Impact



- 7. Generating innovation-based growth
- 8. Creating more and better jobs
- 9. Leveraging investments in R&I

Economic Impact







How the work programms are built? Impact logic

Strategic Plan	egic Plan	EC Policy Priority	Based on the Political Guidelines for the European Commission 2019-2024 with a focus on three key priorities: Green Deal, Europe fit for the Digital Age, and Economy that Works for People → Cross Cluster
	Strat	Key Strategic Orientation	Set of strategic objectives within the EC policy priorities where R&I investments are expected to make a difference Cross Cluster
Work Programme	Expected Impacts	Wider effects on society (including the environment), the economy and science, enabled by the outcomes of R&I outcomes (long-term) → Par Cluster	
		Destination	Packages of actions around which each Work Programme part within Pillar II will be designed. Destinations are a series of coherent packages aimed at contributing to the expected impacts set out in the Strategic Plan. The Destinations will provide the policy narrative for the calls and actions included in the WP. In the WP, the text of the Destination should reflect the expected impact as set out in the Strategic Plan. Par Cluster
		Calls for proposals	Each Destination will be implemented by means of calls for proposals. Under Horizon Europe, we need to align our definition of a 'call' with the Financial Regulation and with the common approach across all MFF programmes.



Strategic plan: Key Strategic Orientations (2021-2024)

- KSO 1: Preserving and restoring **ecosystems and biodiversity** and managing sustainably **natural resources** on land and sea, and achieving climate neutrality and adaptation.
- KSO 2: Ensuring food and nutrition security through sustainable food systems from farm to fork.
- KSO 3: Transforming the EU industry for a clean, more bio-based, climate-neutral, circular and competitive economy.
- KSO 4: Delivering clean, sustainable, competitive, secure, safe and smart **energy and mobility** for climate neutrality.
- KSO 5: Securing EU global industrial leadership and strategic autonomy in key technologies.
- KSO 6: Enhancing the health, and well-being of all citizens and tackling inequalities.
- KSO 7: Strengthening **EU democracies** and **empowering all citizens** to act in the transitions.
- KSO 8: Shaping technologies and innovations that work for people.
- KSO 9: Stepping up **EU resilience**, inclusiveness and preparedness to respond to **disasters**, **security challenges**, **emerging threats and improved border management**.
- KSO 10: Leading the way and joining forces internationally for the transition to sustainability.



Strategic plan: KSO and expected impacts Example Cluster 5

Strategic Plan – KSOs and cluster 5 expected impacts

KSO 1: Preserving and restoring ecosystems and biodiversity and managing sustainably natural resources on land and sea, and achieving climate neutrality and adaptation.

KSO 3: Transforming the **EU industry** for a clean, more bio-based, climate-neutral, circular and competitive economy. 1, 4, 5

KSO 4: Delivering clean, sustainable, competitive, secure, safe and smart energy and mobility for climate neutrality. 1, 2, 3, 4, 5, 6

KSO 5: Securing EU global industrial leadership and strategic autonomy in key technologies. 2

KSO 8: Shaping technologies and innovations that work for people.

KSO 10: Leading the way and joining forces internationally for the transition to sustainability.

- Transition to a climate-neutral society enabled through advanced climate science and responses for climate mitigation and adaptation.
- Clean and sustainable transition of the energy and transport sectors towards climate neutrality facilitated by innovative cross-sectoral solutions.
- More efficient, clean, secure and competitive energy supply thanks to new solutions for smart grids and energy systems based on more performant renewable energy solutions.
- Efficient and sustainable use of energy, accessible and safe for all is ensured thanks to a clean energy system and a just transition.
- Towards climate-neutral and clean solutions across all transport modes through new technologies solutions while increasing global competitiveness of the EU transport sector.
- Safe, seamless, smart, inclusive and sustainable mobility services developed/ensured thanks to digital technologies and advanced satellite navigation services.

DESTINATIONS → CALLS FOR PROPOSALS



CLUSTER 5 – CLIMATE, ENERGY, MOBILITY

- Budget: Budget: 13,429 Md€ (H2020: 14 Md€)
- 6 destinations
 - Destination 1 Climate sciences and responses
 - Destination 2 Cross-sectoral solutions for the climate transition
 - Destination 3 Sustainable, secure and competitive energy supply
 - Destination 4 Efficient, sustainable and inclusive energy use
 - Destination 5 Clean and competitive solutions for all transport modes
 - Destination 6 Safe Resilient Transport and Smart Mobility services for passengers and goods

- ✓ Storage SMES
- ✓ Power conditioning
- ✓ Transport
- ✓ Generators
- ✓ Motors

HORIZON-CL5-2021-D3-02-02: Next generation of renewable energy technologies

<u>Scope</u>: The proposal is expected to address high-risk/high return technology developments for game changing renewable energy technologies including catalyst development, dedicated storage systems and integration of renewable energy technologies into a single energy generation system, heating & cooling systems, fuels production systems, hybrid electricity generation solutions between different renewable energy sources, direct utilization of renewable energy sources.

HORIZON-CL5-2022-D3-01-11: Demonstration of innovative forms of storage and their successful operation and integration into innovative energy systems and grid architectures

<u>Scope</u>: Demonstration of successful operation and integration of either standalone or combined innovative storage solutions (e.g. chemical, electrical, thermal, mechanical including e.g. compressed air/liquid, supercapacitors, innovative hydropower storage solutions) into innovative energy systems and grid architectures.



CLUSTER 1 - HEALTH

- ✓ MRI portable
- ✓ NMR Compact
- ✓ Proton Therapy _Compact
- ✓ MEG Compact

- Budget: 6,893 Md€ (H2020: 7,472 Md€)
- 6 destinations
 - Destination 1 Staying healthy in a rapidly changing society
 - Destination 2 Living and working in a health-promoting environment
 - Destination 3 Tackling diseases and reducing disease burden
 - Destination 4 Ensuring access to innovative, sustainable and high-quality health care
 - Destination 5 Unlocking the full potential of new tools, technologies and digital solutions for a healthy society
 - Destination 6 Maintaining an innovative, sustainable and globally competitive health-related industry

no calls directly related to technologies



CLUSTER 4 – INDUSTRY, DIGITAL, SPACE

- Materials separation and processing
- ✓ Rocket launching
- ✓ Storage
- ✓ Radiation protection Magnetic shielding using SC magnets.
- ✓ Magnetic shielding
- Budget: 13,429 Md€ (H2020: 13,557 Md€)
- 6 destinations
 - Destination 1: Climate neutral, circular and digitised production
 - Destination 2: A digitised, resource-efficient and resilient industry
 - Destination 3: World leading data and computing technologies
 - Destination 4: Digital and emerging technologies for competitiveness and fit for the green deal
 - Destination 5: Strategic autonomy in developing, deploying and using global space-based infrastructures
 - Destination 6: A human-centred and ethical development of digital and industrial technologies

no calls directly related to technologies



stimulating market-creating breakthroughs and ecosystems conducive to innovation

European Innovation Council

Support to innovations with breakthrough and market creating potential

European innovation ecosystems

Connecting with regional and national innovation actors

The budget: €10.6 billion, incl. up to €527 million for ecosystems (including NGEU – Recovery Fund parts dedicated to EIC).

European Institute of Innovation and Technology (EIT)

Bringing key actors (research, education and business) together around a common goal for nurturing innovation

circa €3 billion



Cou

What's holding back European innovation?

Innovation performance

- Strong research performance not translated into innovation
- Lack of breakthrough/ disruptive innovations that create new markets

Innovation funding

Financing gaps (2 "valleys of death") in

- Transition from lab to enterprise
- · Scaling up for high-risk innovative start-ups

Innovation ecosystem

- Many national & local ecosystems, but fragmented at European level
- Need to include all regions and all talent (especially female)



European Innovation Council main instruments

Pathfinder

- **Early stage research** on breakthrough technologies
- Grants up to €3/4 million
- Successor of FET (Open & Proactive)

Transition

- **Technology maturation** from proof of concept to validation
- Business & market readiness
- Grants up to €2.5 million

Accelerator

- Development & scale up of deep-tech/ disruptive innovations by startups/ SMEs
- Blended finance (grants up to €2.5 million; equity investment up to €15 million)
- Successor of SME instrument

- Mission to identify, develop and deploy high risk innovations of all kinds
- Focus on breakthrough, market-creating, deeptech
- **1. Steered by EIC Board** of leading innovators (entrepreneurs, investors, researchers, ecosystem)
- Business Acceleration Services (coaches/ mentors, corporates, investors, ecosystem)
- **3. Pro-active management** (roadmaps, reviews, re-orientations, etc) with EIC Programme Managers
- **4. Follow up funding for results from Horizon** (ERC, EIT, collaborative) & national programmes



What is the EIC Pathfinder?

The EIC Pathfinder programme funds **research** to **develop the scientific basis** to underpin **breakthrough technologies**.

EIC Pathfinder funding schemes

EIC Pathfinder Open



bottom-up approach with no predefined topics

EIC Pathfinder Challenges



top-down challenge-driven calls for tackling specific technology breakthroughs by portfolios of projects



PILLAR III: EUROPEAN INNOVATION COUNCIL

EIC Pathfinder Open

Who is for?

- Do you have a vision for a future technology that could make a real difference to our lives?
- Do you see a plausible way of achieving the scientific breakthrough that will make this technology possible?
- Can you imagine collaborating with an interdisciplinary team of researchers and innovators to realise the proof of principle and validate the scientific basis of the future technology?

Why should you apply?

- for support to realise an ambitious vision for radically new technology, with potential to create new markets and/or to address global challenges.
- for early stage development of such future technologies (e.g. various activities at low Technology Readiness Levels 1-4),
- to provide the foundations of the technology you are envisioning.

Call opening: 8 April June 2021

Deadline: 19 May 2021 at 17.00.00 CET



PILLAR III: EUROPEAN INNOVATION COUNCIL

EIC Pathfinder Challenges

EIC Pathfinder Challenges aim to **build on new, cutting-edge directions in science and technology** to disrupt a field and a market or create new opportunities **by realising innovative technological solutions** grounded in high-risk/high-gain research and development.

Top-down, based on given vision for each Challenge Indicative: TRL 2-4.

Pathfinder Challenges for 2021

Pathfinder Challenges		
1. Awareness inside		
2. Tools to measure & stimulate activity in brain tissue		
3. Emerging Technologies in Cell & Gene Therapy		
4. Novel routes to green hydrogen production		
5. Engineered living materials		

Call opening:
15 June 2021
Deadline:
27 October 2021 at
17.00.00 CET



PILLAR III: EUROPEAN INNOVATION COUNCIL

EIC Pathfinder Challenge

Do you have what we are looking for?

- You have an ambitious idea to realise or significantly contribute to the vision of a specific Pathfinder Challenge.
- EIC is particularly interested in new deep-tech: technology that becomes possible thanks to cutting-edge science in an area of the specific Challenge.
- We are seeking new technological solutions at early stage of development that can disrupt the standard practice and create new opportunities.
- In order to secure this high innovation potential, project outcomes must include top-level scientific publications as well as an adequate formal protection of the generated (and often unexpected) intellectual property (IP).
- Be prepared to become part of a Challenge portfolio, overseen and pro-actively managed by EIC Programme Managers.

Challenge portfolio approach:

- a coherent set of projects exploring different perspectives, competing approaches or complementary aspects of the Challenge;
- multidisciplinary interactions and exchanges for synergies and serendipity;
- contributing to an overarching medium to long-term business goal and technology-based strategic plan, under the supervision of an EIC Programme Manager.

Projects will participate in relevant portfolio activities.



Calls 2021 – Summary table for all funding opportunities

	Pathfinder Open	Pathfinder Challenges	Ad hoc grant
Total budget	€168 million	€132 million	Max. 1% of Pathfinder call budget
Proposals (indicative)	Up to €3 Mio	Up to €4 million	Up to €50000
Funding rate	100% of eligible costs	100% of eliaible costs	100% of eliaible costs
Opening	9 April 2021	15 June 2021	-
Deadline	19 May 2021 at 17:00 CET	27 October 2021 at 17.00 CET	Not applicable
Length of proposal	17-page proposal – Section 1 to 3	25-page proposal	Not applicable
Applicants	Consortia: Min. 3 partners from 3 different MS/AC (of which at least 1 partner in a MS) Legal entities: all types are eligible	1. Single legal entities in a MS/AC (conditions apply) 2. Consortia: - If 2 partners: from different MS/AC, otherwise - Min. 3 partners from 3 different MS/AC (of which at least 1 partner in a MS) (unless differently stated in the Challenge chapter)	No specific requirement: either an individual grant holder or a group of grant holders.



If the 2021-2022 work programmes are finalised now, take the opportunity to prepare a common strategic vision to explore and influence the development of the 2023-2024 work programme.

Gaëlle Decroix

THANK YOU FOR YOUR ATTENTION