European Commission

EN

Horizon Europe

Work Programme 2021-2022

1. General Introduction

(European Commission Decision C(2021)4200 of 15 June 2021)

General introduction

Welcome to Horizon Europe!

Horizon Europe is the new EU flagship programme for research and innovation. It sets the best minds in Europe and the rest of the world to work on delivering excellent solutions to the key issues of our time, supporting the EU's policy priorities and building a better future for the next generation in Europe.

This work programme will cover the years 2021-2022. It will foster excellence in research and support fellowships, training and exchanges for researchers through Marie Skłodowska-Curie Actions, build more connected and efficient European innovation ecosystems, create world-class research infrastructures, support the green and digital transitions and target global challenges while supporting European industrial competiveness, as well as widening participation in the programme and strengthening the European Research Area.

This introduction describes how these actions will underpin EU policy priorities, and presents the main features of this work programme, which are aimed in particular at enhancing its impact and delivering results.

About the Horizon Europe work programmes

Horizon Europe supports research and innovation especially through *work programmes*, which set out funding opportunities for research and innovation activities.

This introduction relates to the work programme which covers the following components of Horizon Europe (highlighted in light blue in the graphic below) for 2021-2022: Marie Skłodowska-Curie actions and research infrastructures (Pillar I); all clusters (Pillar II); European innovation ecosystems (Pillar III); widening participation and spreading excellence, and reforming and enhancing the European R&I system (Widening Participation and Strengthening the European Research Area part).

The work programme at hand is made up of 13 parts: this introduction; 11 parts covering the components mentioned above (including one on missions); and one on the general annexes, which set out rules which apply across the work programme such as the standard admissibility conditions and eligibility criteria, selection and award criteria, etc.

The graphic below depicts all components of one of the two Specific Programmes implementing Horizon Europe as well as the European Institute of Innovation and Technology (EIT). Separate work programmes cover the European Research Council (ERC), the Joint Research Centre (JRC) and the European Innovation Council (EIC). The activities of the EIT are set out in separate programming documents. In addition, a significant part of Pillar II of Horizon Europe will be implemented through institutionalised partnerships, particularly in the areas of Mobility, Energy, Digital and Bio-based economy, which will have their separate work programmes.

In addition to what is shown in the graphic, Horizon Europe is also implemented through the other Specific Programme (the European Defence Fund) and is complemented by the Euratom Research and Training Programme (each having a separate work programme).

Horizon Europe is the most ambitious EU research and innovation programme ever

With Horizon Europe, the EU will invest €95.5 billion in research and innovation that will shape the future of Europe, making it the most ambitious research and innovation programme ever introduced by the EU.

A substantial part of this funding will be dedicated to targeted actions that support the green and digital transitions for our societies and economies as well as a sustainable recovery from the global crisis that has emerged following the COVID-19 pandemic. The aim of Horizon Europe in general, and this work programme in particular, is to create opportunities for the EU and the world of tomorrow from the challenges of today.

In line with the commitment made in the European Health Emergency Preparedness and Response Authority (HERA) Incubator Communication[1], a first version of this work programme was launched in March 2021 with **focused action to target Covid-19 variants, securing the safety and effectiveness of our vaccines**. On 30 January 2020, the WHO declared the COVID-19 outbreak a public health emergency of international concern and the pandemic is still not under control. While vaccines are now becoming available and being used, COVID-19 variants are increasingly of concern – because of their effect on transmissibility, disease severity and vaccine effectiveness. Therefore, €123 million was devoted to bring an additional concerted EU effort to further speed up the process of understanding the occurrence and spread of variants and their effect on disease severity and vaccine effectiveness.[2]

In order to support our commitment to make **EU the world's first climate-neutral continent by 2050**, Horizon Europe will direct a minimum of 35 % of the funding available to climate objectives. These funds will be used for projects that advance the science of climate change, develop solutions to reduce greenhouse gas emissions, and to adapt to the changing climate. For example, activities will accelerate the transition towards clean energy and mobility in a sustainable and fair way, help adapt food systems and support the circular and bio-economy, maintain and enhance natural carbon sinks in ecosystems, and foster adaptation to climate change. Jointly such activities will be fundamental to create the new products, services and business models needed to sustain or enable EU industrial leadership and competitiveness, and to create new markets for climate neutral and circular products.

[1] COM(2021) 78 final: "HERA Incubator: Anticipating together the threat of COVID-19 variants".

[2] As part of the EU response to the COVID-19 pandemic, for activities specifically linked to COVID-19, grants may be awarded without a call for proposals since that pandemic constitutes an exceptional emergency within the meaning of Article 195(b) of the Financial Regulation 2018/1046. Further conditions may be set out in the different work programme parts. Specific derogations and additional conditions may be also announced or communicated to the potential applicants. Such conditions that are set out in the different work programme parts may include additional exploitation obligations to ensure that the resulting products will be available and accessible as soon as possible, additional dissemination obligations, such as open access for research data needed to address the public health emergency, and justified derogations from the standard limits to financial support to third parties. The Commission will assess how the applicants propose to fulfil these conditions. The implementation of these conditions will be appropriately monitored. Where applicable, the relevant grant agreement options will be applied.

Investing in the green transition, climate action and biodiversity

The green transitions guides significant parts of Horizon Europe's investments. The commitment to spend at least 35% of resources on climate action and strengthen investments in biodiversity applies to the entirety of Horizon Europe including the European Research Council (ERC), the European Innovation Council (EIC) and institutional partnerships. These are not included in this work programme.

Taking into account all work programmes and planning documents for Horizon Europe 2021-2022[3] it is estimated that overall 36% of funds will contribute to climate action; and 6.6 % to biodiversity related policy objectives.

The parts of the present work programme dedicated to the six clusters, research infrastructures, widening participation & strengthening the European research area, European innovation ecosystems and the preparatory actions on missions together contribute €5.9 billion to climate action, equal to 48% of the present work programme budget. Furthermore, these parts will contribute €1.228 billion to biodiversity, equal to 9.9% of the present work programme budget. The investment in climate action is a good approximation of investments in the green transitions, monitoring of expenditure will provide more precise data also on other aspects like investments in 'clean air' or specific SDGs.

Contributions to climate action are made by 87% of the budget of cluster 'Climate, energy, transport' (€2.68 billion), 73% of the cluster 'Agriculture, environment' (€1.38 billion), 41% of the cluster 'Industry and digital technologies' (€1.38 billion) and 17% of the cluster 'Health' (€332 million).

To ensure a contribution over 35% in the lifetime of the Horizon Europe programme the expenditure estimates will be updated continuously. The methodology to generate these estimates is based on the 'EU-markers' methodology[4].

The New European Bauhaus is an important initiative, which will greatly contribute greatly to the abovementioned objectives. This movement will blend sustainability, accessibility and aesthetics to make the European Green Deal a 'tangible' experience, by exploring innovative, co-created solutions to complex problems.

[3] The Horizon Europe components European Research Council, Marie Sklodowska Curie Actions, the European Innovation Council, the European Institute of Innovation and Technology, as well as the institutionalised partnerships based on Articles 185/187 TFEU and the direct actions by the Joint Research Centre have a combined budget of 12.043 billion equal to 46.81% of Horizon Europe total.

[4] EU-markers are based on the internationally recognized Rio-markers methods originally developed by OECD (see http://www.oecd.org/dac/environment-development/Revised%20climate%20marker%20handbook_FINAL.pdf). The EU markers assigns 0-40-100% markers to actions and their budgets depending on climate action having a major impact (100%), a significant impact (40%) or a marginal impact (0%) of an activity. In this work programme the - markers are applied to every topic described for climate action, biodiversity, clean air, digital transition and artificial intelligence. For other parts of Horizon Europe they are applied to larger groups of actions and in general to awarded projects for expenditure monitoring and documentation. Actions can be assigned more than one marker if they contribute substantially to more than one of the related objectives.

In support of the digital transition, this work programme will foster research and innovation to make this decade **Europe's digital decade,** and lay the ground work for new digital enterprises even further into the future. For instance, actions supported by this work programme will help to maximise the full potential of digital tools and data-enabled research and innovation in a wide range of sectors, such as healthcare, media, energy and mobility as well as food production, and support the deep transformations required for the modernisation of traditional industrial models. Using an EU-marker type calculation systems it is estimated that 34% of funds in the presented work programmes, and 35% of funds across all parts of Horizon Europe contribute to the digital transition. This equals overall investments of €8.49 billion during 2021/22. The overall investment into main digital activities, i.e. the development of core digital technologies, is estimated at €4.0 billion in 2021/22.

Finally, this work programme will direct investments to build the **NextGeneration EU** helping repair the immediate economic and social damage brought about by the coronavirus pandemic and to create a post-COVID-19 Europe that is greener, more digital, more resilient and better fit for the current and forthcoming challenges. This includes topics contributing to a green, digitally-enabled recovery through modernising health systems, topics contributing to research capacities, in particular for vaccine development, and the European Health Data Space, and supporting a potential new Pandemic Preparedness Partnership.

In order to achieve these and other targets, Horizon Europe introduces a new level of ambition to maximise the impact of EU research and innovation investments for the benefit of European science, economy and the wider society, in line with EU values and in adherence with the highest ethics and integrity standards. Horizon Europe marks a paradigm change in the design of the EU research and innovation programmes by moving from an activity-driven to an impact-driven approach, which allows it to make targeted interventions, based on mutually agreed priorities. This is, for instance, reflected in the so-called destinations and topics of this work programme, which put forward the impacts we want to achieve and the outcomes we expect, but leave the manner of achieving them to the imagination and skills of the applicant.

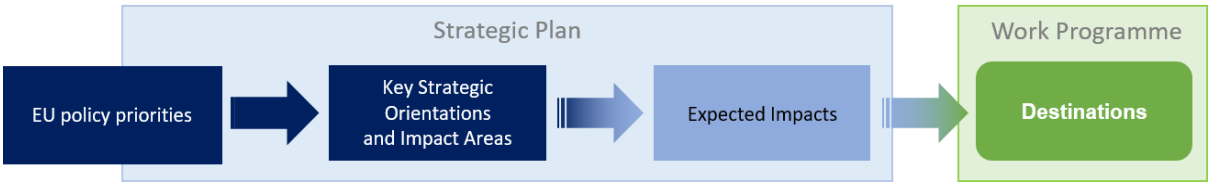
As such, the new, impact-driven design of Horizon Europe aims at maximising the effects of its research and innovation investments, ensuring that they truly deliver on the EU's policy priorities. It is about making sure that priorities are effectively met and translated into concrete action, while giving applicants maximum flexibility on how to achieve these goals.

Horizon Europe delivers on EU policy priorities

This work programme for 2021-2022 is the first step in delivering on the priorities set out in the first strategic plan for Horizon Europe for 2021-2024[5]. Based on the overarching EU policy priorities, the strategic plan sets out four key strategic orientations and 15 impact areas, which are based on 32 expected impacts that have been defined in an inclusive and ambitious strategic planning process. Each expected impact is targeted via dedicated packages of actions in the work programme. These are termed 'destinations', because they indicate both the specific direction and the ultimate point of arrival of the projects to be supported through Horizon Europe. An overview of all expected impacts of the strategic plan and the corresponding destinations in the work programme parts for clusters 1 to 6 can be found in the appendix to this introduction.

[5] C(2021)1602 : COMMISSION IMPLEMENTING DECISION adopting the 2021-2024 strategic research and innovation plan in the framework of the specific programme implementing Horizon Europe – the Framework Programme for Research and Innovation. The strategic plan can be found here.

From EU priorities to work programme destinations



The four key strategic orientations in the strategic plan for Horizon Europe each define a set of higher-level objectives where research and innovation investments are expected to make a difference. The four key strategic orientations are:

Key Strategic Orientation A

Promoting an open strategic autonomy by leading the development of key digital, enabling and emerging technologies, sectors and value chains to accelerate and steer the digital and green transitions through human-centred technologies and innovations

Key Strategic Orientation B

Restoring Europe's ecosystems and biodiversity, and managing sustainably natural resources to ensure food security and a clean and healthy environment

Key Strategic Orientation C

Making Europe the first digitally enabled circular, climate-neutral and sustainable economy through the transformation of its mobility, energy, construction and production systems

Key Strategic Orientation D

Creating a more resilient, inclusive and democratic European society, prepared and responsive to threats and disasters, addressing inequalities and providing high-quality health care, and empowering all citizens to act in the green and digital transitions

Below, each key strategic orientation is presented along with its impact areas. For each impact area, some examples are given to illustrate the activities in the work programme that will implement it.

A - Promoting an open strategic autonomy[6] by leading the development of key digital, enabling and emerging technologies, sectors and value chains

The COVID-19 pandemic has highlighted the importance of digitalisation across all areas of EU society and economy. New technologies have kept our businesses and public services running and our family and social bonds afloat. Already today, the data economy lies at the heart of innovation and job creation, and the European Union has the ambition of empowering European citizens with digital solutions rooted in our common values and enriching the lives of all of us. This work programme will

[6] 'Open strategic autonomy' refers to the term 'strategic autonomy while preserving an open economy', as reflected in the conclusions of the European Council 1–2 October 2020.

help shape innovative technologies and solutions in a wide range of applications. It will also underpin the open strategic autonomy of Europe and its global leadership in digital and emerging enabling technologies.

A total number of eleven expected impacts contribute to this key strategic objective and its **four impact areas**, all of which are being put into effect through this work programme. The following examples provide an illustration of how this is achieved:

- To promote **industrial leadership in key and emerging technologies that work for people**, the co-programmed **Partnership on Artificial Intelligence, Data and Robotics** will drive the development of trustworthy, safe and robust technologies that will boost new markets and applications and that are compatible with Europe's ethical standards and values.
- In order to attain **secure and cybersecure digital technology**, this work programme **supports research and innovation on cybersecure technology and its consequences**. It includes topics such as 'Secure and resilient digital infrastructures and interconnected systems', 'Artificial Intelligence for cybersecurity reinforcement' and 'Human-centric security, privacy and ethics'.
- With a view to supporting **a competitive and secure data-economy,** this work programme paves the way for **a digitised, resource efficient and resilient industry**, for example through research and innovation on earth-observation, remote sensing and digital platforms for the small-scale extractive industry.
- To make available **high quality digital services for all,** it fosters **research and innovation on health-supporting technologies**, for example on 'Smart medical devices and their surgical implantation' and 'Innovative tools for use and re-use of health data'.

B - Restoring Europe's ecosystems and biodiversity, and managing sustainably natural resources

Human activities create pressures on natural resources that go far beyond sustainable levels. This is affecting ecosystems and their capacity to provide multiple services for human well-being, while natural resources are being further degraded because of the impacts of climate change. The European Union has the ambition to halt biodiversity decline, protect and preserve ecosystems, manage natural resources on land and sea in a sustainable way, thereby ensuring food and nutrition security as well as a clean and healthy environment for all. Horizon Europe will thus advance knowledge, build capacities and provide innovative technologies and solutions to support the state and functioning of ecosystems, to ensure a clean and healthy environment and sustainable management of natural resources that provides for our needs and contributes to climate neutrality and adaptation.

The following examples give an idea of how the **three impact areas** under this orientation are being implemented through this work programme:

- With a view to developing **sustainable food systems from farm to fork on land and sea**, this work programme supports **research and innovation on sustainable farming, fisheries and aquaculture** as well as the **transformation of food systems**. It does so through topics such as 'Agroecological approaches for sustainable weed management', 'Digital transition supporting inspection and control for sustainable fisheries' and 'Transition to healthy and sustainable dietary behaviour.

- As a contribution to **clean and healthy air, water and soil**, this work programme will support **research and innovation to prevent environmental contamination**, for example with the topics 'Regional nitrogen and phosphorus load reduction approach within safe ecological boundaries' and 'Increasing the circularity in textiles, plastics and/or electronics value chains'
- To **enhance ecosystems and biodiversity on land and in waters**, the **European Partnership 'Rescuing Biodiversity to Safeguard Life on Earth'** will provide a powerful platform to help bring biodiversity back on its path to recovery. With topics such as 'Natural capital accounting: Measuring the biodiversity footprint of products and organizations', the work programme will also support research and innovation to take into account better the value of biodiversity and ecosystem services in economic activities.

C - Making Europe the first digitally enabled circular, climate-neutral and sustainable economy

The European Union has the ambition to substantially reduce greenhouse gas emissions by 55 % in 2030, to become climate neutral by 2050 and turn into a more sustainable, bio-based, climate-neutral, circular, non- toxic and competitive economy. This requires unprecedented changes in the way we produce, trade, build, move around and consume, which will spur our technological, economic and societal transformation and contribute to a green recovery. This work programme will help transform the EU into a provider of green solutions for the benefit of all, and position Europe as a technological and industrial leader in the green transition industry, in order to make the EU climate neutral by transitioning all economic sectors.

This work programme contributes significantly to achieving the **four impact areas** under this orientation through seven expected impacts, as shown by the following examples:

- To promote **climate change mitigation and adaptation**, this work programme supports **climate sciences and responses** and **cross-sectoral solutions for the climate transition** through dedicated destinations.
- With a view to **affordable and clean energy**, it supports a **broad portfolio of clean and efficient demand side technologies as well as renewable energy technologies** – helping to improve the competitiveness of more mature technologies, and nurturing emerging technology solutions – and their smart integration into the overall energy system, thus boosting the energy transition in all its dimensions.
- To further advance **smart and sustainable transport,** research and innovation activities will pave the way for **zero-emission, safe, resilient transport and Smart Mobility services for passengers and goods**, for example in the field of Connected, Cooperative and Automated Mobility (CCAM).
- As a considerable contribution to **circular and clean economy**, this work programme will advance **research and innovation on climate neutral, circular and digitised production** and support a **Partnership for Clean Steel,** which will demonstrate EU leadership in the transformation of the steel industry into a carbon-neutral sector.

D - Creating a more resilient, inclusive and democratic European society

Social cohesion and inclusiveness and the health, well-being, rights and security of its citizens are central aims of the EU's policies and programmes. To uphold such objectives, the EU needs to tackle the negative consequences of manifold challenges, such as those arising from demographic change,

globalisation, climate changes, evolving security threats and rapid technological change. These are putting the well-being of citizens and communities under strain, thereby challenging business models, public services, as well as the foundations of the Single Market and Social Rights. Investments under Horizon Europe will be instrumental for the EU to develop stronger health systems, improve health technologies and develop the knowledge and innovations that underpin the health and well-being of all its citizens. Furthermore, Horizon Europe will develop innovations, policies and institutions to safeguard democratic governance, foster civic participation and enhance trust in democratic institutions, tackling polarisation and extremism. These will safeguard and promote Europe's common values and cultural heritage, and support creative ways of cultivating independent critical thinking and inclusive debates. It will support innovative solutions for connecting education and training to emerging social and labour market needs while improving societal adaptation and citizens' engagement in the green and digital transitions. It will also reinforce disaster risk management, border management and law enforcement while mitigating the negative effects of acute crises such as the COVID-19 pandemic.

This key strategic objective and **four impact areas** encompasses ten expected impacts, all of which become operative through the Horizon Europe work programme, as these examples illustrate:

- To secure **good health and high-quality accessible healthcare**, this work programme will contribute to **research and innovation on tackling diseases and reducing their burden**, through topics such as 'Personalised medicine and infectious diseases' and 'Vaccines 2.0'.
- To promote **a secure, open and democratic EU society**, it will foster **research on how to protect, nurture and reshape democracies**, through topics such as 'The impact of inequalities on democracy', 'The future of democracy and civic participation' and 'Politics and the impact of online social networks and new media'.
- To create a **resilient EU prepared for emerging threats,** research and innovation will enhance Europe's **disaster-resilience**, through topics such as 'Improved impact forecasting and early warning' and 'Disaster Risk Management and Governance'.
- Finally, to foster **inclusive growth and new job opportunities,** research and innovation under this work programme will examine **integration of emerging new technologies into education and training** and **inclusive labour markets and their impact on inequalities** through specific topics**.**

Supporting priorities through international cooperation

International cooperation in research and innovation is essential for tackling global challenges such as climate change or global health security more effectively and underpins all the key strategic orientations of the strategic plan for Horizon Europe. It also enables Europe to access resources, know-how, scientific excellence, value chains and markets that are developing outside the EU.

This work programme will tap into the opportunities offered by international cooperation in order to maximise the impact of its actions. It includes dedicated actions to support and strengthen cooperation through multilateral initiatives in areas such as **biodiversity and climate protection, environmental observations, ocean research or global health.** It also includes targeted actions with key third-country partners, including the first ever ambitious and comprehensive '**Africa Initiative**' that will draw on topics across the six clusters of Pillar II.

The openness of the work programme to international cooperation will be balanced with the need to safeguard EU interests in strategic areas, in particular to promote the EU's open strategic autonomy and its technological leadership and competitiveness where it is necessary. Joint and coordinated calls will advance research and innovation in areas of mutual benefit, based on common approaches to the framework conditions. In a limited number of cases for actions related to Union strategic assets, interests, autonomy or security, actions will be limited to cooperation between Member States only, Member States and Associated Countries, and/or certain third countries. For duly justified and exceptional reasons participation can also be limited to legal entities established in the Union or in associated countries that are not directly or indirectly controlled by non-associated third countries or by legal entities of non-associated third countries, or make the participation of the controlled entities subject to conditions set out in the work programme.

Strengthening framework conditions for research and innovation

The four key strategic orientations identified in the strategic plan apply first and foremost to Pillar II of Horizon Europe, 'Global challenges and European industrial competitiveness', but due to their overarching relevance, they extend to other parts of Horizon Europe as well. Thanks to this integrated approach, synergies between different programme parts, even across pillars, are greatly facilitated. While other programme components will contribute greatly to the key strategic orientations, they will also address a number of other priorities described below. Overall, they will contribute to a stronger European research and innovation ecosystem through wider participation, greater mobility for researchers and world class research infrastructures.

The **Marie Skłodowska-Curie Actions (MSCA)** respond to Europe's continuing need for a highly-skilled and resilient human capital base in research and innovation that can easily adapt to, and find sustainable solutions for, current and future challenges. The COVID-19 crisis has highlighted once more that the EU relies on talents who are experts in their field but able to think across disciplines, while naturally regarding cross-border and international cooperation as a fundamental part of their work. The MSCA make an important contribution by equipping researchers with new knowledge and skills and providing them with international and inter-sectoral exposure. This is achieved by supporting researchers' training and mobility through bottom-up and excellence-driven research in the framework of doctoral networks, postdoctoral fellowships[7], staff exchanges and citizen outreach. The MSCA also have a structuring impact on higher education institutions and other R&I entities way beyond academia by widely spreading excellence and setting standards for high-quality researcher education and training, not only across the European Research Area (ERA) but also worldwide.

Europe's research and innovation system depends on world-class **research infrastructures** that are open and accessible to all researchers in Europe and beyond. To fully tap their potential for ground-breaking research and innovation, it is important to reduce fragmentation, avoid duplication of effort, and better coordinate the design, development, accessibility and use of research infrastructures. This includes supporting open access for all European researchers and stimulating the up-take of open science and open data practices. The destinations of the work programme part on European research infrastructures cater exactly to these needs and will guide concrete action towards filling knowledge gaps and addressing emerging needs and science breakthroughs, notably in the field of health and in support of the green and digital transitions. In addition, efforts for further development and consolidation of research infrastructures will provide the ERA with a more

[7] Aiming to enhance nuclear expertise and excellence as well as synergies between Horizon Europe and the Euratom Programme, nuclear researchers are eligible to participate in MSCA Postdoctoral Fellowships supported by an annual financial contribution from the Euratom Programme.

effective, accessible, interlinked and well-functioning Research Infrastructure landscape. The use of research infrastructures across the Horizon Europe pillars is strongly encouraged.

Innovation ecosystems provide a stimulating environment within which innovation can flourish. Well-functioning innovation ecosystems provide a flow of ideas and knowledge, and they motivate a broad range of actors to join forces and develop innovative solutions. The work programme part on European Innovation Ecosystems (EIE) supports concrete actions to facilitate the extension and strengthening of these ecosystems. By pulling in new and under-represented actors and territories and reinforcing connectivity within and between ecosystems on a national, regional or local level, it aims at achieving collective ambitions for the benefit of society and sustainable business growth. The work programme encourages synergies with related EU funds and programmes and will act in complement with the European Innovation Council (EIC) and the **European Institute for Innovation & Technology**. In particular, the EIC Forum will promote coordination and dialogue on the development of the EU's innovation ecosystem, connecting the existing ecosystems with the EIC. Synergies also include the European Partnership on Innovative SMEs, which will help innovative SMEs to increase their research and innovation (R&I) capacity and productivity and to become embedded in global value chains and new markets.

The innovation ecosystems created by the EIT Knowledge and Innovation Communities (KICs) can in particular contribute to building communities or platforms for coordination and support actions, sharing knowledge or disseminating and fostering the exploitation of project results. Where relevant, it is encouraged to explore possible forms and means of service provisions distinct to the EIT KICs, that can be complementary to proposals and their activities. The collaboration with other innovation communities that can support project implementation and impact is also encouraged.

Despite much progress in developing the European Research Area, Europe still has a fragmented research and innovation landscape, and Member States face bottlenecks in their research and innovation systems, which require policy reforms. Similarly, the level of research and innovation investment in Europe is still far below the policy objective of 3% of GDP and continues to grow slowly. Hence, it is necessary to fully exploit the research and innovation potential of the ERA. The work programme part on **Widening participation and strengthening the European Research Area** contributes to the expected impacts of Horizon Europe by reducing the research and innovation divide and geographical disparities in research and innovation performance. It supports Member States in building the necessary capacities that allow them to successfully participate in research and innovation processes and, eventually, translate the results into the society and the economy.

New approaches for greater impact

Horizon Europe introduces new approaches to best target its research and innovation investments to maximise impact, also covered by this work programme:

- A new generation of **European Partnerships** for greater impact: Horizon Europe rationalises the number of partnerships that the EU co-programmes or co-funds involving a wide range of public and private partners, including national governments, industry, civil society organisations and funding organisations. This new approach ensures that the partnerships instrument of Horizon 2020 can continue in a simplified and more transparent form, reaching a broader set of stakeholders and creating stronger links with EU and national policies.

- Horizon Europe introduces **Missions** as an entirely new concept for the EU framework programmes. Missions address global challenges that affect our daily lives and, for this purpose, put forward ambitious and inspirational but achievable goals. Employing a large portfolio of instruments across diverse disciplines and policy areas, Missions tackle complex issues in a concerted and particularly target-oriented way.
  Five missions have been identified and are now in a preparatory phase. During this phase, implementation plans will be developed, which will include the detailed objectives, specific interventions, investment strategy and performance indicators for each mission. When finalised, within a period of maximum one year, these implementation plans will be assessed against objective criteria, published online.
  This work programme for the moment contains actions for each of the five missions during their preparatory phase, and will be updated with the full R&I agenda when the implementation phase is launched. The actions included in this work programme aim to establish foundations for the missions' implementation phase and thus support rapid development of the R&I actions when these are launched.

Horizon Europe ensures continuity and brings in new features

The Horizon Europe work programme for 2021-2022 is shaped around the successes of and lessons learned from the EU's previous research and innovation framework programmes. It continues and builds on a number of key elements, such as open access to research data and results, which have proven their worth and relevance. It also features a number of important novelties to further streamline and enhance the programme:

Gender equality – Gender equality is a cross-cutting priority in Horizon Europe and concerns all programme parts. The appropriate consideration of the gender dimension in research and innovation content[8] is mandatory for all applicants across the whole programme, unless the non-relevance of sex and/or gender analysis is indicated at topic level. Furthermore, Horizon Europe is promoting gender equality through sustainable institutional change by requesting that applicants (public bodies, research organisations and higher education establishments) have in place a gender equality plan.

Widening participation - While keeping excellence as the main feature, a wide spectrum of measures will foster participation in the work programme actions and facilitate collaborative links. For instance, the ex-post 'Hop on' feature will allow existing project consortia to expand by including participants from so-called 'low R&I performing countries', in order to build collaborative links and reduce the research and innovation divide across Europe.

Making it easier for applicants – Horizon Europe will increase legal certainty and reduce administrative burden for beneficiaries and programme administrators. The aim is to provide a strong measure of continuity from Horizon 2020 while incorporating improvements across the project life cycle, from submission to efficient reporting and exploitation of results, as set out in the Implementation Strategy for Horizon Europe.

Synergies by design – The deployment and uptake of research results and innovative solutions developed in this work programme, and Horizon Europe in general, will be facilitated with the

[8] Integrating the gender dimension in research and innovation content is an umbrella term for integrating sex and/or gender analysis, that is, ensuring that the biological characteristics and the social/cultural features of both women and men are taken into account as relevant in the content of research and innovation projects. For more information see: https://ec.europa.eu/info/news/gendered-innovations-2-2020-nov-24_en

support of other European Union funding programmes. To make synergies between Horizon Europe and other programmes and policies happen, they are considered in design and strategic planning, project selection, management, communication, dissemination and exploitation of results.

Making sustainable investments – Horizon Europe's objective is to support research and innovation activities that fully respect climate and environmental standards and priorities of the Union and cause no significant harm to any of them. The adoption of the EU Taxonomy Regulation[9] creates a common science-based classification system defining under which conditions economic activities in a given sector can be considered as environmentally sustainable. Horizon Europe projects will play an important role in helping economic operators reach or go beyond the standards and thresholds set up in the Regulation as technical screening criteria and to keep them up-to-date. This includes setting the bases for systemic changes over time delivering greater environmental benefits in the sector as compared to improving the environmental performance of individual economic activities. Most importantly, research and innovation activities' compliance with the 'do no significant harm' principle[10] will ensure consistency with the European Green Deal objectives and promote the transition to a safe, climate-neutral, climate-resilient, more resource-efficient and circular economy.

Social innovation – i.e. innovation for societal impact and innovation with citizens as co-designers, co-developers, and co-implementers is a cross-cutting priority in Horizon Europe. Social innovation recognises the sociotechnical nature of all innovations, benefits the need for society to own innovation, and serves the profound changes in social practices required, inter alia, to achieve, the digital and energy transition, climate-neutrality, sustainable management of natural resources, and greater societal resilience in the face of health, climatic and other hazards.

Trustworthy technologies - All projects supported by this work programme will be in line with EU values and adhere to the highest ethics and integrity standards. Horizon Europe is spearheading the artificial intelligence ethics by design agenda. Due diligence will be required to make sure all AI-based systems or techniques used or developed will be trustworthy: ethical, lawful and robust, with particular attention to safety, accuracy, reliability and explainability.

Stakeholder involvement - The work programme for 2021 – 2022 is based on the Horizon Europe strategic plan, which has been designed with and for stakeholders. In an ambitious co-design process, involving Member States of the EU and the European Economic Area (EEA), the European Parliament and stakeholders from all over Europe and beyond, more than 8 000 contributions from a broad range of stakeholders have been synthesised into the first strategic plan for Horizon Europe that guides the first work programmes and ensures they focus on the issues that matter most to Europeans.

[9] Regulation (EU) 2020/852 of the European Parliament and of the Council of 18 June 2020 on the establishment of a framework to facilitate sustainable investment, and amending Regulation (EU) 2019/2088

[10] As defined in Articles 17 of Regulation (EU) 2020/852 of the European Parliament and of the Council of 18 June 2020 on the establishment of a framework to facilitate sustainable investment, and amending Regulation (EU) 2019/2088

What you will find in this work programme

Each part of this work programme, except for this Introduction, the MSCA part and the General Annexes, is designed around a series of coherent packages of calls for proposals and impact-driven destinations and topics.

Each **destination** describes socio-economic challenges to be addressed and the related expected impacts that R&I activities will contribute to.

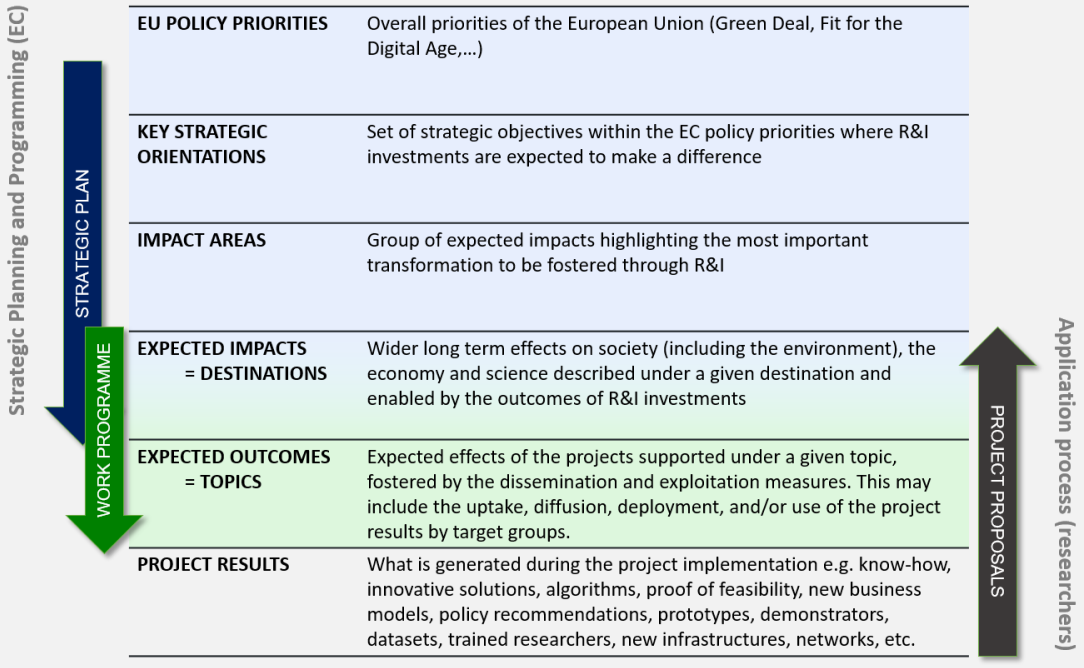
In many cases, destinations correspond directly to an expected impact identified in the Horizon Europe strategic plan 2021-2024, as shown in the overview below. Together, the destinations of this work programme cover the 32 expected impacts in the Horizon Europe strategic plan.

Under each destination, one or more **topics** describe the expected outcomes and the scope of the research and innovation activities to be supported. The **expected outcomes** are the desired effects of the project in the medium term such as the uptake, diffusion, use and/or deployment of the project's results by direct target groups. The **scope** describes the area of research/innovation that needs to be tackled if the expected outcomes are to be successfully addressed, without prescribing the method to achieve them. It is therefore up to the creativity and skill of the applicants to design a project that will generate results and substantially contribute to the expected outcomes and impacts.

Each topic also sets out the general conditions, deadlines, budget, and any specific conditions that may apply. The topics are grouped under calls for proposals, which is a technical term for a number of topics that share the deadline for the opening of the topic for submission of applications.

The graphic below gives an overview of the relationship between policy priorities and project results and explains the various terms used in this context.

Horizon Europe implementation logic – overview

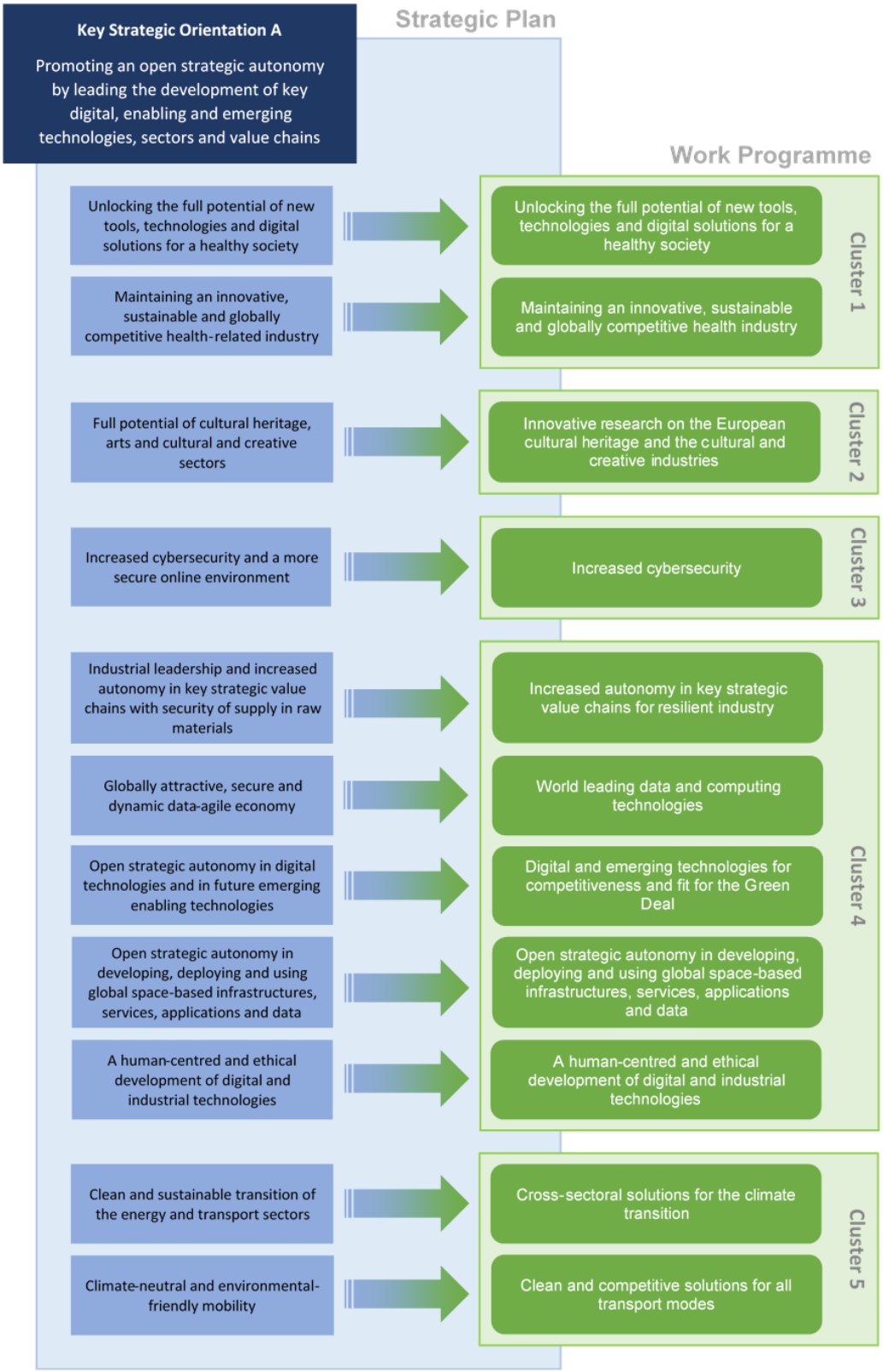


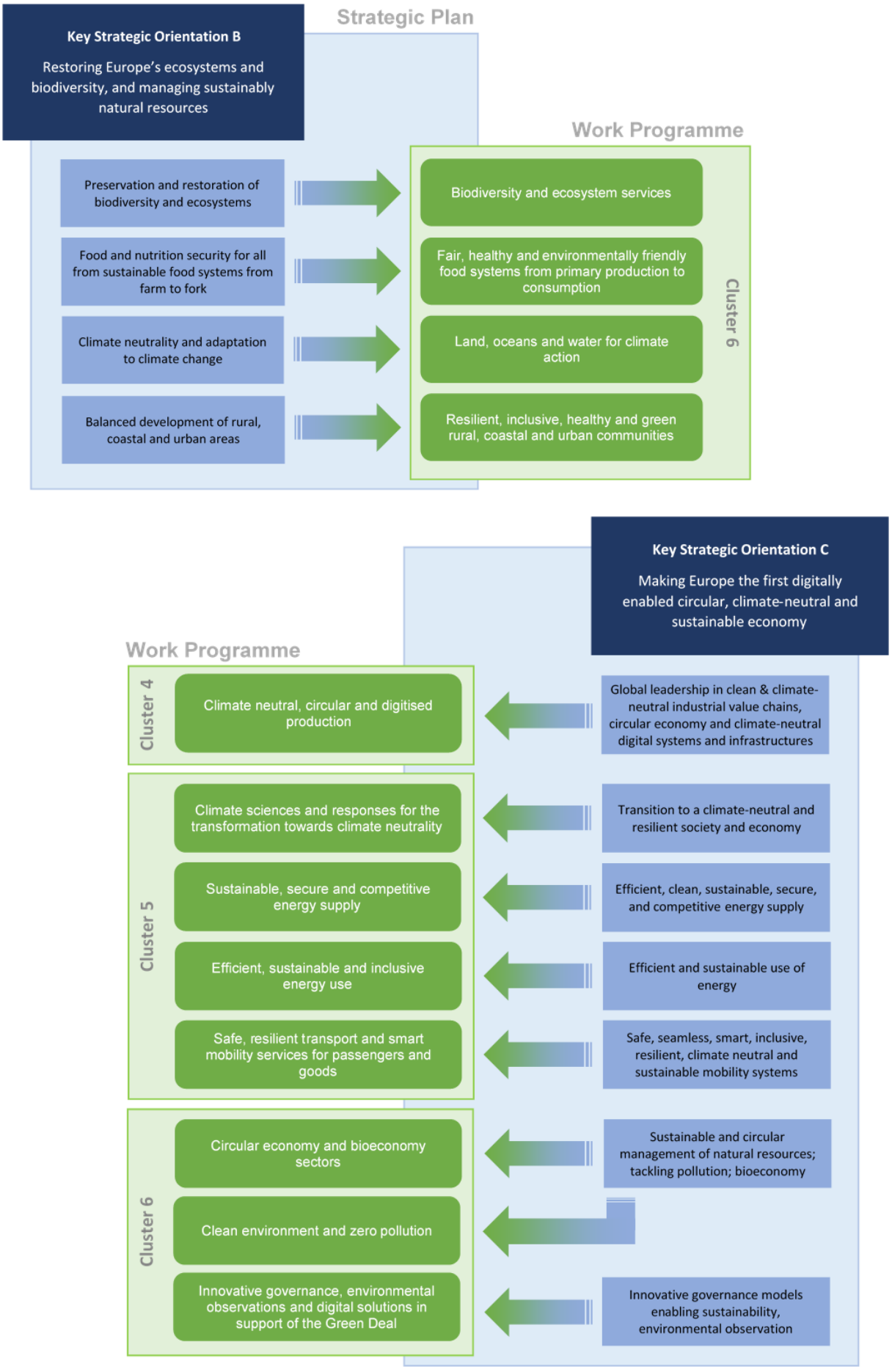
Getting started

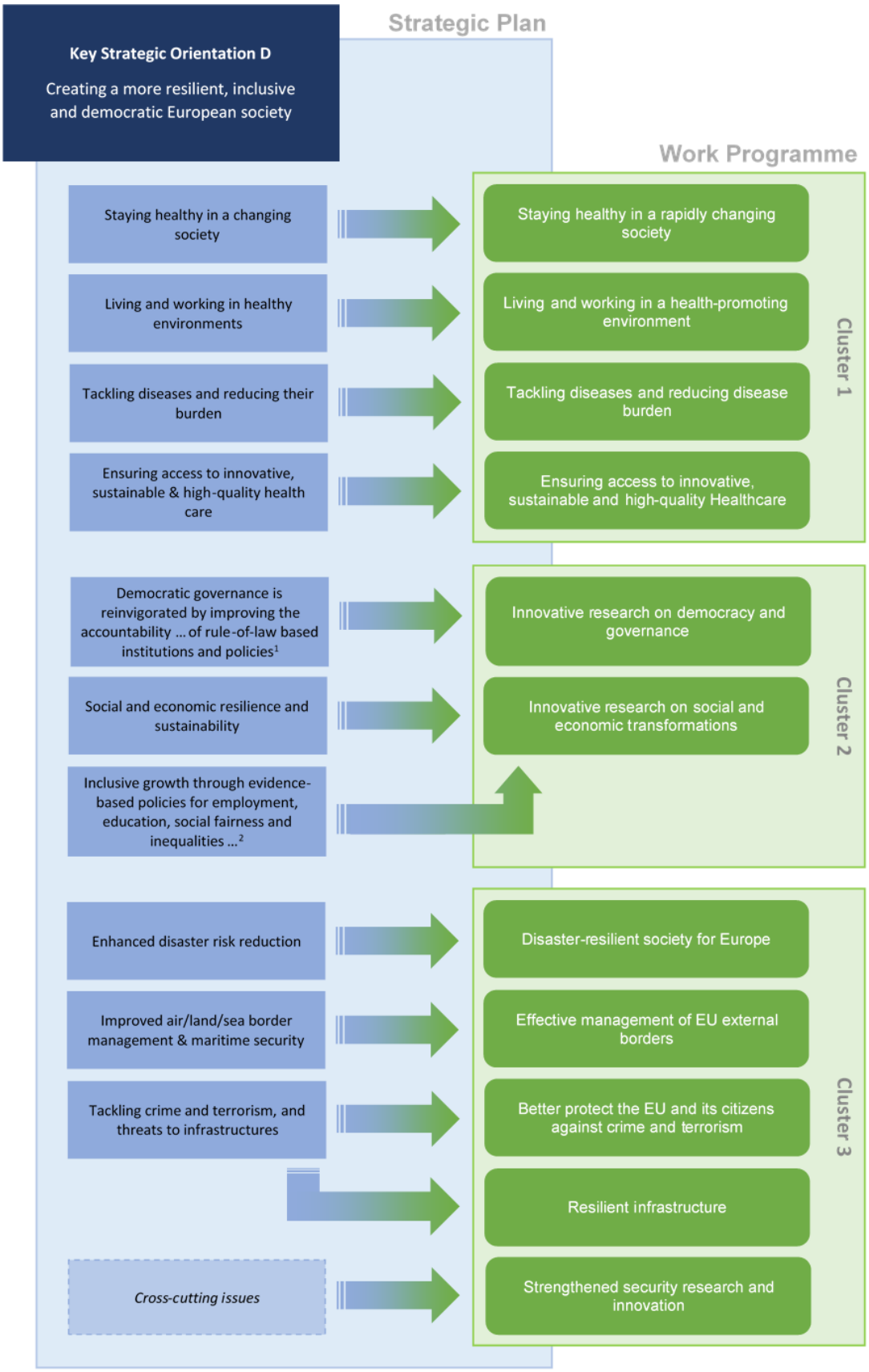
Are you interested in applying for funding through Horizon Europe? On the Funding and Tenders Portal you can see which topics are currently open for applications. The network of National Contact Points stands ready to answer any questions you might have on the application process in your own language.

You can also find more about the Horizon Europe programme at the Horizon Europe web page.

Overview of strategic plan's key strategic orientations, expected impacts and corresponding work programme destinations




Strategic Plan
Key Strategic Orientation B
Restoring Europe's ecosystems and biodiversity, and managing sustainably natural resources
Work Programme
Preservation and restoration of biodiversity and ecosystems
Food and nutrition security for all from sustainable food systems from farm to fork
Climate neutrality and adaptation to climate change
Balanced development of rural, coastal and urban areas
Biodiversity and ecosystem services
Fair, healthy and environmentally friendly food systems from primary production to consumption
Land, oceans and water for climate action
Resilient, inclusive, healthy and green rural, coastal and urban communities
Cluster 6
Key Strategic Orientation C
Making Europe the first digitally enabled circular, climate-neutral and sustainable economy
Work Programme
Cluster 4
Climate neutral, circular and digitised production
Global leadership in clean & climate-neutral industrial value chains, circular economy and climate-neutral digital systems and infrastructures
Cluster 5
Climate sciences and responses for the transformation towards climate neutrality
Transition to a climate-neutral and resilient society and economy
Sustainable, secure and competitive energy supply
Efficient, clean, sustainable, secure, and competitive energy supply
Efficient, sustainable and inclusive energy use
Efficient and sustainable use of energy
Safe, resilient transport and smart mobility services for passengers and goods
Safe, seamless, smart, inclusive, resilient, climate neutral and sustainable mobility systems
Cluster 6
Circular economy and bioeconomy sectors
Sustainable and circular management of natural resources; tackling pollution; bioeconomy
Clean environment and zero pollution
Innovative governance, environmental observations and digital solutions in support of the Green Deal
Innovative governance models enabling sustainability, environmental observation



1: Full title: Democratic governance is reinvigorated by improving the accountability, transparency, effectiveness and trustworthiness of rule-of-law based institutions and policies

2: Full title: Inclusive growth through evidence-based policies for employment, education, social fairness and inequalities, including in response to the socio-economic challenges due to the COVID-19 pandemic