

Research and innovation for a competitive Europe - Thematic priorities in the next framework programme for research and innovation

Introduction

Norway presented its first [input paper on the next Framework Programme](#) (FP10) for Research and Innovation (R&I) in June 2024. Since then, the political guidelines for the new Commission have been presented, and several high-level reports have fed into the discussions about the upcoming programme. The Norwegian input paper is based on a clear recognition of the main arguments provided in both the Draghi and the Heitor reports, and it is based on consultations with Norwegian ministries, agencies, research performing institutions and private and public actors engaged in R&I activities.

To ensure a competitive and resilient Single Market fit for the future and to implement a just green and digital transition, there is a need for a closer cooperation in research, education and industry between the EU and the EEA EFTA States. Regardless of the structure of FP 10, the Norwegian stance is that a strong instrument for collaborative R&I must be continued within the frame of a visible and reinforced integrated R&I programme.

The upcoming program should, to an even greater extent than its predecessor programs, contribute to solving Europe's overarching challenges, increasing the pace of transformation and, not least, ensuring that more companies commercialize, grow and scale in Europe. FP10 should contribute to creating a favourable investment climate that attracts national and international investments.

This document focuses on thematic priorities (ref. the Pillar II of Horizon Europe) and is a follow-up of our first input paper. The suggested priorities are in our view priorities where European and international cooperation within the FP brings clear European added value which will strengthen our societies and our social model and contribute to increased European competitiveness.

Thematic priorities in FP10

Below, Norway suggests six thematic priorities for FP10, priorities contributing to competitiveness, resilience and sustainability. All priorities underline the need to facilitate collaborative R&I between research entities, industry and/or the public sector, for interdisciplinary, cross-sectoral and international collaboration. Social sciences and humanities contribute with important knowledge for strengthening European societies but are also crucial to better address complex challenges. Digitalisation, including responsible and ethical use of new/disruptive technologies, should be a cross-cutting priority. The six priorities are all tightly interconnected.

1. Climate and nature resilient development, sustainable energy systems and the green transition

FP10 must contribute to the achievement of relevant multilateral environmental agreements, like the goals of the 2030 Agenda for Sustainable Development, the Paris Agreement and the Kunming-Montreal Global Diversity Framework.

The geopolitical developments and the acceleration of global crises - including the triple planetary crisis of climate change, biodiversity loss and pollution - demand speeding up the transition towards a sustainable and competitive economy. Moreover, we are in a global energy transition and the need for secure, affordable, and renewable energy is increasing dramatically. Scaling up the circular economy is a prerequisite for reaching the goals and requires that climate, environment, land, food, water and energy aspects must be integrated in systemic approaches, including synergies and trade-offs between the different aspects.

Integrating mitigation and adaptation actions to advance sustainable development affects several policy areas and critical thematic areas at the science-policy interface. New solutions need to be implemented and deployed through innovative R&I efforts to reduce emissions and ensure sustainable nature and area management on land and at sea, as well as to ensure a just transition from GHG-intensive economies to green and circular economies.

The polar regions are particularly vulnerable to environmental challenges. The warming of the Arctic leads to less sea ice, melting of snow and glaciers, and thawing of permafrost. This has major consequences for arctic species and ecosystems and affects global climate and weather patterns. The High North is particularly affected by ocean acidification and pollution, including long-range transport of environmental toxins, marine litter and microplastics. We need in depth and up-dated knowledge about the physical science base of climate change and its effects on ecosystems.

Europe's power systems are becoming more complex and the need for flexibility is increasing. Access to sufficient and affordable clean and low carbon energy is crucial and underlines the urgency of R&I efforts aiming to build robust energy systems, considering the need for security of supply along the value chain; from vital materials to complete systems. In this regard, developing standards and regulations that facilitate effective roll out and upscaling of clean energy production technologies, including carbon capture and storage (CCS), and energy distribution / grid technologies, is necessary. A continued R&I effort on renewable energy, energy distribution and storage and energy efficiency, should be complemented with a stronger R&I effort on low carbon solutions, such as blue hydrogen. It is essential that R&I on energy identify and effectively manage risks and opportunities associated with impacts on biodiversity, ecosystem services, natural-resource dependent livelihoods and rights. Green transition and decarbonisation are crucial, also to secure long-term competitiveness and growth.

Possible R&I issues

- Balancing energy production with climate mitigation and sustainable nature management incl. equality and non-discrimination as cross-cutting principles
- Societal acceptance and support related to the green transition
- Strong and diverse climate modelling tools
- Further development of Copernicus to strengthen Europe's knowledge and ability in areas like climate, environment, oceans, the arctic and others
- CCS, including industrial carbon management and natural sinks for absorbing carbon, and low carbon solutions, such as blue hydrogen
- Integrated and resilient energy systems
- Security of supply of critical materials needed for energy production, storage and distribution
- Better understanding of the role of polar regions in stabilising the global climate system
- Water resilience: a holistic and integrated approach to water quality issues

2. Transformative- and industrial technologies

Transformative digital, deep, and industrial technologies are poised to drive substantial impact across all sectors; to support green transitions, enhance industrial competitiveness, strengthen welfare, public services and build public trust. These technologies will be a game changer for many industries and their targeted use may give Europe major advantages across important sectors. Europe's commitment to advancing collaborative R&I in quantum and space-technologies, critical and advanced materials, biotech, cleantech, IoT, AI, and high-performance computing – alongside skills development and public education – is vital for this to happen. Innovations in biotechnology, including precision medicine and climate-adaptive agriculture and forestry, will further bolster the circular economy and long-term sustainability by minimizing reliance on non-renewable resources.

Driving digital and green transitions through human centric industrial automation, sustainable energy solutions and a responsible uptake of AI and digital technologies across all fields of science and technology can reduce Europe's carbon footprint substantially. Aligning production within European value chains and developing circular models will strengthen supply chain resilience, reduce external dependencies and advance EU climate goals.

Future efforts must focus on harnessing the opportunities in data sharing, data and data-driven innovation, as well as the opportunities of AI. This includes data ecosystems with secure, interoperable, and decentralised data infrastructures to promote cross-border sharing, AI and data-ecosystem design, and development of technologies for analysis of large datasets. Developing these types of technologies requires significant resources and expertise. International collaboration enables sharing of costs, infrastructure and knowledge.

Efforts in enabling and transformative industrial technologies must be developed and deployed with European values of fairness, transparency and accountability, with ethical standards and stakeholder engagement. Furthermore, we need R&I to prevent increased digitalisation from having a negative effect on the climate and nature.

Possible R&I issues

- Quantum and space-technologies, critical and advanced materials, biotech, cleantech, IoT, AI, and high-performance computing
- Development of technologies for efficient and intelligent analysis of large data sets
- Data ecosystems with secure, interoperable, and decentralised data infrastructures
- Next-generation AI and robotics, emphasising scalable, explainable AI-driven systems for manufacturing, energy, materials, health, and other areas
- Subsea robotics
- Digital technologies' effects on societies, democratic processes and the rule of law. This must include R&I on responsible use of transformative technologies, as AI
- Strengthen the development of the in-orbit demonstration and validation service, for testing new technologies
- Further development of Copernicus and the Copernicus Core Services

3. Societal security and civil preparedness

Geopolitical tensions, war, security threats, organized crime and terror in combination with nature- and climate crises, migration, refugee crises, violence and increasing social inequality require that we

prepare for scenarios related to complex, multiple and extensive crises and disasters. Our response will involve several policy areas, and depend on resources and public administration, businesses, industry and civil society actors. Societal trust is vital.

Europe must strengthen its preparedness to meet long-term challenges, as well as to handle acute crises. It is necessary to protect the population and civil society while creating and maintaining a sustainable and democratic society characterised by openness, fact-based debate and information, compliance with laws and norms and respect for human rights. R&I within this area should prioritise cross-cutting research on preparedness for - and resilience to - a wide range of threats, whether accidental or intentional, of human or natural origin, or of physical or hybrid nature. European societal security research needs to focus on the understanding of - and preparing for - compound events and cascading consequences in cooperation with relevant actors and end-users.

Coordinated Europe-wide approaches concerning digital sovereignty, cybersecurity and resilience are crucial to secure Europe's digital infrastructure, particularly in post quantum cryptography, critical software and hardware components and systems, digital supply chains with emphasis on open-source software, cloud-edge infrastructure, and comprehensive preparedness and response capabilities. There is a need for international cooperation on materials to strengthen European strategic autonomy and competitiveness.

Possible R&I issues

- Technology and societal security, including critical infrastructure and resource protection
- Food- water and energy security
- Global health threats, resilience to serious natural events and preparedness to handle major crises and hazards of any kind on all levels of societies, incl. warning systems
- Nuclear safety
- Challenges related to security and environmental relations is necessary to find robust solutions to surveillance, communication and infrastructure in demanding geographical areas
- Risk assessment, -mitigation and crisis management incl. compound crises

4. Oceans, coastal areas and blue growth

The seas and oceans are of vital importance as they provide the foundation for fulfilling human needs for food, energy and transport. To meet these needs and to manage the different uses in a sustainable and resilient way, we need R&I on the sustainable coexistence of different ocean industries such as fisheries, aquaculture, energy production, maritime transport, marine biotechnology and raw materials, and how they relate to marine ecosystems. These industries contribute significantly to Europe's GDP, supporting millions of jobs.

The oceans and polar regions play a crucial role in the climate system, and we need R&I to increase our understanding of the interrelationship between climate change, marine ecosystems and human activities. Robust marine ecosystems require solutions that deal with threats such as acidification or plastic pollution. Integrated ocean and polar observation systems, and appropriate regulatory frameworks must continually be developed for sustainable management of healthy oceans and the blue economy. Interdisciplinary research is required to protect and restore the oceans and to ensure the resilience of coastal and polar communities.

Maritime transport and ports are crucial for European connectivity, trade and security, and form the backbone for established and emerging ocean industries. For maritime transport to continue to contribute to European competitiveness and become more efficient, climate gas emissions, local pollution and the spread of marine organisms must be curtailed. Despite the significant knowledge development, there is an urgent need to accelerate innovation and gain a clearer understanding of the future of maritime transport, including how new forms of energy carriers will affect sailing patterns and port structures. This encompasses new technologies, business models, and feasibility studies.

Possible R&I issues

- The role of the ocean in climate and weather systems
- Sustainable coexistence of different ocean industries and their relation to marine ecosystems
- Integrated ocean and polar observation systems and infrastructures
- The physics and chemistry of the oceans and the geography and geology of the sea floor
- Marine ecosystems, ecosystem services and biodiversity, and nature-based solutions to conserve, protect, restore and manage marine ecosystems
- Coastal economies and coastal resilience
- Sustainable fisheries, aquaculture, safe and healthy seafood and feed, incl. technologies for catch documentation and real time reporting
- Decarbonizing fisheries
- Maritime science and technology, including zero-emission operations and new digital technologies to enhance the efficiency, safety and security of shipping and ports
- The influence of geopolitics on maritime industries

5. Health

Good public health is a prerequisite for the sustainable development of society and a sustainable health sector. Europe is experiencing increasing social health inequities, demographic shifts, a rising burden of non-communicable diseases, escalating health expenditure and declining employment rates. There is an urgent need for public health initiatives grounded in R&I. Health is a significant driver of economic inequality and mechanisms for setting fair priorities are key both for the health of the population and for social cohesion and democratic legitimacy.

Collaborative R&I is crucial for disease prevention; for improved healthcare accessibility, sustainability and resilience; to address challenges like brain- and mental health; the effect of climate change on health; how food environments affect consumer's choices; health threats; infectious diseases and AMR. Investments in R&I in personalised medicine, both treatment and care, can lead to tailored care to individual needs and boost patient outcomes.

Digitalisation and access to high quality health data is key to addressing future health challenges. A digital transformation focusing on data sharing, telemedicine, AI and sensors is essential. Furthermore, medical imaging, -omics, and big health data analytics can further advance personalized healthcare and precision medicine. The integration of these technologies will enhance European competitiveness in cutting-edge medical technologies.

Strengthening international R&I collaboration on global health issues will contribute to sustainable improvements in health and health equity for people in all countries; reduce the burden of poverty-related infectious and non-infectious diseases, and strengthen global health preparedness, public health institutions and systems.

Labour and skills shortages are key challenges in the health sector across Europe. New and innovative solutions for prevention, treatment and organizing healthcare systems can alleviate the burden on the health and care systems and the workforce.

Possible R&I issues

- Sustainable health and care services and systems
- Public health, incl. disease prevention, treatment, and improving life quality
- Inequalities in health, incl. gender differences and women's health
- Health issues in the elderly population, incl. dementia and other neurodegenerative diseases
- Causes for - and prevention of - non-communicable diseases
- Mental health, including among children and young people
- Promoting AI in health, E-health, digitalisation and telemedicine
- Personalised- and precision medicine
- Regulation and ethical frameworks
- Global health preparedness, poverty-related infectious diseases and health impacts associated with climate change and migration
- The one-health perspective and interlinkages of animal health and welfare, plant health, food production and the environment, incl. antimicrobial resistance (AMR)
- Effects of food-systems, including food environment, on health and consumer behaviour
- Food safety and food waste
- Occupational safety and health

6. Societal resilience and cohesion

Europe faces major changes in demography, digitalization and labour market restructuring, immigration, economic uncertainty and growing social inequality. Furthermore, democratic processes and public debate are under pressure from troll factories, fake news, various forms of manipulation through digital media and the emergence of echo chambers. An increasingly polarized public sphere and an erosion of trust threatens societal cohesion. We must ensure that societal transitions are effective and fair and that our societies promote equal opportunities and inclusion of marginalized groups.

A well-functioning society is characterised by a high level of trust between individuals and groups and between people and authorities. Trust is linked to people's sense of community and cultural identity and is an important aspect of societal security and civil preparedness. The social contract between individuals and society rests on respect for fundamental values, such as justice, equality and freedom. Social sustainability is about the conditions that allow people to enjoy good health and quality of life, and the equitable distribution of benefits and burdens in society. Work participation prevents poverty and plays an important role in social inclusion.

A common effort is needed to ensure secure, stable, resilient and inclusive societies and democracies. We need research to build understanding of autocratic processes and early warning signs; political extremism; deglobalization, and inequality and social exclusion related to the labour market, housing market and tax systems. Furthermore, we need research on how to counteract democratic weakening and on how to include more marginalized children and young people in Europe in education, work and community life. We need to explore the increasing cultural and religious complexity in democratic structures and processes.

Mobilizing the expertise of social sciences and humanities for understanding fundamental contemporary transformations of society, economy, politics and culture is key.

Possible R&I issues

- Drivers impacting public discourse, undermining objective debate and democratic processes
- Democratic competence and trust in institutions
- Violence, abuse and hate crime
- Crime prevention and compliance with societal norms and regulations
- Cultural and religious complexity in democratic structures and processes
- Political, democratic, and social frameworks of the welfare state
- Inequality and social exclusion
- Risk factors and the effect of preventive measures to counteract exclusion
- Measures to increase upward social mobility and equal opportunities for young people.
- Gender issues
- The integration of migrants into the workforce, including leveraging social entrepreneurship
- Geopolitical dynamics regarding political-, security- and financial changes
- Social and cultural sustainability in the green transition
- Cultural heritage
- Educational research, including research on schools and education systems

European partnerships and missions

[In our first input to FP10](#), we commented on the future of the partnerships and missions as instruments that strongly contribute to implementation of new knowledge and to transformative change within their thematic priorities.

Partnerships is a vital instrument with great potential. For FP10, we reiterate that fewer and more targeted partnerships based on simpler procedures and a better balance with collaborative research projects should be considered. Furthermore, we support the recommendations made by the Partnership knowledge Hub on the European Partnerships under the future EU Framework Programme i.e. the call *for an early strategic assessment of the need for European partnerships in FP10*.

The EU-missions should be further developed, to reach their full potential ([see Norway's first Norwegian input to FP10](#)). The NEB Facility should be continued, and we suggest that the five EU missions should be developed along the lines of the NEB Facility, with its R&I- and roll-out components ensuring a good dialogue between R&I and implementation.

We suggest launching a new European mission:

Social exclusion among children and young people: Mental health problems and social exclusion among children and young people is a growing problem in most European countries. It is a challenge for the welfare system, for the future support for and development of social institutions, for democracy, trust and unity in society, and for the young people themselves. To promote European goals of welfare, democracy, sustainable development, and a Europe equipped to handle a changing world order, it is important to include more children and young people in education, work and social institutions, and to prevent social exclusion from an early age. This includes themes such as participation in various communities, inequality in education and work, mental health, and societal inclusion, as well as the full inclusion of ethnic and religious minorities in democratic states.