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ANNEX I

“Annex I

Horizon Europe

Work Programme 2023-2024

1. General Introduction

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General introduction

Welcome to the Horizon Europe work programme 2023 - 2024

Horizon Europe is the 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 generations in Europe.

This work programme will cover the years 2023-2024. 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 competitiveness, including through the EU Missions. Finally, it will widen participation in the programme and strengthen 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 this work programme

Horizon Europe supports research and innovation especially through *work programmes*, which set out funding opportunities for research and innovation activities.¹

This introduction covers the following components of Horizon Europe for 2023-2024:

- Marie Skłodowska-Curie actions;
- Research infrastructures;
- Health;
- Culture, Creativity and Inclusive Society;
- Civil Security for Society;
- Digital, Industry and Space;
- Climate, Energy and Mobility;
- Food, Bioeconomy, Natural Resources, Agriculture and Environment;
- European innovation ecosystems;
- Widening participation and spreading excellence, and reforming and enhancing the European R&I system;
- EU Missions (covering 2023²).

In addition to the work programme parts mentioned in the above, the *General Annexes* to this work programme set out the general conditions applying to the calls of the work programme such as eligibility rules; details on how to submit an application; and how the Commission services evaluate applications.

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](#).

¹ See Council Decision (EU) 2021/764.

² As set out in Regulation (EU) 2021/695, art. 8(5), an assessment of the first missions established under the Programme shall take place no later than 2023 and before any decision is taken on creating new missions, or on continuing, terminating or redirecting ongoing missions. The assessment is foreseen by 2023.

Delivering on EU policy priorities

With this work programme, the EU will invest around €13.5 billion in research and innovation that will shape the future of Europe. 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 our security, resilience and a sustainable recovery 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 the light of the new geo-political situation following Russia's unjustified military invasion of **Ukraine**, this work programme will place a special emphasis on actions that contribute to a safe and secure Europe, help reduce energy- and other dependencies and build a more robust economic base. In particular, actions included will help accelerate the clean energy transition in line with the REPowerEU Plan³, improve food security, cybersecurity, help ensure open strategic autonomy and reduce dependencies on critical raw materials, and accelerate delivery of the Green Deal. For example, a package of actions across the 'Climate, Energy and Mobility', 'Digital, Industry and Space' and 'Food, Bioeconomy, Natural Resources, Agriculture and Environment' clusters in particular will aim to speed up the clean energy transition. In addition, this work programme includes targeted actions to support Ukraine such as reinforcing Ukrainian researchers' access to European research infrastructures while the EU Mission for Climate-Neutral and Smart Cities will support a number of Ukrainian cities in integrating the principles of climate neutrality in their reconstruction.

The European Commission encourages all potential participants in actions in this work programme to create, where possible, opportunities for the affected persons and entities, in particular researchers and innovators previously active in Ukraine, Ukrainian researchers and innovators who are unable to return to Ukraine in the given circumstances as well as those who remain in Ukraine but have limited means to continue their work.⁴

In order to support our commitment to make the **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 zero-pollution production, 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.

The **New European Bauhaus** is an initiative in the wider context of the European Green Deal, which aims to show the benefits of the green transition in people's daily lives and living spaces. Research and innovation policy is an integral part of the New European Bauhaus's enabling framework⁵.

³ See the RePower EU plan [here](#).

⁴ Please note that the criteria for evaluation of proposals remain unchanged. The creation of such opportunities is voluntary and does not affect the ranking of proposals.

⁵ COM(2021) 573 final. Read the Communication [here](#).

Horizon Europe - Work programme 2023-2024
General Introduction

Horizon Europe contributes by supporting, across many areas and disciplines, the holistic transformation of the built environment and land-use complex with a regenerative design approach.⁶

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 to ensure that all actors of society, including enterprises, master the complex interplay of technology and humankind, for a better society and life, fully respecting universal human rights and planetary boundaries. For instance, actions supported by this work programme will help to maximise the full potential of human-centric digital tools and data-enabled research and innovation in a wide range of sectors, such as healthcare, cultural and creative industries, energy and mobility as well as food production, and support the deep transformations required for the modernisation of traditional industrial models. Using an EU-coefficient type calculation system it is estimated that 34.5% of funds in the presented work programme, and 36.5% of funds across all parts of Horizon Europe contribute to the digital transition. This equals overall investments of €9.6 billion during 2023-2024. The overall investment into main digital activities, i.e. the development of core digital technologies, is estimated at €3.6 billion in 2023-24.

Finally, this work programme will direct investments of more than €1 billion in 2023 from **NextGeneration EU** to help repair the immediate economic and social damage brought about by the COVID-19 pandemic and to create a post-COVID-19 Europe that is greener, more digital, more resilient, more inclusive and better fit for the current and forthcoming challenges. This is done through topics contributing to a green, digitally-enabled recovery, through modernising health systems, topics contributing to research capacities, including for vaccine development, and supporting actions to increase preparedness for future crises.

⁶ European Commission, Directorate-General for Research and Innovation, Schellnhuber, H., Widera, B., Kutnar, A., et al., *Horizon Europe and new European Bauhaus NEXUS report*, 2022, can be found [here](#).

Investing in the green transition, climate action and biodiversity

The green transition 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 Institutionalised European Partnerships. These are not included in this work programme.

Taking into account all work programmes and planning documents for Horizon Europe 2023-2024⁷ it is estimated that overall 35.6% of funds will contribute to climate action; and 8.5% to biodiversity related policy objectives.

The parts of the present work programme dedicated to the clusters of Pillar II, 'Global Challenges and European Industrial Competitiveness', research infrastructures, widening participation & strengthening the European research area, European innovation ecosystems and the EU Missions together contribute €5.67 billion to climate action, equal to 42.2% of the present work programme budget. Furthermore, these parts will contribute €1.67 billion to biodiversity, equal to 12.4% of the present work programme budget. €242 million of the contributions to biodiversity are from the activities described in the EU Missions. 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 90% of the budget of cluster 'Climate, energy, transport' (€2.27 billion), 55% of the cluster 'Food, Bioeconomy, Natural Resources, Agriculture and Environment' (€998 million), 48% of the cluster 'Digital, Industry and Space' (€1.32 billion) and 5.5% of the cluster 'Health' (€80 million). The actions described in the work programme part on EU Missions allocate €401 million, equal to 65.3% of the Missions' allocated budget, to climate action.

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-coefficients' methodology⁸.

Horizon Europe is committed to the 'Do no harm'-principle (Green Oath), that applies to all EU programmes as expressed in the agreement on the Multiannual Financial Framework⁹. To that end,

⁷ The Horizon Europe components European Research Council, Marie Skłodowska Curie Actions, the European Innovation Council, the European Institute of Innovation and Technology, as well as the Institutionalised European 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. The calculation includes a 60% share for climate action of budgets set aside for a potential missions related amendment for 2024.

⁸ EU-coefficients are based on the internationally recognized Rio-markers methods originally developed by OECD (see further information [here](#).) The EU coefficients 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 coefficients 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 coefficient if they contribute substantially to more than one of the related objectives.

⁹ https://commission.europa.eu/strategy-and-policy/eu-budget/how-it-works/budget-law/interinstitutional-agreement_en

the proposed outcomes of topics in this work programme have been screened for potential detrimental effects on the green transition and on the objectives of the Green Deal related policies¹⁰, and on supporting mid- and long term policy objectives notably of the green and digital transition and societal and economic resilience. Horizon Europe funds research conducted according to highest ethical standards, expressed in the ethics appraisal (for details see the Horizon Europe programme guide¹¹). Ethics standards include an environmental ethics dimension to which proposals have to adhere. Evaluators may ask for ethics screening of proposals as part of the evaluation or ask for checks and audits during project implementation. Potential applicants and participants to actions in this programme can contribute to this aim by reflecting on minimising the direct environmental impacts from their activities in their application form (proposal part B template) e.g. in their choice of methods, the organisation of work, notably the related travel, and from future use of the results¹².

¹⁰ For Horizon Europe's innovation support provided closer to commercialisation by this work programme as well as by the European Innovation Council, the European Commission wants to apply standards that are not lower than those of the EU taxonomy regulation that apply to commercial activities and investments. The ambition to raise standards and environmental performance is reflected in the formulation of topics, their scope and expected outcomes.

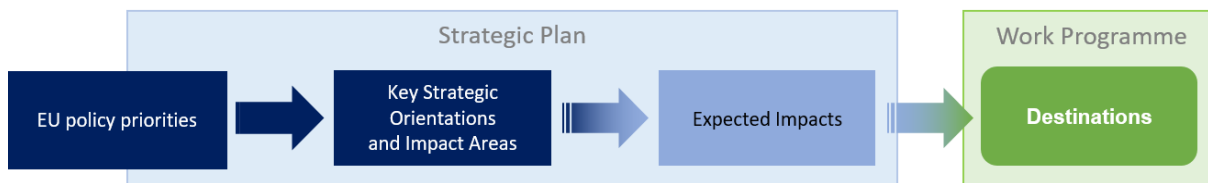
¹¹ https://ec.europa.eu/info/funding-tenders/opportunities/docs/2021-2027/horizon/guidance/programme-guide_horizon_en.pdf

¹² Please note that the criteria for evaluation of proposals remain unchanged. Evaluators will not score applications in relation to their compliance with the principle unless explicitly stated in the work programme.

Delivering on the Horizon Europe Strategic Plan 2021-2024

This work programme for 2023-2024 is a key step in delivering on the priorities set out in the Horizon Europe Strategic Plan for 2021-2024¹³. Based on the overarching EU policy priorities, the Strategic Plan sets out four key strategic orientations and 15 impact areas. These 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 the six clusters can be found in the appendix to this introduction.

From EU priorities to work programme destinations



The four key strategic orientations in the Horizon Europe Strategic Plan 2021-2024 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:



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.

¹³ 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 2021 – 2024 can be found [here](#).

A - Promoting an open strategic autonomy¹⁴ by leading the development of key digital, enabling and emerging technologies, sectors and value chains

As set out in the Versailles declaration¹⁵ following Russia's unjustified military invasion of Ukraine on 24 February 2022, Europe's economic base needs to be more resilient, competitive and fit for the green and digital transitions, while leaving no one behind. Current strategic dependencies related to sensitive areas such as critical raw materials and the digital area are evident across the EU society and economy and need to be addressed. Throughout the COVID-19 pandemic, new technologies have kept our businesses and public services running and our family and social bonds afloat. A number of these are now thoroughly ingrained in our everyday lives, and today, the data economy lies at the heart of innovation and job creation. 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 help shape innovative technologies and solutions in a wide range of applications, paving the way to a resilient, inclusive, regenerative and circular economy, reducing strategic dependencies. Thereby, 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 human-centric, trustworthy, safe and robust technologies that will boost new markets and applications and that are compatible with Europe's ethical standards and values. A dedicated action will also examine humanistic deployment of artificial intelligence and related technologies. Within the **quantum field**, this work programme will target efforts to ensure that Europe will have its first computer with quantum acceleration by 2025, also paving the way for Europe to be at the cutting edge of quantum capabilities by 2030. Efforts will also support the ambitions of the future European Chips Act, including by supporting research at lower Technology Readiness Levels (TRL)¹⁶ in micro-electronics and integration technologies for industrial solutions.
- In order to attain **secure and cybersecure digital technology**, this work programme **supports research and innovation on cybersecure technology and its implications**. For this work programme, efforts will include actions aimed at enhancing prevention and deterrence of advanced forms of cyber threats and cyber-dependent crime and tracing of cryptocurrency transactions.
- With a view to supporting **a competitive and secure data-economy**, a wide-ranging effort on **critical raw materials** is undertaken, targeting all steps of the value chain from exploration, extraction, processing and up- and recycling. Furthermore, this work programme will support efforts to develop advanced materials that can substitute critical raw materials, for instance in applications for the new energy innovation, promoting a circular economy and resource efficiency while reducing strategic dependencies.

¹⁴ '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.

¹⁵ The declaration is available [here](#).

¹⁶ The definition of Technology Readiness Levels (TRL) is available in the General Annexes to this work programme.

- To make available **high quality digital services for all**, it fosters research and innovation on, for example, innovative approaches to empower the **cultural and creative industries**, including its many micro enterprises, to reap the benefits of using digital technologies, creating more appealing and valuable products, services and experiences for its users. Collaborative platforms for cultural heritage and cultural and creative industries will be supported, including a **cloud platform for European cultural heritage institutions**. Such platforms will strengthen the collaboration and co-creation among cultural heritage institutions and with other stakeholders in the cultural heritage domain, widen access for citizens and strengthen research.

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 a wide range of actions, including the European partnership on accelerating farming systems transition and the European partnership on safe and sustainable food systems for people, planet and climate, also focusing on R&I to promote the production, provision and safe consumption of **alternative sources of protein**. Actions also aim to make use of the latest **digital technologies** to revolutionise **fisheries control** and contribute to ensuring sustainable fishing. A number of initiatives also aim to enhance collaboration with **Africa** on these topics. Furthermore, specific initiatives aim to use **advanced materials for sustainable agriculture**, by creating more sustainable agrochemicals. At the other end of the food system, this work programme will also help create biodegradable polymers for sustainable packaging materials.
- 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 actions focusing on halting emissions of pollution to air, soil and water; also promoting sustainable use of pesticides; protecting drinking water and managing urban water pollution, enabling chemicals and materials that are safe and sustainable by design¹⁷ and increasing environmental performances and sustainability of processes and products, e.g. in

¹⁷ Read more about the Safe and Sustainable by Design Framework and the Strategic Research and Innovation Plan for chemicals and materials [here](#).

construction products and textiles. Related actions will also create new knowledge about the role of **environmental pollution in human health**.

- To **enhance ecosystems and biodiversity on land and in waters**, actions will focus on understanding and addressing the main **drivers of biodiversity loss**; **promote biodiversity protection and restoration** and help develop new **biodiversity friendly practices** in agriculture, forestry, industry and aquaculture, for instance by promoting pollinator friendly farming systems. This work programme also supports the European Biodiversity Partnership: Biodiversa+.

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 and topics throughout the work programme.
- With a view to reducing energy dependencies and promote **affordable and clean energy**, this work programme 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. One focus area in this regard is supporting a competitive and sustainable **European battery value chain**.
- 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). Efforts are also focused to promote **zero-emission road transport**; accelerating climate neutral hydrogen-powered/electrified **aviation** and sustainable **waterborne transport**.
- As a considerable contribution to **regenerative, circular and clean economy**, this work programme will advance **research and innovation on climate neutral, circular and digitised production** and support the European Partnerships **Made in Europe, Processes4Planet and Clean Steel**, which will demonstrate EU leadership in the transformation of the manufacturing and energy-intensive industries into circular and carbon-neutral sectors. This work programme will also pave the way to the development of chemicals and materials fit

for the twin digital and green transition through the Safe and Sustainable by Design approach¹⁸. Finally, efforts include a project to create **one hundred circular model households**, which will pilot efforts aimed at making European households sustainable through inclusive circular practices.

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 facilitate the development of 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 civil security research for disaster risk management, border management and law enforcement while mitigating the negative effects of acute crises.

This key strategic objective and **four impact areas** encompass 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 with a wide-ranging number of activities targeting the **young** as well as the **'silver' generations**, with **personalised medicine** and **special care for people in vulnerable situations**¹⁹, as we are adapting to the post-pandemic life, for instance with actions aimed to create evidence-based interventions for promotion of mental and physical health in changing working environments (post-pandemic workplaces).
- 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 'Detecting, analysing and countering foreign information manipulation and interference'; 'Disinformation by state authorities: developing a better understanding of information suppression' and 'Computational Social Science approaches in research on democratic legitimacy, resilience of democratic institutions and the new patterns of democratic participation'. It will also support actions to combat hate speech on the internet and beyond. It will support critical

¹⁸ https://ec.europa.eu/info/research-and-innovation/research-area/industrial-research-and-innovation/key-enabling-technologies/advanced-materials_en#sustainable-by-design-approach-towards-a-sustainable-future

¹⁹ E.g. groups of people and/or patients vulnerable from a social, financial, or health perspective, or at risk of discrimination, such as migrants, Roma people, trans and intersex people, specific age and gender groups (that intersect with other aspects of vulnerability, such as elderly women), indigenous people, homeless people, people in poverty or at risk of poverty, people with disabilities or patients with complex conditions.

infrastructures against physical and cyber threats to reinforce the EU **resilience of critical entities**, in order to anticipate the future risk landscape, the increasingly tight interdependencies between different sectors, and also the increasingly interdependent relationships between physical and digital infrastructures.

- To create a **resilient EU prepared for emerging threats**, research and innovation will enhance Europe's **disaster-resilience**, including through actions to enhance **pandemic preparedness**, e.g. by developing new broad spectrum anti-viral therapeutics for infectious diseases with epidemic potential, and creating new knowledge to better understand the relationship between infectious and non-communicable diseases. It will also support actions aimed at improving preparedness for **health emergencies**. With a view to supporting the **European Health Emergency Preparedness and Response Authority** (HERA)'s objectives, this work programme will promote investments in research to improve Europe's preparedness and ability to respond to serious cross-border threats to health.
- Finally, to foster **inclusive growth and new job opportunities**, research and innovation under this work programme will help assessing and strengthening the complementarity between **new technologies and human skills**; and tackling **inequalities in the green and digital transitions** through specific topics.

The EU Missions

Horizon Europe has introduced the EU Missions as a new concept for the EU framework programmes. EU Missions address some of the greatest global challenges that affect our daily lives. They have ambitious, clear and targeted objectives that are time-bound, realistic and measurable. They are rooted in research and innovation and they will employ a portfolio approach to tackle these challenges using instruments across diverse disciplines and policy areas in a joined-up way.

With this work programme, the Commission launches an investment of more than €600 million for 2023. The investment will support research and innovation which is expected to result in, for example, better prepared local and regional authorities to face climate-related risks, the restoration of at least 25 000 km of free-flowing rivers, Climate City Contracts with 100 cities, the roll-out of robust soil monitoring programmes or optimise minimally-invasive diagnostic cancer interventions. The actions included directly support key overarching EU priorities such as the European Green Deal, a Europe fit for the Digital Age, the Europe's Beating Cancer Plan and an Economy that works for people.

The Commission invites researchers and innovators as well as citizens and all interested stakeholders to take part in the five Missions:

Adaptation to Climate Change: support at least 150 European regions and communities to become climate resilient by 2030.

This Mission will turn the urgent challenge of adapting to climate change into an opportunity to make Europe resilient, fair and prepared to deal with climate disruptions, such as extreme weather events, drought, wildfires, heat or sea level rise. The Mission will support European regions to be prepared for the inevitable changes and extreme events and share experiences and solutions to prevent loss of lives and livelihoods.

Cancer: improving the lives of more than 3 million people by 2030 through prevention, cure and for those affected by cancer including their families, to live longer and better.

The Mission on Cancer will support Member States, regions and communities on cancer control, even more so in light of the disruptive effect of the COVID-19 pandemic. It will enhance understanding of cancer, boost prevention, optimise diagnosis and treatment, improve quality of lives of patients and their families and ensure equitable access to care across Europe. The Mission will put citizens, including patients, at the centre of research and innovation, and research and innovation at the centre of policy development.

Restore our Ocean and Waters by 2030

Man-made and climate-driven changes are putting our ocean and waters and consequently our societies at a serious risk. The Mission's new, systemic approach will address the ocean and waters as one and play a key role in achieving climate neutrality and restoring nature. The Mission will preserve aquatic ecosystems and biodiversity by protecting 30% of the EU's sea area as well as restoring marine eco-systems and 25.000 km of free flowing rivers, prevent and eliminate pollution by reducing plastic litter at sea, nutrient losses and use of chemical pesticides by 50% and make the blue economy climate-neutral and circular with net-zero maritime emissions.

100 Climate neutral and smart cities by 2030

Producing more than 70% of global CO₂ emissions, cities play a pivotal role in achieving climate neutrality by 2050. Through the novel instrument of Climate City Contracts that closely involve citizens, at least 100 cities will be supported in their ambition to become climate-neutral by 2030.

They will lead in green and digital innovation and they will demonstrate solutions that will enable all other cities to follow suit by 2050. On 28 April 2022, the Commission announced²⁰ the selection of the 112 cities from Member States and Associated Countries that will be participating in the mission and with whom Climate City Contracts will be concluded.

A Soil Deal for Europe: 100 living labs and lighthouses to lead the transition towards healthy soils by 2030

Life on Earth depends on healthy soils, but they are under threat, making us more vulnerable to food insecurity and extreme weather events. The Mission will engage with people, create effective partnerships across sectors and territories to protect and restore soils. It will contribute to Green Deal targets relating to sustainable farming, climate resilience, biodiversity and zero-pollution.

Supporting EU priorities through international cooperation in research and innovation

International cooperation in research and innovation is essential for tackling global challenges more effectively and underpins all the key strategic orientations of the Horizon Europe Strategic Plan 2021-2024. It also enables Europe to access resources, know-how, scientific excellence, value chains and markets that are developing outside the EU.

In line with the EU global approach to research and innovation²¹, 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 international initiatives in areas such as **renewable energies, global health, environmental observations, ocean- coastal and arctic research, disaster management, and fair, healthy and environment-friendly food systems**. It also builds on the ambitious and comprehensive '**Africa Initiative**' and introduces the '**Mediterranean Initiative**', which identifies relevant topics across different clusters to respond to the new R&I Agenda developed with the Union for the Mediterranean.

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. In a limited number of cases for actions related to Union strategic assets, interests, autonomy or security, actions will be limited to cooperation between legal entities established in 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.

The EU is a front-runner of international openness in R&I, at the same time, international cooperation can involve risks and challenges that must be taken into account. To support R&I actors in mitigating such risks, the Commission has published a **toolkit for tackling foreign interference in R&I**²². It is strongly recommended that participants in Horizon Europe actions familiarise themselves with this publication and consider its relevance for the proposals they intend to submit.

²⁰ See the press release [here](#).

²¹ COM(2021) 252. Read the Communication [here](#).

²² Tackling R&I foreign interference: staff working document, 2022. See the document [here](#)

Strengthening framework conditions for research and innovation

This work programme will also strengthen the framework conditions for research and innovation within the EU by contributing to a stronger European research and innovation ecosystem, including through wider participation, greater mobility for researchers and world class research infrastructures.

The work programme part for **Marie Skłodowska-Curie Actions** (MSCA) responds 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 MSCA make an important contribution by supporting researchers' training and mobility through bottom-up and excellence-driven research in the framework of doctoral networks, postdoctoral fellowships²³, staff exchanges and citizen outreach, thereby equipping researchers with new knowledge and skills and providing them with international and inter-sectoral exposure. A special area of focus is providing researchers at risk with tailored support in their new geographical area. 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. Through the dedicated work programme part, excellent research and breakthrough science and innovation will be supported with cutting-edge, interconnected, specialised and sustainable **Research Infrastructures**. Special focus areas will be the further development of the European Open Science Cloud, thereby supporting open access to digital services for all European researchers; the support for access and integration of other research infrastructures services, including in the field of health and the green and digital areas but also to enable curiosity driven research in all scientific domains, and the development of the next generation of scientific tools and solutions for research and innovation.

As also set out in the New European Innovation Agenda²⁴, the urgent challenges of today are inherently complex and systemic and will not be solved by individual actors or territories in isolation. To foster enabling innovation ecosystems across Europe requires a systemic approach that is inclusive and collaborative, involves diverse actors, institutions and places, maximises the value of innovation to all and ensures equitable diffusion of its benefits. The work programme part on **European Innovation Ecosystems** (EIE) supports concrete actions to help create interconnected, inclusive and more efficient innovation ecosystems across Europe that draw on the existing strengths of European, national, regional and local ecosystems and pulls in new, less well-represented stakeholders and less advanced in innovation territories. Furthermore, it supports cooperation between innovation players, for instance with actions aimed at strengthening cooperation between academia and industry, or deep tech companies led by women. It also provides opportunities for innovative SMEs cooperation with European and/or international partners through funding market-led, cross-border, R&I collaborative projects and providing accompanying measures.

²³ Aiming to enhance nuclear expertise and excellence as well as synergies between Horizon Europe and the Euratom Research and Training Programme, nuclear researchers are eligible to participate in MSCA Postdoctoral Fellowships supported by an annual financial contribution from the Euratom Research and Training Programme.

²⁴ A New European Innovation Agenda: COM(2022) 332 final. See the communication [here](#).

The European Research Area (ERA) foresees a single, borderless market for research, innovation and technology across the EU based on excellent, competitive, open and talent driven research. Actions on Open science, Citizen Science, Gender and Ethics as well as a broad spectrum of actions to prioritise investments and reforms, improve access to excellence and reduce the research divide and geographical disparities in research and innovation performance, translate R&I results into the economy and deepen the ERA are presented in the current work programme part on **Widening participation and strengthening the European Research Area**. The goal is to have a Union, where knowledge and a highly skilled workforce circulate freely; where research outputs are shared rapidly and efficiently; where researchers benefit from attractive careers and gender equality is ensured.

Ensuring continuity and bringing in new features

The work programme for 2023-2024 is shaped around the successes of and lessons learned from the work programme 2021-2022 and 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 introduced with Horizon Europe 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 content²⁵ 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 as an eligibility criterion.

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.

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 in cooperation with EU funding programmes. To foster synergies between Horizon Europe and other EU programmes and policies, they are considered in the design of the work programmes, level, as well as throughout all relevant implementation steps, such as project selection, management, communication, dissemination and exploitation of results. For instance, a set of guidelines on new opportunities to maximise the synergies between Horizon Europe and the European Regional Development Fund programmes was published in July 2022.²⁶

²⁵ 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, as well as gender equality objectives, 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

²⁶ See the guidelines [here](#).

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Social innovation – i.e. innovation for societal impact and innovation with citizens, academics, entrepreneurs, and public administrators 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.

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.

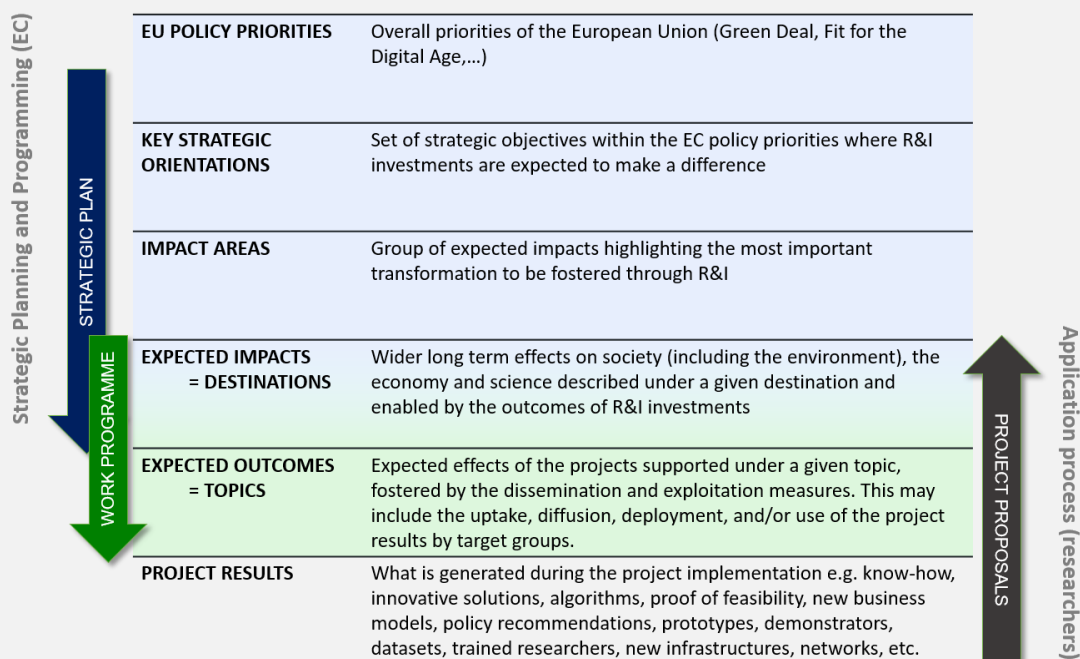
Each **destination** describes socio-economic challenges to be addressed and the related expected impacts that R&I activities will contribute to.

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 2021-2024.

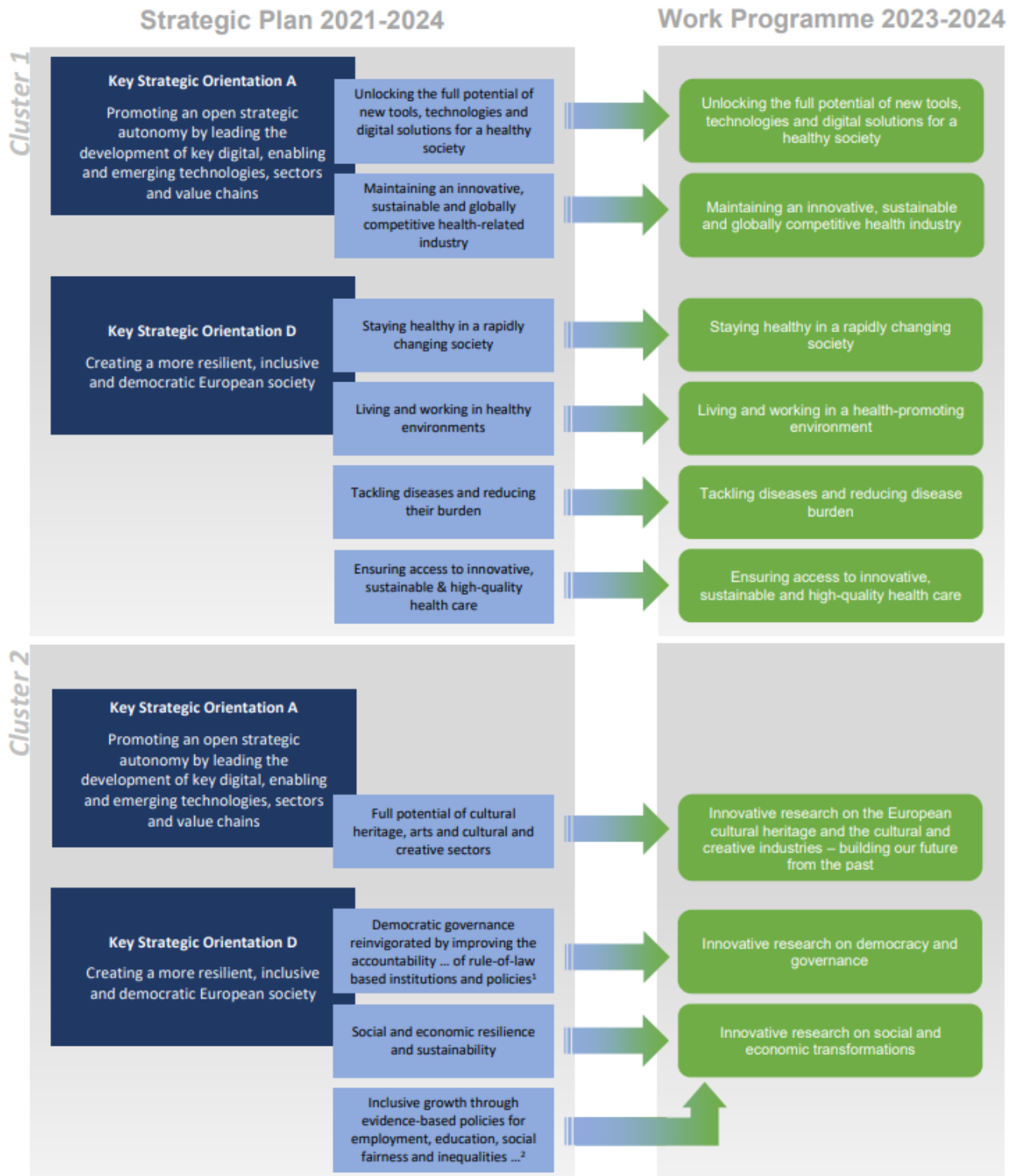
Under each destination, one or more **topics** describe the expected outcomes and the scope of the research and innovation activities to be supported. The **expected outcomes** are the desired effects of the project in the medium term such as the uptake, diffusion, use and/or deployment of the project's 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



Annex 1



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

