



# HORIZON EUROPE

THE EU  
RESEARCH &  
INNOVATION  
PROGRAMME 2021 – 27



This presentation is based on the political agreement of 11 December 2020 on the Horizon Europe. Information on some parts is pending revision.

19 March 2021

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HORIZON EUROPE

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# Investing to shape our future



# Our Vision

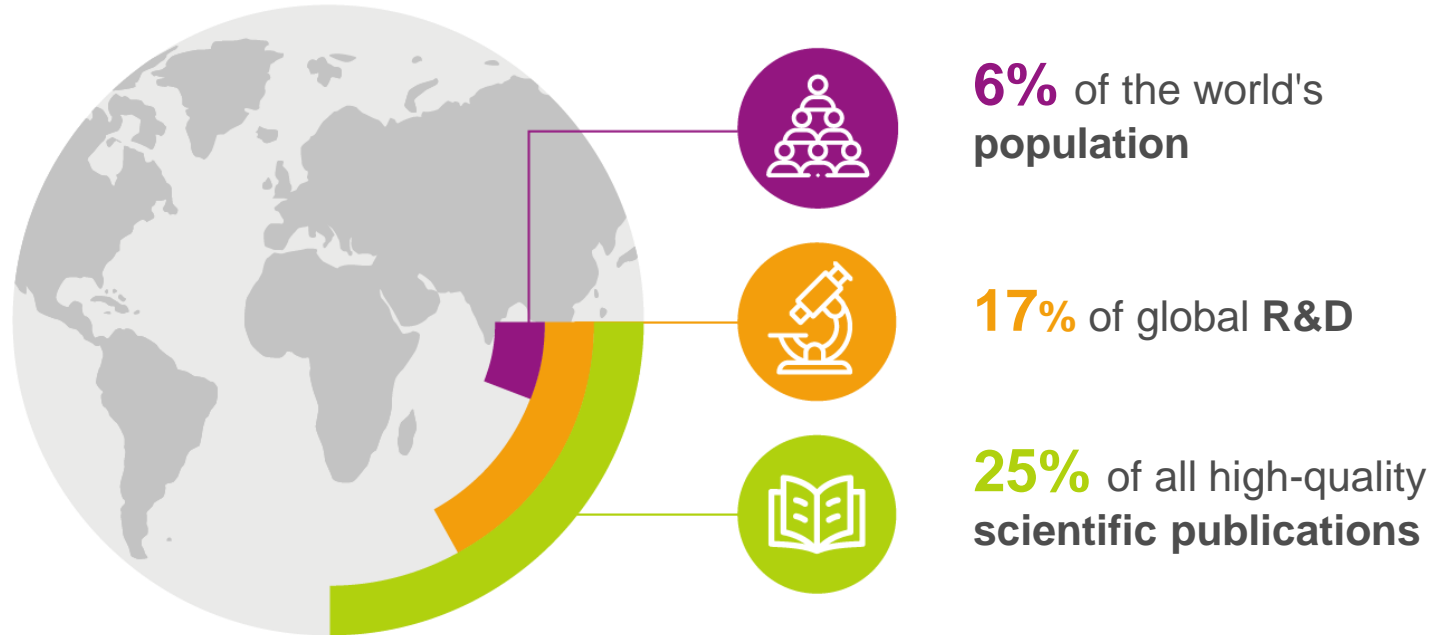
The EU's key funding programme for research and innovation:

- Tackles climate change
- Helps to achieve the UN's Sustainable Development Goals
- Boosts the EU's competitiveness and growth
- Facilitates collaboration and strengthens the impact of research and innovation in developing, supporting and implementing EU policies while tackling global challenges
- Supports the creation and better diffusion of excellent knowledge and technologies
- Creates jobs, fully engages the EU's talent pool, boosts economic growth, promotes industrial competitiveness and optimises investment impact within a strengthened European Research Area.



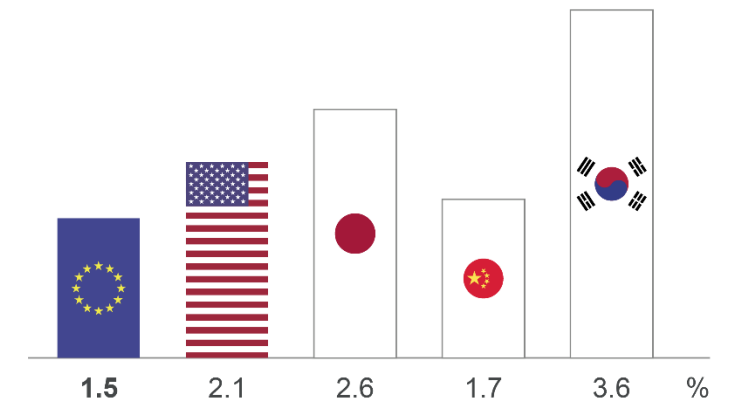
Credits: <https://www.un.org/sustainabledevelopment/sustainable-development-goals/>

# While benefiting from world-class research and strong industries... Our knowledge and skills are our main resources



...Europe can do better at transforming this into **leadership in innovation** and **entrepreneurship**

## 1.5% EU business R&D investment



*EU figure is for 2019  
Figures for USA, Japan, China and South Korea are for 2018. Figures represent R&D as % of GDP*

# HORIZON EUROPE

# EURATOM


**SPECIFIC PROGRAMME: EUROPEAN DEFENCE FUND**  
*Exclusive focus on defence research & development*

Research actions

Development actions

**SPECIFIC PROGRAMME IMPLEMENTING HORIZON EUROPE & EIT\***  
*Exclusive focus on civil applications*

**Pillar I  
EXCELLENT SCIENCE**




European Research Council

Marie Skłodowska-Curie

Research Infrastructures

**Pillar II  
GLOBAL CHALLENGES & EUROPEAN INDUSTRIAL COMPETITIVENESS**




**Clusters**

- Health
- Culture, Creativity & Inclusive Society
- Civil Security for Society
- Digital, Industry & Space
- Climate, Energy & Mobility
- Food, Bioeconomy, Natural Resources, Agriculture & Environment

Joint Research Centre

**Pillar III  
INNOVATIVE EUROPE**



European Innovation Council

European Innovation Ecosystems

European Institute of Innovation & Technology\*

**WIDENING PARTICIPATION AND STRENGTHENING THE EUROPEAN RESEARCH AREA**

Widening participation & spreading excellence

Reforming & Enhancing the European R&I system

Fusion

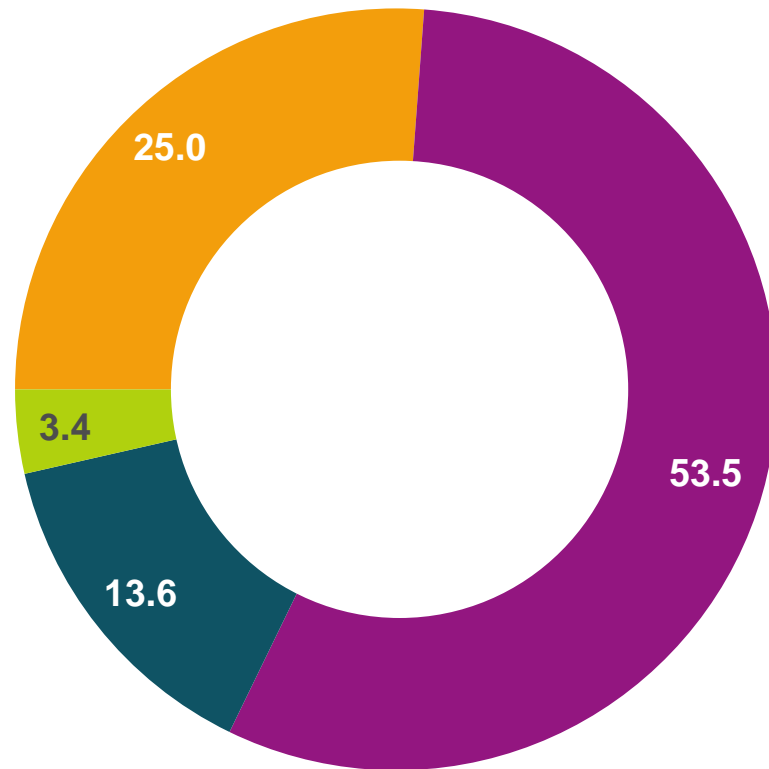
Fission

Joint Research Center

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

# Horizon Europe Budget: €95.5 billion (2021-2027)

(including €5.4 billion from NGEU – Next Generation Europe – programme of EU for Recovery from COVID-19 crisis)



## Political agreement December 2020

€ billion in current prices

- Excellent Science
- Global challenges and European ind. comp.
- Innovative Europe
- Widening Part and ERA

# Lessons Learned

from Horizon 2020 Interim Evaluation



Support breakthrough innovation



Create more impact through mission-orientation and citizens' involvement



Rationalise partnerships' landscape



Reinforce openness



Strengthen international cooperation



Encourage participation



# Key Novelties

in Horizon Europe

European Innovation Council

EU Missions

New approach to partnerships

Open science policy

Extended association possibilities

Spreading Excellence

# EU framework programmes proved powerful for research & innovation impact

**1.5 million**

Collaborations from more than **150 countries**

**3X**

more often among **top 1% cited publications** compared to output in Member States

**€48.2 million**

Directed to coronavirus R&I just **seven days after the first EU case** reported

**84%**

of investments address Sustainable Development Goals; **30% address climate change**

**double**

the proposals received per year **compared to the previous programme**

**19%**

estimated labour productivity increase in funded companies **thanks to the programme\***



# Next: Horizon Europe

The ambitious EU research and innovation framework programme (2021-2027)



fuel EU's **scientific and technological excellence** and the strengthen the European Research Area (ERA)

**Science  
& technology**



tackle policy priorities, including **green and digital transitions** and Sustainable Development Goals

**Society**



boost Europe's **innovation uptake, competitiveness** and **jobs**

**Economy**



# European Innovation Council

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

**European  
Innovation Council –  
a one-stop-shop**

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

Complementary instruments bridging the gap from idea to market

## **PATHFINDER**

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

## **TRANSITION**

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

## **ACCELERATOR**

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



# EU Missions

## R&I Missions

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

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

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

# Five Missions Areas



**Adaptation to  
climate change,  
including societal  
transformation**



**Cancer**



**Healthy oceans,  
seas, coastal &  
inland waters**



**Climate-neutral  
& smart cities**



**Soil health &  
food**

# Mission Board proposals Sept 2020

- **Conquering Cancer: Mission Possible**

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

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

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

- **Mission Starfish 2030: Restore our Ocean and Waters**

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

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

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

- **Caring for Soil is Caring for Life**

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



# New approach to European Partnerships

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

## Key Features

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

### CO-PROGRAMMED

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

### CO-FUNDED

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

### INSTITUTIONALISED

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

# Overview of 49 candidate European Partnerships

## HORIZON EUROPE PILLAR II - Global challenges & European industrial competitiveness

CLUSTER 1: Health	CLUSTER 4: Digital, Industry & Space	CLUSTER 5: Climate, Energy & Mobility	CLUSTER 6: Food, Bioeconomy, Agriculture, ...
Innovative Health Initiative	Key Digital Technologies	Clean Hydrogen	Circular Bio-based Europe
Global Health Partnership	Smart Networks & Services	Clean Aviation	Rescuing Biodiversity to Safeguard Life on Earth
Transformation of health systems	High Performance Computing	Single European Sky ATM Research 3	Climate Neutral, Sustainable & Productive Blue Economy
Chemicals risk assessment	European Metrology (Art. 185)	Europe's Rail	Water4All
ERA for Health	AI-Data-Robotics	Connected and Automated Mobility (CCAM)	Animal Health & Welfare*
Rare diseases*	Photonics	Batteries	Accelerating Farming Systems Transitions*
One-Health Anti Microbial Resistance*	Made in Europe	Zero-emission waterborne transport	Agriculture of Data*
Personalised Medicine*	Clean steel – low-carbon steelmaking	Zero-emission road transport	Safe & Sustainable Food System*
Pandemic Preparedness* <i>Co-funded or co-programmed</i>	Processes4Planet	Built4People	
	Global competitive space systems**	Clean Energy Transition	
		Driving Urban Transitions	

- Institutionalised Partnerships (Art 185/7)
- Institutionalised Partnerships / EIT KICs
- Co-Programmed
- Co-Funded

\* Calls with opening dates in 2023-24  
 \*\* Calls with opening dates not before 2022

## PILLAR III - Innovative Europe

EIT (KNOWLEDGE & INNOVATION COMMUNITIES)	SUPPORT TO INNOVATION ECOSYSTEMS
InnoEnergy	Innovative SMEs
Climate	
Digital	
Food	
Health	
Raw Materials	
Manufacturing	
Urban Mobility	
Cultural and Creative Industries	

## CROSS-PILLARS II & III

European Open Science Cloud
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# European Partnerships: more information

[European partnerships webpage](#) on europa.eu:

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

**Horizon Europe Strategic Plan** – identification of co-programmed and co-funded European partnerships

**Commission proposals for Art 185/7 initiatives**





# International Cooperation

## International Cooperation

Tackling together global societal challenges; access to the world's best talents, expertise and resources; enhanced supply and demand of innovative solutions

## Association to Horizon Europe

- Third countries with good capacity in science, technology and innovation
- Taking into account objective of driving economic growth in Europe through innovation
- Intensified targeted actions
- Strengthened support to multilateral cooperation
- Openness to international participation balanced with the promotion of EU strategic autonomy



# Open Science across the programme

Open  
Science

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

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

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

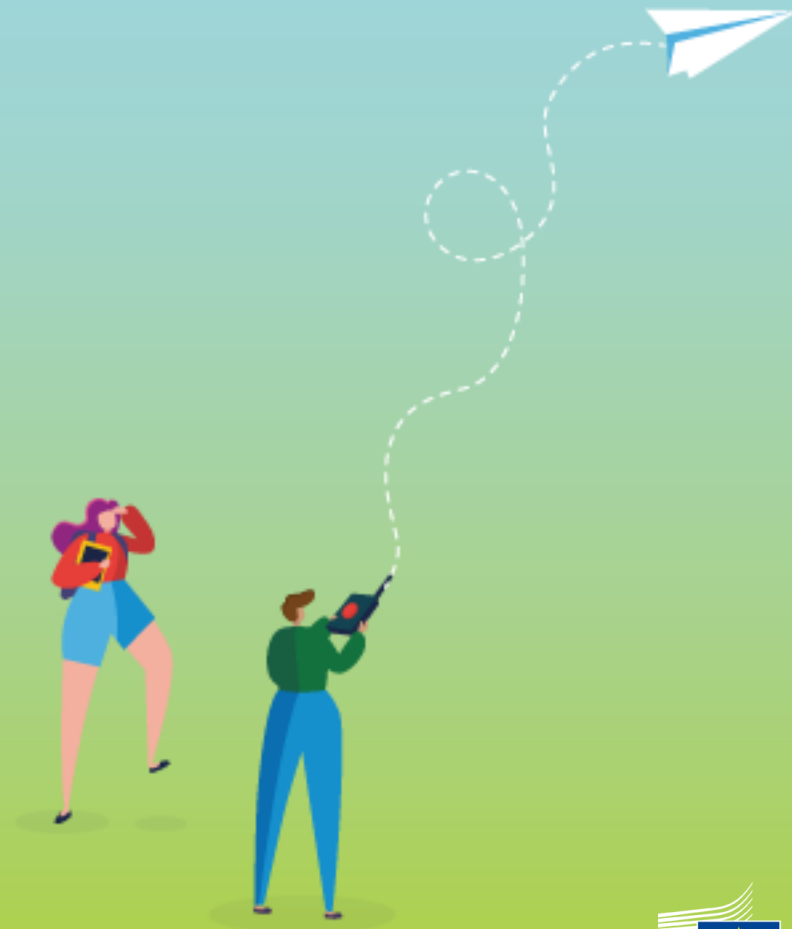
- Work Programmes may incentivize or oblige to adhere to **open science practices** such as involvement of citizens, or to use the **European Open Science Cloud**
- Assessment of open science practices through the **award criteria** for proposal evaluation
- Dedicated support to **open science policy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

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# In detail



## Pillar I

# EXCELLENT SCIENCE:

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

### European Research Council

Frontier research by the best researchers and their teams

**€16 billion**

### Marie Skłodowska-Curie Actions

Equipping researchers with new knowledge and skills through mobility and training

**€6.6 billion**

### Research Infrastructures

Integrated and inter-connected world-class research infrastructures

**€2.4 billion**



# European Research Council

Competitive funding to support investigator-driven frontier research across all fields, on the basis of scientific excellence.

## Funding



10,000+  
Projects funded  
since 2007



Over 70% of completed  
ERC projects led to  
breakthroughs or major  
advances (according to  
independent studies)



7 Nobel Prizes, 4 Fields  
Medals, hundreds of  
important prizes awarded  
to ERC grantees



80+  
Nationalities  
(ERC grantees)



**Starting Grant:** up to €1.5 million. Duration: up to 5 years. 2-7 years of experience since completion of PhD.



**Consolidator Grant:** up to €2 million. Duration: up to 5 years. 7-12 years of experience since completion of PhD.



**Advanced Grant:** up to €2.5 million. Duration: up to 5 years. An excellent scientific track record of recognized achievements in the last 10 years.



**Synergy Grant:** 2-4 researchers (one can be based outside Europe). Up to a maximum of €10 million for a period of 6 years.

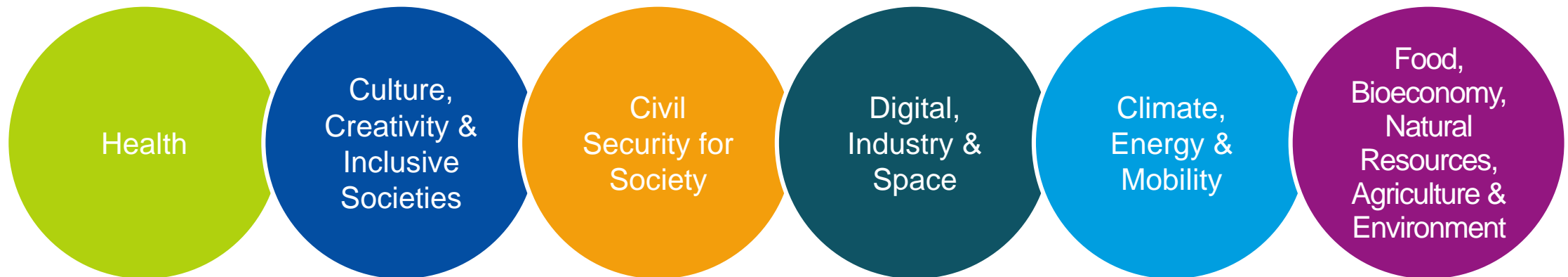
*“The expertise that we gathered in cancer trials encouraged us to extend the use of mRNA vaccines towards the prevention of infectious diseases. Groundbreaking innovation requires decades of research and contributions from multiple research frontiers until it reaches maturity to provide benefit for humanity.”*

**ERC Grantee Uğur Şahin, Mainz University**

## Pillar II - Clusters

# GLOBAL CHALLENGES & EUROPEAN INDUSTRIAL COMPETITIVENESS:

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



€53.5 billion

## Pillar II

# Budget for clusters & for JRC

*in current prices*

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

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

## Pillar III

# INNOVATIVE EUROPE:

stimulating **market-creating breakthroughs** and **ecosystems** conducive to innovation

### European Innovation Council

Support to innovations with breakthrough and market creating potential

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

### European innovation ecosystems

Connecting with regional and national innovation actors

### European Institute of Innovation and Technology (EIT)

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

circa **€3 billion**



Part

# Widening Participation & Strengthening the European Research Area (ERA):

## Widening Participation and Spreading Excellence

- Teaming, Twinning, ERA Chairs,
- European Cooperation in Science and Technology (COST)
- Boosting National Contact Points' (NCPs) activities, pre-proposal checks and advice
- Brain circulation
- Excellence initiatives:
- Possibility for entities from widening countries to join already selected collaborative R&I actions
- Recognition of participation
- Matchmaking services

**€2.96 billion**

## Reforming and enhancing the EU R&I system

- Strengthening the evidence base for R&I policy
- Foresight
- Support for policy makers to the ERA development
- Support to national R&I policy reform, including Policy Support Facility
- Attractive researcher careers and links with higher education
- Open science, citizen science and science communication
- Gender equality
- Ethics and integrity
- Support to international cooperation
- Scientific input to other policies
- Support to the Programme implementation
- Support for National Contact Points
- Support to dissemination & exploitation

**€0.44 billion**

# EURATOM research and training programme (2021-2025)

## Objective

Research and training activities to reduce risks in nuclear safety and security, development of safe nuclear technologies and optimal radiation protection.

## Key novelties

- Increased focus on non-power applications of radiation (medical, industrial, space)
- Opening mobility opportunities for nuclear researchers through inclusion in Marie Skłodowska-Curie Actions

## Budget for years 2021-27

**€1.981 billion**

# Strategic Plan

- The implementation of the specific programme and the EIT's KICs shall be supported by a transparent and strategic planning of research and innovation activities, in particular for the pillar 'Global Challenges and European Industrial Competitiveness' and cover also relevant activities in other pillars and the Widening Participation and Strengthening the European Research Area part.
- The Commission ensures early involvement of the Member States and extensive exchanges with the European Parliament, complemented by consultation with stakeholders and the general public.
- The Strategic Planning shall ensure alignment with other relevant Union programmes and consistency with EU priorities and commitments and increase complementarity and synergies with national and regional funding programmes and priorities, thereby strengthening the ERA.
- The result of the Strategic Planning are set out in a multiannual Strategic Plan, for preparing the content in the work programmes covering a maximum period of four years, while retaining sufficient flexibility to respond rapidly to new and emerging challenges, unexpected opportunities and crises.

# Strategic Plan

The Strategic plan contains:

- Key strategic orientations for R&I support, including a description of expected impacts, cross-cluster issues and intervention areas covered;
- Identification of co-programmed and co-funded European Partnerships;
- Identification of missions;
- Areas for international cooperation;
- Specific issues, such as the balance between research and innovation; the integration of Social Sciences and Humanities; the role of Key Enabling Technologies and strategic value chains; gender equality, including the integration of gender dimension in the R&I content; adherence to the highest ethics and integrity standards; priorities for dissemination and exploitation

# The first Strategic Plan

The first Strategic Plan covers the years 2021-2024.

It follows a series of intense co-creation activities among European Commission services and co-design activities with representatives of the Member States, Members of the European Parliament, stakeholders and the general public over a period of 18 months.

The co-design activities with stakeholders and the public have taken the form of web surveys and interactive workshops during the 2019 and 2020 editions of the European Research and Innovation Days.

It was adopted in March 2021.

# 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.

The 'main' Work Programme covers the following components of Horizon Europe:

- Marie Skłodowska-Curie actions and research infrastructures (Pillar I);
- all clusters (Pillar II);
- the 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 'main' Work Programme for 2021-2022 is made up of 13 parts:

- the 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.

# About the Horizon Europe Work Programmes

Separate Work Programmes cover:

- the European Research Council (ERC)
- the Joint Research Centre (JRC)
- 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.

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).

# InvestEU for Research and Innovation (R&I)

**Stimulates more investment in research and innovation**, notably by the private sector; leverages and complements national/regional initiatives

**No market distortion:** intervention only to address financing gaps in the R&I delivery chain (notably due to high risk)

## Support through:

- InvestEU Fund
- InvestEU Assistance
- InvestEU Portal

With an EU budgetary guarantee of **€6.6 billion**, the Research, Innovation and Digitisation is expected to leverage an estimated **€90 billion** of investments into R&I; **market-based finance** for the exploitation and scale-up of European R&I.



# Implementation. Simple & fit for purpose rules

- **ensuring continuity and consistency for beneficiaries by maintaining**
  - Attractive Horizon 2020 funding model, including up to 100% funding rate of direct costs
  - Single set of rules principle
- Further alignment to the Financial Regulation
- Increased use of **simplified forms of funding** where appropriate (building on the H2020 lump sum pilot experience)
- Broader acceptance of **usual cost accounting practices**
- Enhanced **cross-reliance on audits** benefiting beneficiaries taking part in several Union programmes

# Implementation Strategy: guiding principles

- **Maximising impacts**
- **Greater transparency and further simplification (model grant agreement and guidance to beneficiaries)**
- **Fostering synergies** with other EU funding programmes
- **Easing access** through digital transformation and outreach (Funding and tenders portal – one-stop-shop for **easy access** to EU funding and project implementation)

Under each guiding principles, we will implement key measures:

[https://ec.europa.eu/info/files/implementation-strategy-horizon-europe\\_en](https://ec.europa.eu/info/files/implementation-strategy-horizon-europe_en)

# Synergies with other Union programmes

HORIZON EUROPE			
Other Union Programmes, including			
Common Agricultural Policy	InvestEU	ESF+	Innovation Fund
External Instrument	LIFE	Digital Europe	Internal Security Fund and Instrument for Border Management
Maritime & Fisheries Fund	EU4Health	Space Programme	Single Market Programme
Connecting Europe Facility	ERDF	ERASMUS+	Recovery and Resilience Facility
Just Transition Mechanism		Creative Europe	

## Enhanced synergies

### COMPATIBILITY

Harmonisation of funding rules; flexible co-funding schemes; pooling resources at EU level

### COHERENCE & COMPLEMENTARITY

Alignment of strategic priorities in support of a common vision

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# Impact, flexibility, co-design



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



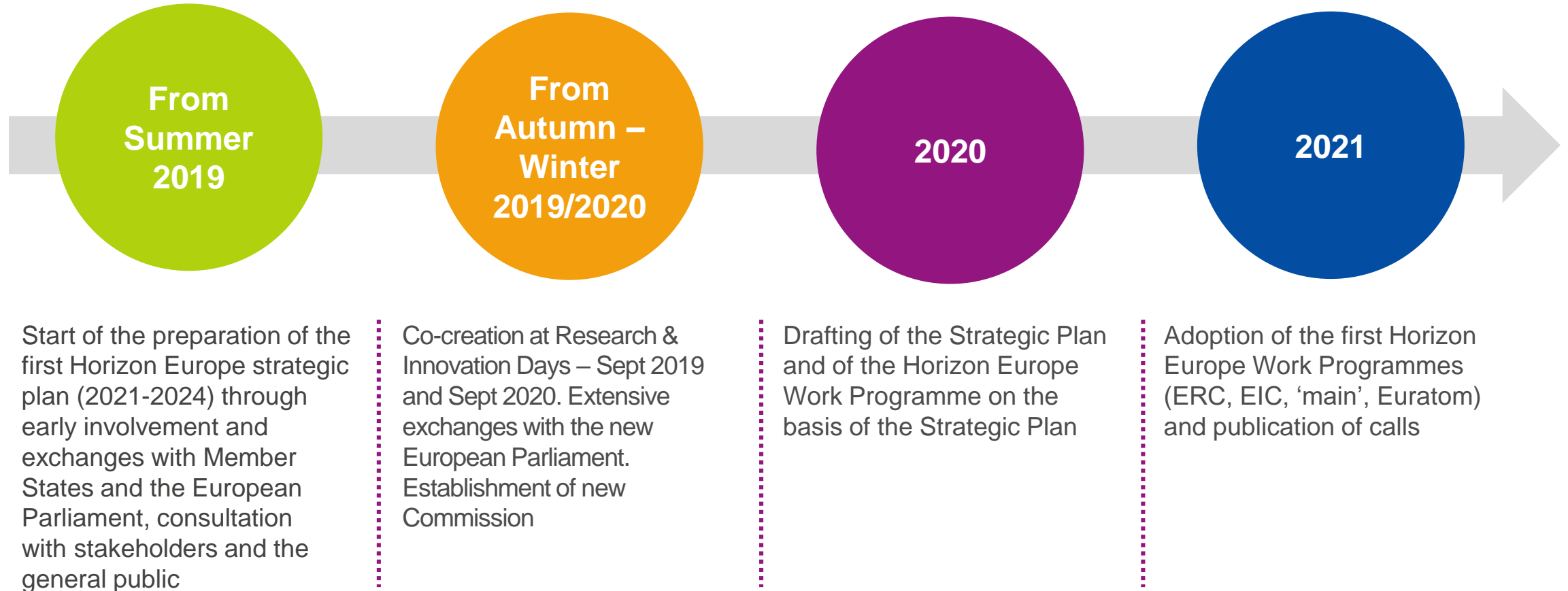
## Why do we need a robust **monitoring system**?

- Make sense of a complex funding landscape
- Connect micro-data with programme's objectives
- Get insights on time
- Account for the inherent risk and time lag of R&I investments
- Uncover the true added value of EU funding
- Reduce administrative burden on beneficiaries

## Key principles of **Key Impact Pathways** Ambitious & pragmatic framework

- **Proximity** from broad overview to continuous monitoring of each project
- **Attribution** details about most granular details (VAT numbers, researcher identifiers, DOIs...)
- **Traceability** multiple data sources in one place minimize reporting burden (publications, patents, companies, researchers)
- **Holistic approach** knowing how each part of the programme contributes to its impact
- **Stability** building on current systems, piloting new advanced counterfactual approaches

# Steps towards the first Horizon Europe work programme



# Follow us and keep up to date via:

## HorizonEU

*Commissioner Mariya Gabriel:* @GabrielMariya

*Director-General Jean-Eric Paquet:* @JEPaquetEU

**DG Research and Innovation:** @EUScienceInnov @EU\_H2020

<https://www.facebook.com/EUScienceInnov/>

**Horizon Magazine:** @HorizonMagEU

**Horizon Europe website:** <http://ec.europa.eu/horizon-europe>

**European Innovation Council:** <http://ec.europa.eu/research/eic>

**European Research Council:** <https://erc.europa.eu/>





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With Horizon Europe, we step up our ambition for a sustainable future. The programme will maximise its impact by strengthening our scientific and technological bases, boosting our innovation capacity, driving the green and digital transitions and supporting an inclusive recovery.

**Mariya Gabriel**

*Commissioner for Innovation, Research, Culture, Education & Youth*

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European  
Commission |



# Thank you!

## #HorizonEU

<http://ec.europa.eu/horizon-europe>



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