

EUROPEAN CROSS-BORDER DOCTORIALS

DIVE INTO THE EXPERIENCE
OF A EUROPEAN PROJECT

creativity, innovation, training, networking ...

LIVE EVENT

CALL FOR PROJECTS
NextGen Horizon
Pathfinder

From 13th to 15th
October, 2026

• Aigues-Mortes (Gard)



CONTEXT

Europe is facing unprecedented challenges: climate disruption, an ageing population, scarcity of critical resources, geopolitical tensions over access to strategic technologies, and weakened democracies facing digital misinformation.

To remain a global leader in responsible innovation, the Cross-Border Doctorials has launched a new phase of its program: NextGen Horizon – Pathfinder. This strategic pillar funds collaborative and transdisciplinary research projects designed to profoundly transform our economic, social, and environmental systems. Support the development of new scientific concepts and emerging technologies, at an early stage, that could tomorrow transform entire sectors or solve global crises.

In this context, the Cross-Border Doctorials focuses on supporting innovative technologies capable of creating new value chains, high-quality jobs, and European technological and strategic sovereignty, by investing in the new generation of researchers.

SCENARIO

You are a consortium of young researchers.

Your mission: respond to the NextGen Horizon – Pathfinder call by designing an innovative solution to a major societal challenge, with the dual goal of creating knowledge and value.

Your proposal must demonstrate scientific and technological innovation, true interdisciplinarity (sciences, humanities, social sciences, law, economics), tangible impact for European citizens and industrial competitiveness, and a clear valorisation strategy (IP, technology transfer, spin-off creation, or licensing).

EXPECTED RESULTS

- > **Generation of new high-potential knowledge and technologies**
- > **Creation of synergies between disciplines**
- > **Identification and protection of Intellectual Property (patents, know-how, trademarks)**

CONSORTIUM FORMATION

Doctoral students are invited to select three challenges to which they believe they can contribute, based on their research expertise, within a consortium of five to eight participants.

Groups will be formed according to these preferences in order to ensure interdisciplinarity and complementary expertise within the consortia.

Challenge 1

Integrated Health Systems for a Changing World: From Environmental Risks to Personalised Prevention

Description: Human health is increasingly shaped by complex interactions between environmental change, pollution, emerging diseases, chronic conditions and socio-economic inequalities. Climate disruption, ecosystem degradation and unequal exposure to risk create new vulnerabilities while placing growing pressure on healthcare and public-health systems. This challenge seeks to develop innovative approaches that integrate environmental sciences, biomedical research, digital technologies, public health, law and social sciences to improve prevention, early diagnosis and health equity. Research directions may include environmental exposure assessment, AI-assisted disease surveillance, predictive epidemiology, biomarker discovery, molecular diagnostics, personalised prevention, health-data integration and resilient models of care.

Projects should examine the links between environmental drivers and health outcomes while addressing ethical, legal and societal questions such as data sharing, affordability, access to care, regulatory oversight and community participation. Interdisciplinary teams are encouraged to connect laboratory evidence, modelling, territorial data and policy analysis in a common demonstrator.

By bridging health sciences, environmental research, data science and governance, this challenge aims to generate transferable knowledge, decision-support tools and preventive or diagnostic solutions. Valorisation pathways may include clinical or public-health tools, software, biomarkers, protocols, regulatory methods, licensing and partnerships with health authorities, hospitals, biotech firms and environmental agencies.

Challenge 2

Living with Change: Resilient Water, Coastal and Climate Systems for Sustainable Territories

Description: Climate change is profoundly transforming water cycles, coastal environments, ecosystems, infrastructures and human settlements. Droughts, floods, coastal erosion, sea-level rise and extreme weather events challenge existing models of environmental management and territorial planning.

This challenge invites interdisciplinary teams to design innovative solutions integrating hydrology, climate science, coastal dynamics, ecology, engineering, economics, governance and social sciences. Research directions may include predictive climate-risk modelling, resilient water management, nature-based solutions, adaptive coastal protection, ecosystem restoration, environmental monitoring and decision-support systems.

Projects should combine physical understanding with territorial needs. They may investigate how laws, economic incentives, local knowledge and community participation can support adaptation, fair resource allocation and long-term resilience. Solutions should explicitly consider uncertainty, multi-scale effects and the needs of vulnerable populations.

Expected outcomes include adaptation strategies, monitoring or modelling tools, demonstrators and governance frameworks that can be transferred to local authorities, utilities, coastal managers, engineering companies and communities. Valorisation may take the form of software, services, protocols, policy tools or nature-based intervention models.

Challenge 3

Observing, Modelling and Anticipating Territories through Digital Twins and Multi-Source Data

Description: Advances in Earth observation, remote sensing, autonomous platforms, connected sensors and artificial intelligence are transforming the capacity to understand territories. The central challenge is to convert heterogeneous data streams into reliable, actionable and socially legitimate knowledge.

This challenge focuses on next-generation digital twins and predictive platforms combining satellite, aerial, in-situ, mobility and citizen-generated data. Research directions include geospatial AI, multi-source data fusion, autonomous sensing, environmental intelligence, signal processing, risk detection, navigation, interoperable platforms and real-time territorial simulation.

Applications may address climate adaptation, disaster management, environmental protection, public health, mobility, emergency services and spatial planning. Projects should consider uncertainty, robustness, interoperability, cybersecurity, data governance, ethical use and equitable access to information.

By combining observation technologies, modelling, AI and participatory decision-making, the challenge aims to create operational demonstrators for public authorities, SMEs, infrastructure operators and international organisations. Possible outputs include platforms, algorithms, sensor architectures, digital twins, standards, protected software and decision-support services.

Challenge 4

Trustworthy Artificial Intelligence for Inclusive, Democratic and Sustainable Societies

Description: Artificial intelligence increasingly shapes work, entrepreneurship, access to information, public services and democratic participation. Its benefits depend on systems that are transparent, robust, inclusive and aligned with fundamental rights and cultural diversity.

This challenge seeks to design, evaluate and govern trustworthy AI systems that strengthen human and collective capabilities. Research directions include generative AI, explainable and accountable AI, algorithmic decision-making, human-AI collaboration, multilingual technologies, AI-enabled public services, digital participation and responsible innovation.

Projects should integrate technological, legal, ethical, organisational and sociocultural perspectives. Particular attention should be given to bias, oversight, data protection, labour transformation, inclusion, representation, cultural diversity and the co-design of systems with affected communities.

Expected outputs may include prototypes, audits, governance frameworks, training methods, decision-support tools and digital platforms. Valorisation pathways include protected software, consulting methods, standards, public-sector adoption, licensing and responsible start-up creation.

Challenge 5

Engineering the Future of Human Health: Neurotechnologies, Biomaterials and Precision Therapies

Description: Advances in neuroscience, biotechnology, biomaterials, imaging and intelligent medical devices create new opportunities for earlier diagnosis, targeted treatment, functional rehabilitation and regenerative medicine.

This challenge integrates life sciences, medicine, engineering, modelling and data science to design next-generation health technologies. Research directions may include neurostimulation and neural recording, bioresorbable devices, medical imaging, haptic learning, implantable systems, advanced cell therapies, regenerative models, precision biomarkers and patient-specific simulation.

Projects should address translation from proof of concept to clinical use, including safety, manufacturability, characterisation, standards, regulation, ethics, accessibility and patient or professional acceptance. Teams are encouraged to connect biological mechanisms, device performance, computational models and care pathways.

Potential outcomes include validated prototypes, biomaterials, diagnostic signatures, cell-production methods, simulation tools and clinical protocols. Valorisation routes include patents, licensing, medtech or biotech partnerships, spin-offs and translational collaborations with hospitals and research centres.

Challenge 6

Advanced Materials, Clean Energy and Circular Industrial Systems for Strategic Autonomy

Description: The transition towards climate neutrality requires transformative innovations in materials, energy systems, manufacturing processes and resource efficiency. At the same time, geopolitical tensions and demand for critical raw materials highlight the need for technological sovereignty and resilient industrial value chains.

This challenge focuses on the next generation of materials, devices and industrial systems enabling a circular, low-carbon and competitive economy. Research directions include functional materials, sustainable coatings, smart composites, energy conversion, battery second-life applications, resource-efficient manufacturing, digitalised production and circular value chains for critical resources.

Projects should combine materials science, mechanical and electrical engineering, AI, automation, environmental assessment, economics and industrial policy. Particular attention should be given to life-cycle performance, reparability, industrial scalability, resource security, standards and market deployment.

By connecting fundamental research with industrial innovation and circular-economy principles, this challenge seeks to strengthen European strategic autonomy. Potential outcomes include materials, coating processes, power systems, models, manufacturing methods, patents, know-how, licences and industrial demonstrators.

Challenge 7

Inclusive Governance, Digital Commons and Community Innovation for Resilient Territories

Description: Ecological, digital and societal transitions require governance models capable of strengthening participation, empowering communities and ensuring fair access to resources, knowledge and public services. Territorial resilience depends not only on technologies, but also on trust, rights, institutions and the capacity for collective action.

This challenge explores how local knowledge, digital commons, participatory governance and social innovation can contribute to inclusive and sustainable territories. Research directions may include community-based resource management, citizen platforms, collaborative decision support, environmental justice, indigenous and local knowledge systems, data governance and innovative legal frameworks.

Projects should investigate how geospatial tools, AI, open data and collaborative infrastructures can enhance transparency and collective action while respecting cultural diversity, fundamental rights and community autonomy. Particular attention should be paid to vulnerable populations, territorial inequalities and conflicts between resource uses.

By bridging social sciences, law, environmental sciences, humanities and digital innovation, the challenge aims to produce replicable governance methods, participatory platforms, commons frameworks, policy tools and community demonstrators. Valorisation may involve public-sector services, open or protected digital tools, social innovation, training and partnerships with local authorities and civil-society organisations.

Challenge 8

Complex Systems Modelling and Decision Intelligence for Climate, Health and Sustainable Technologies

Description: Climate dynamics, health systems, industrial processes, ecosystems, transport networks and socio-technical infrastructures involve strongly interconnected phenomena operating across multiple spatial and temporal scales. Their management requires methods able to represent complexity, uncertainty and competing objectives.

This challenge seeks to develop next-generation modelling, simulation and decision-support frameworks for climate, health and sustainable technologies. Research directions include multi-scale and multi-physics modelling, uncertainty quantification, optimisation, high-performance computing, digital simulation environments, complex networks, tensor methods, hybrid physics-informed AI and decision intelligence.

Projects should connect methodological advances with concrete use cases such as climate adaptation, environmental management, healthcare, mobility, emergency systems, industrial innovation or public policy. Teams should explain how models will be validated, interpreted and transformed into actionable knowledge.

By bringing together mathematics, physics, computer science, engineering, domain sciences and decision research, the challenge creates routes from fundamental methods to operational tools. Potential outputs include algorithms, software, simulation environments, optimisation methods, digital twins, patents and specialised decision-support services.

