APRE
Agenzia per la Promozione della Ricerca Europea

Cluster 4 – Digital, Industry and Space

APRE- Agency for the Promotion of European Research

GRUPPO DI SUPPORTO RISTRETTO – *CLUSTER4*

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Agenda

- From H2020 Industrial Leadership to HE Cluster 4
- Cluster 4 – Relevant Policies
- Cluster 4 related Destinations
- Cluster 4 – European Partnerships


"Europe must lead the transition to a healthy planet and a new digital world. But it can only do so by bringing people together and upgrading our unique social market economy to fit today's new ambitions."
European Commission

Digital, Industry and Space

15,358 B €

16,7% di HEU

Pillar 1
Excellent Science

- European Research Council
- Marie Skłodowska-Curie Actions
- Research Infrastructures

Pillar 2
Global Challenges and European Industrial Competitiveness

Clusters
- 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

- Joint Research Centre

Pillar 3
Innovative Europe

- European Innovation Council
- European innovation ecosystems
- European Institute of Innovation and Technology

Widening Participation and Strengthening the European Research Area

- Widening participation and spreading excellence
- Reforming and Enhancing the European R&I system

Partnerships
&
Missions

CLUSTER 4 GENESIS

DIGITAL, INDUSTRY AND SPACE

Excellence Science

- **European Research Council**
  Frontier research by the best individual teams (ERA)
- **Future and Emerging Technologies**
  Collaborative research to open new fields of innovation
- **Marie Sklodowska Curie Actions**
  Opportunities for training and carrer development
- **Research Infrastructures (Including e-infrastructure)**
  Ensuring access to world-class facilities

Industrial Leadership

Leadership in enabling and industrial technologies

- ICT
- Nanotechnologies materials, biotechnologies, manifacturing
- Space

- **Access to risk finance**
  Leveraging private finance and venture capital for research and innovation
- **Innovation in SMEs**
  Fostering all forms of innovationin all types of SMEs

Societal Challange

- Health, demographic change and wellbeing
- Food security, sustainable agriculture, marine and maritime research, and the bio-economy
- Secure, clean and efficient energy
- Smart, green and integrated transport
- Climate action, resource efficiency and raw materials
- Europe in a changing world – inclusive, innovative, reflective societies
- Secure Societies

Pillar 1
Excellent Science

- European Research Council
- Marie Skłodowska-Curie Actions
- Research Infrastructures

Pillar 2
Global Challenges and European Industrial Competitiveness

Cluster

- Health
- Culture, Creativity and Inclusive Society
- Civil Security for Society
- **Digital, Industry and Space**
- Climate, Energy and Mobility
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Joint Research Centre

Pillar 3
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Widening Participation and Strengthening the European Research Area

- Widening participation and spreading excellence
- Reforming and Enhancing the European R&I system

Cluster 4 - Political Priorities

RELEVANT EU STRATEGIES AND POLICIES FOR DIGITAL TRANSFORMATION

A Europe fit for the digital age

- Excellence and trust in Artificial Intelligence – AI Regulatory Package

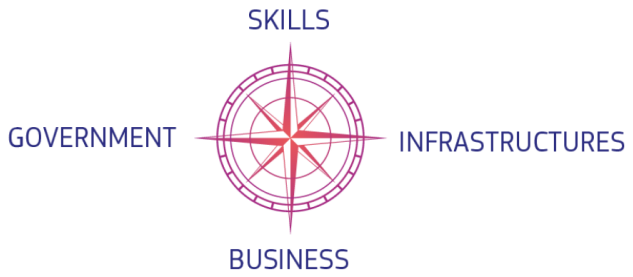
Empowering businesses to start, scale up, innovate and compete on fair terms

- European Data Strategy

Promoting social and environmental sustainability, and making emission-heavy processes more efficient through digital technologies

Digital Compass 2030

On 9 March 2021, the Commission presented a vision and avenues for Europe's digital transformation by 2030.



RELEVANT EU STRATEGIES AND POLICIES FOR INDUSTRIAL COMPETITIVENESS

A European Green Deal

The European Green Deal is a set of policy initiatives brought forward by the European Commission with the overarching aim of making Europe climate neutral in 2050

New Industrial Strategy

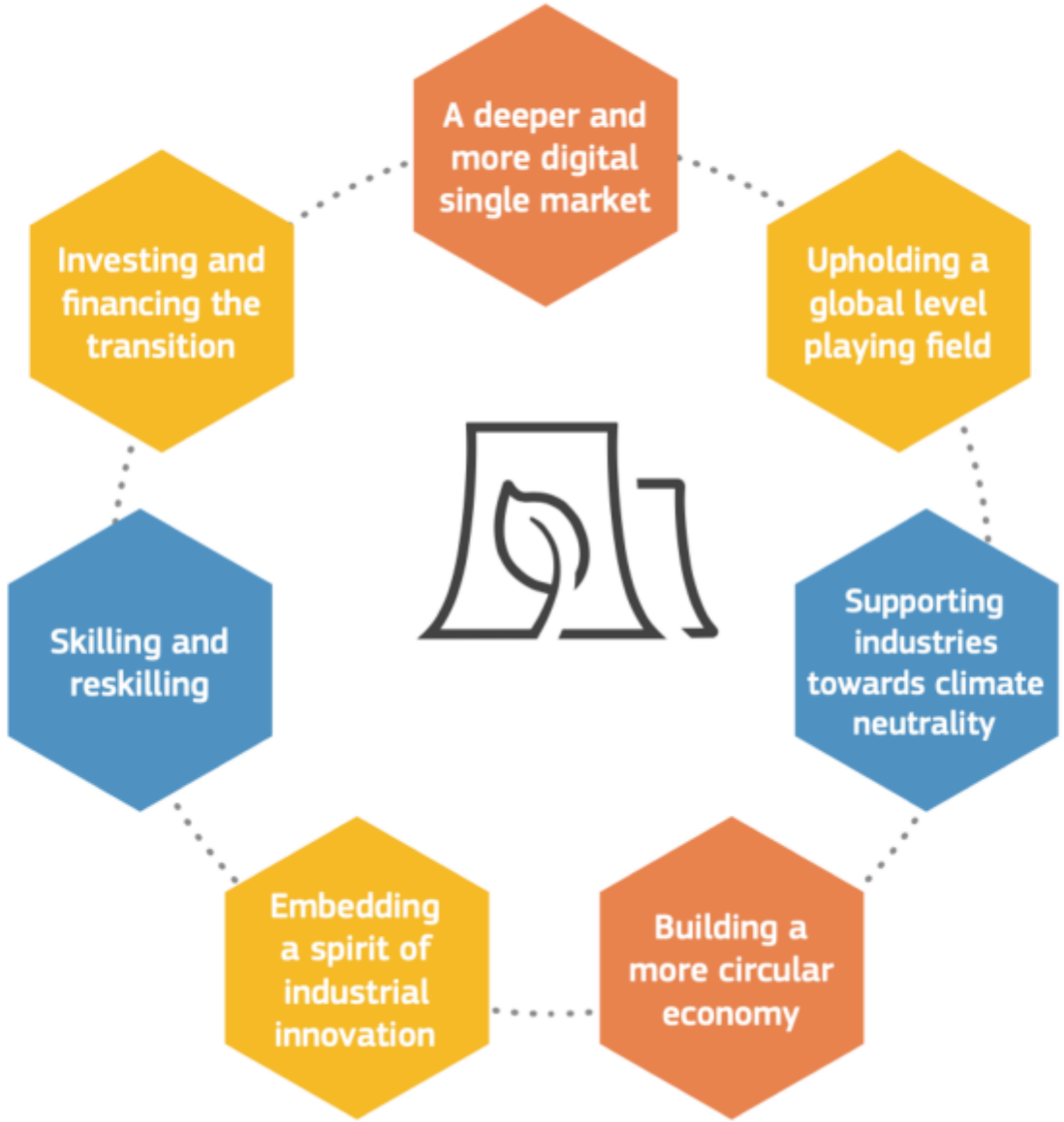
With its new industrial strategy, the European Commission aims to ensure that European businesses remain fit to achieve their ambitions, while coping with global competition.

Circular economy Action plan

Changing how we produce and consume: New Circular Economy Action Plan shows the way to a climate-neutral, competitive economy of empowered consumers

Achieving industrial transformation

These are fundamental factors in making Europe's industrial twin transformation happen:



What is strengthened with CL 4 in Horizon Europe

- Global leadership in clean and climate-neutral industrial value chains, circular economy and climate-neutral digital systems and infrastructures (networks, data centres)
- Industrial leadership and increased autonomy in key strategic value chains with security of supply in raw materials
- Sovereignty in digital technologies and in future emerging enabling technologies by strengthening European capacities in key parts of digital and future supply chains
- Globally attractive, secure and dynamic data-agile economy by developing and enabling the uptake of the next-generation computing and data technologies and infrastructures (including space infrastructure and data)
- Strategic autonomy in conceiving, developing, deploying and using global space-based infrastructures, services, applications and data
- A human-centred and ethical development of digital and industrial technologies

Four key strategic orientations for greater impact

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

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

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

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

Cluster 4 & Key Strategic Orientation

Strategic Plan 2021-2024

CLUSTER 4 – AREAS OF INTERVENTION 2021-2027

DIGITAL

- Key Digital Technologies
- AI and Robotics
- NGI
- Advanced Computing and Big Data

INDUSTRY

- Manufacturing
- Advanced materials
- Circular industry
- Low carbon and clean industry

SPACE

- A globally competitive Space sector
- New services from Space

Emerging enabling technologies: Graphene, Quantum Technologies, spintronics, smart materials

Cluster 4 Expected Impacts

2021-24

- Global leadership in clean and climate-neutral industrial value chains, circular economy and climate-neutral digital systems and infrastructures
- Industrial leadership and increased autonomy in key strategic value chains with security of supply in raw materials
- Globally attractive, secure and dynamic data-agile economy
- Sovereignty in digital technologies and in future emerging enabling technologies
- Strategic autonomy in developing, deploying and using global space-based infrastructures, services, applications and data
- A human-centred and ethical development of digital and industrial technologies

Cluster 4 Destinations

2021-22

1. Climate neutral, circular and digitised production
2. A digitised, resource-efficient and resilient industry
3. World leading data and computing technologies
4. Digital and emerging technologies for competitiveness and fit for the green deal
5. Strategic autonomy in developing, deploying and using global space-based infrastructures
6. A human-centred and ethical development of digital and industrial technologies

Horizon Europe
"Destinations" in Cluster 4

Short name	Full name	Topics include:
TWIN-TRANSITION	1. Climate neutral, circular and digitised production	Green, flexible, digital ; Construction; Renewable resources, waste
RESILIENCE	2. A digitised, resource-efficient and resilient industry	Materials (raw, green, sustainable); Multi-functional materials, green electronic materials
DATA	3. World leading data and computing technologies	**Data**, platforms, Cloud to Edge computing, Internet infrastructures
DIGITAL-EMERGING	4. Digital and emerging technologies for competitiveness and fit for the green deal	Electronics, Photonics, low-power processors, **AI,** 6G, **Robotics**, Quantum, Graphene
SPACE	5. Strategic autonomy in developing, deploying and using global space-based infrastructures, services, applications and data	Space, Satellite, Observation systems, space services
HUMAN	6. A human-centred and ethical development of digital and industrial technologies	**Trustworthy AI**, Ethics, Next Generation Internet, digital interaction, digital learning

HE CL4 Work Programme 2021-2022

- Published on June 15th, 2021
- Call 2021 Opening: June 22th, 2021

HORIZON-CL4-2021-TWIN-TRANSITION-01 (Scadenza: 23 Settembre 2021)

HORIZON-CL4-2021-RESILIENCE-01 (Scadenza: 23 Settembre 2021)

HORIZON-CL4-2021-DATA-01 (Scadenza: 21 Ottobre 2021)

HORIZON-CL4-2021-DIGITAL-EMERGING-01 (Scadenza: 21 Ottobre 2021)

HORIZON-CL4-2021-HUMAN-01 (Scadenza: 21 Ottobre 2021)

HORIZON-CL4-2021-RESILIENCE-02 (Scadenza: 25 Gennaio 2022)

HORIZON-CL4-2021-DIGITAL-EMERGING-02 (Scadenza: 27 Gennaio 2022)

HORIZON-CL4-2021-SPACE-01 (Scadenza: 16 Febbraio 2022)

HORIZON-CL4-2022-SPACE-01 (Scadenza: 16 Febbraio 2022)

HORIZON-CL4-2021-RESILIENCE-02-PCP (Scadenza: 30 Marzo 2022)

1 Climate neutral, circular and digitised production

Green, flexible and advanced manufacturing

From Laser-based technologies for green manufacturing & Manufacturing technologies for bio-based materials; to **AI enhanced robotics systems** for smart manufacturing & **Zero-defect manufacturing towards zero-waste**

Advanced digital technologies for manufacturing

Artificial Intelligence for sustainable, agile manufacturing & Data-driven Distributed Industrial Environments

A new way to build, accelerating disruptive change in construction

From Automated tools for the valorisation of construction waste & Breakthrough technologies supporting technological sovereignty in construction to Digital permits and compliance checks for buildings and infrastructure

HORIZON-CL4-2021-TWIN-TRANSITION-01 (Scadenza: 23 Settembre 2021)

1 Climate neutral, circular and digitised production

Enabling circularity of resources in the process industries, including waste, water and CO2/CO

Plastic waste as a circular carbon feedstock for industry; Carbon Direct Avoidance in steel: Electricity and hydrogen-based metallurgy; Improvement of the yield of the iron and steel making; Reducing environmental footprint, improving circularity in extractive and processing value chains

Hubs for circularity, a stepping stone towards climate neutrality and circularity in industry

Deploying industrial-urban symbiosis solutions for the utilization of energy, water, industrial waste and by-products at regional scale & Hubs for Circularity European Community of Practice (ECoP)

Integration of Renewables and Electrification in process industry

Design and optimisation of energy flexible industrial processes; Adjustment of Steel process production to prepare for the transition towards climate neutrality

HORIZON-CL4-2021-TWIN-TRANSITION-01 (Scadenza: 23 Settembre 2021)

Budget

Call	Budgets (EUR million)		Deadline(s)
	2021	2022	
HORIZON-CL4-2021-TWIN-TRANSITION-01	403.00		23 Sep 2021
HORIZON-CL4-2022-TWIN-TRANSITION-01		334.50	30 Mar 2022
Overall indicative budget	403.00	334.50	

SECTION: Green, flexible and advanced manufacturing

targets:

Laser based manufacturing technologies,(PPP)
AI enhanced robotics systems for smart manufacturing (PPP)
Zero-defect manufacturing (PPP),
Bio-based Materials, (PPP),
zero-wastem nufacturing, laser-based, Advanced materials,
circular economy

Objectives

Increase resilience and global competitiveness of European manufacturing companies, through more efficient, versatile, effective and participatory production processes, while reducing CO2 emissions and waste ending up in landfills, and material use by increasing durability, re-use/repair/ re-manufacturing/recycling of products/components.

SECTION: Advanced digital technologies for manufacturing

targets:

AI for sustainable manufacturing (PPPs), Data Driven Industrial Environments,
Big data, sensors, 5G, AI, virtual reality, wearable devices,
Advanced modelling and analysis tools, easily reconfigurable robots and 3D printing capabilities, human-robot collaboration

Objectives

to increase productivity and innovation capacity of the manufacturing sector, to contribute to making manufacturing greener, more digital, and more resilient, and to make the jobs of the humans working in the manufacturing sector more attractive and safer, via smart application of digital technologies.

SECTION: A new way to build, accelerating disruptive change in construction

targets:

Digital permits and compliance checks for buildings and infrastructure (IA), Industrialisation in Construction Automation in Construction and de-construction
Automated tools for the valorisation of construction waste,
Breakthrough technologies supporting technological sovereignty in construction
Building Information Modelling
Safety in construction
Materials

Objectives
European competitiveness and climate neutrality of the construction sector through deeper digitalisation and automation

SECTION: Hubs for circularity, a stepping stone towards climate neutrality and circularity in industry

targets:

Large-scale industrial symbiosis projects

- Deploying industrial-urban symbiosis solutions for the utilization of energy, water, industrial waste and by-products at regional scale (PPP)
- **Hubs for Circularity European Community of Practice (ECoP) platform**

Reduction of emissions and waste, promoting resource and energy efficiency, waste streams valorisation and secondary raw materials uptake, along with integration of re
industry

N. TOPIC	5

Objectives

Establish at least 10 new Hubs for circularity by 2026, providing large scale demonstration platforms (e.g. industrial cluster regional level) for (near) climate neutral, near zero waste and zero landfill concepts at TRL 7 and above.

These hubs should become lighthouse examples of win-win cooperation between industry, SMEs, public authorities, educational institutions and civil society on circular economy beyond 2026

SECTION: Enabling circularity of resources in the process industries, including waste, water and CO2/CO

targets:

Technologies for the valorisation and decontamination of inputs, waste (plastic, biomass, etc.) and CO2/CO streams
Steel processes, raw material for EU industrial value chains

N. TOPIC	5

Objectives

Maximise the utilisation of CO2/CO streams and waste as secondary raw materials. Cut GHG and pollutant emissions and decrease primary raw materials utilisation.

SECTION: Integration of Renewables and Electrification in process industry

targets:

Electricity powered processes and technologies, management systems for real time balancing of energy demand and supply at cluster level, system integration of industry produced carbon and nitrogen based energy carriers

Objectives

Electrify Energy intensive industries and develop technologies to enable and support the energy transition (grid services, energy storage). Foster the achievement of a climate neutral, zero GHG and pollutant emissions industry, moving away from fossil-based energy.

2 A digitised, resource-efficient and resilient industry

Novel paradigms to establish resilient and circular value chains

Ensuring circularity of composite materials

Raw materials for EU strategic autonomy and successful transition to a climate-neutral and circular economy

From Identifying future availability of secondary raw materials to Developing climate-neutral and circular raw materials & supporting responsible EU sourcing of primary raw materials & Building innovative value chains; EU-Africa partnerships

Green and Sustainable Materials

Fostering the sustainable-by-design materials communities and research on polymeric materials & metallic coatings and engineered surfaces; Promote Europe's availability, affordability, sustainability and security of supply of essential chemicals and materials; increase recycled plastics in value products

HORIZON-CL4-2021-RESILIENCE-01 (Scadenza: 23 Settembre 2021)

2 A digitised, resource-efficient and resilient industry

Materials for the benefit of society and the environment and materials for decarbonising Industry

From Advanced materials for hydrogen storage to Antimicrobial, Antiviral, and Antifungal Nanocoatings (To TRL 5); To Development of more energy efficient electrically heated catalytic reactors; and support the community for solar fuels and chemicals

Materials and data cross-cutting actions

From Sustainable Industry Commons research-driven approach; To development of Biomaterials database for Health Applications

Improving the resilience and preparedness of EU businesses, especially SMEs and Startups

Fostering the European Technological and Social Innovation Factory & Social and affordable housing district demonstrator; supporting 'Innovate to transform' principle for SMEs, OITB

HORIZON-CL4-2021-RESILIENCE-01 (Scadenza: 23 Settembre 2021)
HORIZON-CL4-2021-RESILIENCE-02-PCP (Scadenza: 30 Marzo 2022)

Call	Budgets (EUR million)		Deadline(s)
	2021	2022	
HORIZON-CL4-2021-RESILIENCE-01	365.20		23 Sep 2021
HORIZON-CL4-2022-RESILIENCE-01		402.20	30 Mar 2022
HORIZON-CL4-2022-RESILIENCE-02-PCP		9.00	30 Mar 2022
Overall indicative budget	365.20	411.20	

3 World leading data and computing technologies

Data sharing in the common European data space (from TRL 5)

From responsible & compliant data operations (sustainability and privacy-by-design); to data management; in 2022 data, exchange and interoperability (focus on trading & monetizing)

Strengthening Europe's data analytics capacity (in 2022)

From Extreme-scale data mining, aggregation and analytics technologies (from TRL 5) to analysis, prediction, decision support for the exploitation of extremely precise outcomes (to TRL 5)

From Cloud to Edge to IoT for European Data

From Meta Operating System and Platforms, to community building and roadmap for next computing and systems technologies and "Cloud-Edge-IoT" domain. In 2022 Cognitive Cloud and Programming tools for decentralised intelligence and swarms

HORIZON-CL4-2021-DATA-01 (Scadenza: 21 Ottobre 2021)

Call	Budgets (EUR million)		Deadline(s)
	2021	2022	
IZON-CL4-2021-DATA-01	141.00		21 Oct 2021
IZON-CL4-2022-DATA-01		205.00	05 Apr 2022
all indicative budget	141.00	205.00	

targets:

improve the efficiency of and the use of trustworthy digital technologies;
improve the availability of digital technologies, solutions and interoperable frameworks for data markets and data economy;
develop new secure and scalable data management tools

N. TOPIC	3

Objectives

In line with the **FAIR principles (Findable, Accessible, Interoperable and Reusable)** make the EU the most successful area in the world in terms of data sharing and data re-use while respecting the legal framework relating to security and privacy and fostering collaboration and building on existing initiatives.

SECTION: Strengthening Europe's data analytics capacity

targets:

improve the efficiency of and the use of trustworthy digital technologies;
improve the availability of digital technologies, solutions and interoperable frameworks for data markets and data economy;
develop new secure and scalable data management tools

N. TOPIC	2

Objectives

In line with the FAIR principles (Findable, Accessible, Interoperable and Reusable) make the EU the most successful area in the world in terms of data sharing and data re-use while respecting the legal framework relating to security and privacy and fostering collaboration and building on existing initiatives.

4 Digital and emerging technologies for competitiveness and fit for the green deal

- Ultra-low power processors

Ultra-low-power, secure processors for edge computing (To TRL 5) and community building on Open Source Hardware for ultra-low-power, secure processors

- European Innovation Leadership in Electronics

Functional electronics for green and circular economy

- European Innovation Leadership in Photonics

From research-driven approaches on integrated photonics circuits to advanced optical communication components.

- Innovation in AI, data and robotics

AI, data and robotics at work and for the Green Deal (to TRL 5)

- Tomorrow's deployable Robots: efficient, robust, safe, adaptive and trusted

Robotics cognition research; Network of Excellence Centres in Robotics

HORIZON-CL4-2021-DIGITAL-EMERGING-01 (Scadenza: 21 Ottobre 2021)

4 Digital and emerging technologies for competitiveness and fit for the green deal

6G and foundational connectivity technologies

Coordination of European Smart Network actions

HORIZON-CL4-2021-DIGITAL-EMERGING-01 (Scadenza: 21 Ottobre 2021)

European leadership in Emerging Enabling Technologies

Advanced Spintronics, and bio-intelligent manufacturing; Academia- Industry forum

Flagship on Quantum Technologies: a Paradigm Shift

Qsensing technologies; emerging QT technologies Int. Coop. with Canada; Support to QT Flagship and FPA selection

Graphene: Europe in the lead (2022)

Safe-by-design 2D materials production (focus on composites, coatings, foams); electronic and photonic 2D devices; 2D materials-based devices for Energy storage and for biomedical applications. Support to Flagship

HORIZON-CL4-2021-DIGITAL-EMERGING-02 (Scadenza: 27 Gennaio 2022)

SECTION: Ultra-low power processors

targets:

Ultra-low-power, secure processors for edge computing;
Embedded systems, operating systems and software technologies for edge computing;
Strengthen EU technological sovereignty with Open Source software and hardware

N. TOPIC	3

Objectives

ensure EU technological sovereignty through the development of low-power, low environmental impact, secure and trusted components and software for strategic value-chains.

Link

- **Key Digital Technologies**
- **EuroHPC**
- Cybersecurity (Cluster 3)

SECTION: European Innovation Leadership in Electronics

targets:

Reinforce European industrial leadership in KDT;
Establish Europe as a world player in the post-Moore era;
To deliver components and systems for energy-efficient, clean and circular production

N. TOPIC	3

Objectives

To secure access in Europe to cutting-edge digital technologies, to strengthen current leadership in strategic value-chains, and to seize emerging opportunities addressing existing technological gaps.

Link

- **Key Digital Technologies**
- AI, data & robotics

SECTION: European Innovation Leadership in Photonics

targets:

Deliver communication at light speed;
Develop a new generation of multi-sensing systems;
Develop photonic building blocks and integration schemes and platforms

N. TOPIC	3

Objectives

To strengthen current leadership in photonic technologies and applications, and to secure access in Europe to cutting-edge photonic technologies.

Link:

- **Photonics**
- Key Digital Technologies
- AI, data & robotics

targets:

Reinforce European leadership in **connectivity, devices and service infrastructure**, with European capabilities in shaping future connectivity (**6G**) standards;
Enable a massive **digital and green transitions** towards low carbon footprint of conventional (vertical) industries;
Enable networks to deliver advanced real-time sub-millisecond latency applications that are competitive, secure and privacy-preserving;
Enable trusted and energy-efficient network infrastructures

N. TOPIC	2

Objectives

develop a strong supply chain for connectivity, increase European competitiveness and sovereignty in core Internet infrastructures, and to contribute to a reduction of the growing effect of the Internet on the global energy consumption with the aim of achieving a climate neutral Internet.

Link

- **Smart Networks and Services**

SECTION: Innovation in AI, data and robotics

targets:

Industry-empowering **AI, Data and robotics** in **improving processes, products or services**, contributing to their competitiveness, quality of services, and strategy for environmental sustainability;
Providing industry with more **autonomous** and more **intuitive** and **easy to operate** technologies;
Providing **trustworthy AI solutions** combining various sources of data, sensors and information to address industrial challenges;
Combining the power of latest progress in AI, FAIR data, autonomous or interactive robotics, smart devices and next generation networks and computing to increase automation and optimise processes, resources, and services.

N. TOPIC	3

Objectives

Ensure sovereignty and autonomy for Europe in AI, data and robotics in developing world-class technologies serving the needs of all types of European industries providing top-performing solutions that industries will trust and adopt to maintain their competitiveness and maximise their contribution to environmental and resources sustainability.

Link

- AI, Data and Robotics

targets:

new generation of **AI-Powered Robotics**;
solutions for taking over autonomously dangerous, dull and dirty jobs and in reaching the level of reactivity, flexibility and adaptivity required for smooth and beneficial **human-robot**, as well as **robot-robot collaboration** and interaction (with the help from **SSH** expertise, innovative applications are expected in a vast range of **applications involving humans**)
Develop **lifelong autonomous robotics** with new types of AI systems; **new intelligent robotic concepts;** Increased robot **acceptance**

N. TOPIC	4

Objectives

ensure sovereignty and autonomy for Europe in robotics, leading the way in research, development and deployment of world-class technologies.

Link

- AI, Data and Robotics

SECTION: European leadership in Emerging Enabling Technologies

targets:

Promising **emerging enabling technologies** that are crucial for the future competitiveness and Green Deal objectives of Europe,
Biological transformation of industry, including bio-intelligent manufacturing and 3D food bioprinting
Sustainable **smart materials**
Alternative computing models (New forms of non-conventional hardware including analogue, bio- and neuro-morphic, approximate, biological and chemical approaches)

N. TOPIC	8

Including Bottom-up scheme (RIA)

Objectives

identify early technologies that have the potential to become Europe's future industrial leading technologies in all areas of this cluster and to establish industry leadership in these technologies from the outset. This section has a unique focus on off-roadmap transformations with a longer time-horizon but profound potential impact

targets:

Quantum computing platforms;
Quantum simulation platforms;
Software for operating both quantum computers and quantum simulators;
Quantum communication technologies and systems;
Miniaturised, integrated, quantum sensing devices

Including selection FPAs consortia + CSA for Quantum Technologies Flagship

N. TOPIC	8

Objectives

further develop quantum technologies and their applications in the areas of quantum computing, simulation, sensing and communication, in order to strengthen European technological sovereignty in this strategic field and achieve first-mover industry leadership, capitalising on Europe's established excellence in quantum science and technology.

targets:

Improve performance and create new functionalities for devices in a large number of industrial applications and sectors;
ensure consistent **high-quality production methods** for graphene and other 2D materials, **expand Europe's experimental pilot lines** to reach market-making capacity and ensure **first production capabilities in Europe** for high value-added products.

N. TOPIC	7

Including CSA for Graphene Flagship

Objectives

strengthen and accelerate the technology developments that would support a strong European supply and value chain in graphene and related materials and provide first-mover market advantages of scale.

5 Strategic autonomy in developing, deploying and using global space-based infrastructures

Foster competitiveness of space systems

From end-to-end satellite communication to On-Orbit operations; in 2022 From end to end Earth observation systems and Electrical Propulsion; Technologies to preparation of orbital demonstration mission

Reinforce EU capacity to access and use space

Sustainable approaches to launchers demonstrations (cost reduction, reusability, transportations services, ground tests and interoperable and multi sites facilities); low cost propulsion

Evolution of Space and ground infrastructures for Galileo/Egnos (Other Actions calls)

EUSST Missions and Services, SST & STM system architecture, Space-based SST (mission, system and sensors network, security and Data sharing); CASSINI Prize for digital space applications, products and services; support to CASSINI Space Entrepreneurship Initiative 2021-2027

HORIZON-CL4-2021-SPACE-01 (Scadenza: 16 Febbraio 2022)

HORIZON-CL4-2022-SPACE-01 (Scadenza: 16 Febbraio 2022)

5 Strategic autonomy in developing, deploying and using global space-based infrastructures

- **Evolution of Copernicus services**
  Climate Change service evolution; Atmosphere Monitoring service evolution; Security and Emergency evolution ; cross-services thematic domain. In 2022 Copernicus services evolution (Marine, Anthropogenic CO_2 Emissions and Land monitoring)
- **Innovative space capabilities: SSA, GOVSATCOM, Quantum**
  Quantum technologies for space gravimetry & Space Weather forecast
- **Space entrepreneurship ecosystems (incl. New Space and start-ups) and skills**
  Education and skills (community building)
- **Targeted and strategic actions supporting the EU space sector**
  Space technologies for European non-dependence and competitiveness; in 2022 space science and exploration technologies (to TRL5)

HORIZON-CL4-2021-SPACE-01 (Scadenza: 16 Febbraio 2022)
HORIZON-CL4-2022-SPACE-01 (Scadenza: 16 Febbraio 2022)

6 A human-centred and ethical development of digital and industrial technologies

Leadership in AI based on trust

From verifiable robustness and transparency approaches; tackling AI biases and approaches to fight disinformation to EU AI excellence Centres and AI Lighthouse (to TRL 5); CSA on coordination, standardisation & adoption of trustworthy AI

An Internet of Trust

Trust & data sovereignty on the Internet; Trustworthy open search and discovery; Next Generation Internet community building; Transatlantic Int. Coop.; NGI Tech Review

New digital interactions, 3D, augmented and virtual reality

Applied interactive and immersive technologies: eXtended Reality Modelling, Haptics; eXtended Collaborative Telepresence; XR Learning; Innovation for Media; XR Ethics, Interoperability and Impact

Systemic approaches to make the most of the techs within society and industry

Awareness Raising on IP Mng; Fostering Standardisation; Testing solutions on local communities; Industry-academia knowledge exchange; Art-driven use experiments and design; Workforce skills for industry 5.0

HORIZON-CL4-2021-HUMAN-01 (Scadenza: 21 Ottobre 2021)

SECTION: Leadership in AI based on trust

targets:

Develop trustworthy AI technology
Build the next level of “intelligence” and autonomy
Build the next level of perception, interaction and collaboration between humans and AI systems working together
Build AI systems that are socially aware
Trustworthy AI, based on the respect of the ethical principles, the fundamental rights, including privacy.

N. TOPIC	4

Objectives

ensure **sovereignty and autonomy for Europe in AI**, leading the way in research, development and deployment of world-class technologies that are beneficial to humans both individually and societally, and that adheres to European ethical values, values, such as the principles reflected in our fundamental rights and environmental sustainability. One priority will be the **development of top-performing technologies that industries and citizens will trust** and that will be applied in a wide range of applications and industrial sectors. Trustworthy AI is particularly key in application such as healthcare for helping professionals

targets:

Review and upgrade the Internet infrastructure to make it more **resilient to security threats**, energy efficient, and increasingly supportive of open and decentralised technologies and services. Solve current blockchain limitations

Develop **secure digital identity** that is platform-independent and standardised with global acceptance

Develop **new platforms** that address the dynamic nature of human **communications.**

N. TOPIC	13

Objectives

develop a trustworthy digital environment, built on a more resilient, sustainable, and decentralised internet architecture, to empower end-users with more control over their data and their digital identity, and to enable new social and business models respecting European values.

SECTION: New digital interactions, 3D, augmented and virtual reality

targets:

interactive applications in key sectors such as healthcare, manufacturing and education, cultural and creative industries;
Innovative, secure and, where relevant language-transparent, **immersive and multimodal interactive applications**
pan-european human-centric development of digital interaction technologies and systems
Based on user experiences, habits and knowledge, **European conversational systems** work irrespective of languages and make trusted autonomous decisions
Innovative systems and solutions **extend human perception, understand user intention, and boost the interaction performance**

N. TOPIC	6

Objectives
gain industrial leadership in digital interaction, while ensuring the European values of privacy, ethics and inclusiveness.

SECTION: Digital learning technologies, including upskilling of the workforce

targets:

explore, develop and demonstrate the use of **innovative technologies in the education sector**, through R&I actions;
digital educational solutions, applications and tools based on emerging technologies such as Artificial Intelligence, Data Analytics, immersive and interactive applications;
High value datasets are collected on the use of digital technologies in education;
Develop an **On-Demand Education Platform** for the European School of the Future;
Host a pan-European Network/Forum involving all relevant actors stimulating the exchange of best practices and developing guidelines for digital education methods and tools.

N. TOPIC	8

Objectives

The overall objective is to support the digital transformation of education. To create a pan-European Digital Education Ecosystem (EDEE), encapsulating research and innovation activities with pedagogical, ethical and societal aspects of education, while also strengthening the SMEs and industry active in the sector.

targets:

- **Valorisation of European R&I and data** to address industrial and societal challenges
- Innovation driven by European strengths in **cutting-edge technologies and creativity**
- Precautionary **socio- and human centric simulation approaches** for testing new and emerging technologies
- Constant **reskilling of workforce**

N. TOPIC	7

Objectives

Activities that cut across the areas of intervention of the Cluster, and which place a particular emphasis on **human-centred developments**. It will include, for example, business intelligence and valorisation (especially in the context of resilience); societal engagement; contributions to the development of skills; and general coordination and support actions.

Policy and horizontal considerations

- Open Science across the programme
- Gender dimension in R&I content
- Pathway to impact
- Measures to maximise impact
- Do no significant harm principle (DNSH)
- Artificial intelligence

These aspects must normally be considered in all Horizon Europe calls (unless explicitly mentioned in the topic description).

Specific calls may include other aspects to take into account.

EC Webinar - A successful proposal for Horizon Europe (21 April 2021)

Cluster 4 – Focus on AI

European Partnerships

International Cooperation

Cross- complementarities with Clusters and Programmes

AI & ROBOTICS in the EUROPEAN AI STRATEGY

EU Funding Programme

AI & Robotics @ Maker Faire - Rome 11 December 2020

Cécile Huet, PhD

Deputy Head of Unit A1

Robotics & Artificial Intelligence

European Commission

Major Milestones TOWARDS A EUROPEAN AI STRATEGY

2018 – A European approach to Artificial Intelligence

2018 – Coordinated Plan on Artificial Intelligence "Made in Europe"

2019 – Building Trust in Human Centric Artificial Intelligence

2020 – White paper on AI

Ecosystem of Excellence & Ecosystem of trust

European Commission

EUROPEAN AI STRATEGY: EU strengths

Excellent research centres

World-leading position in robotics

Strong business-to-business domain

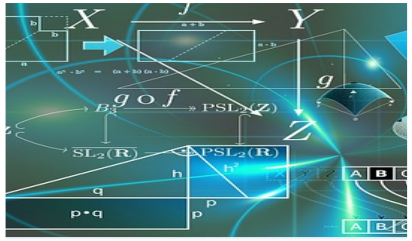
Strong industrial and services sectors: automotive, healthcare, agrifood

Industrial data

AI STRATEGY: Boosting the EU's technological and industrial capacity

€1.5 billion EC investments into AI in 2018-20

BY 70% INCREASE OF ANNUAL INVESTMENT



Basic and industrial research

(health, transport, agriculture, manufacturing, etc.)

AI-on-demand platform

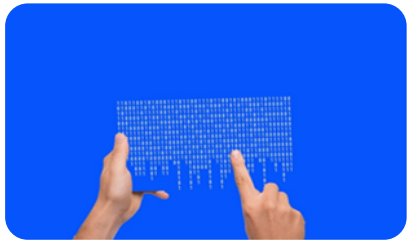
ICT26 + ICT 49

AI4EU

Network of AI-focused Digital Innovation Hubs (DIHs)

Strengthening AI excellence centres

ICT-48



Setting up an industrial data platform

Beyond 2020:

Increasing investments to €20 billion / year (PUB & PRIV)

APRE

A balanced approach to AI

EC Strategies for AI and data

White Paper on AI

A European approach to excellence and trust

A European strategy for data

Increase availability of data

Ecosystem of EXCELLENCE

Ecosystem of TRUST

Accelerate development, application and use of AI

Risk-based and proportionate regulatory approach

STRENGTHEN RESEARCH, INNOVATION AND DEPLOYMENT

PPP on AI, Data and Robotics

- Mobilise the community
- Define, Invest & implement the Strategy for Research, Development, Innovation and Deployment (SRIDA)

Secure **European's sovereignty over AI, Data and Robotics** technologies and knowhow

Establish **European leadership in AI, Data and Robotics** technologies with high socio-economic impact

Reinforce a **strong and global competitive position of Europe** in AI, Data and Robotics


AI DATA ROBOTICS PARTNERSHIP EU
ABOUT
PARTNERS
SRIDA
RESOURCES
EVENTS
CONTACT
European Partnership on Artificial Intelligence, Data and Robotics
The Vision of the Partnership is to boost European competitiveness, societal wellbeing and environmental aspects to lead the world in researching, developing and deploying value-driven trustworthy AI, Data and Robotics based on fundamental European rights, principles and values.
BE PART OF IT!
A joint initiative by:
BDV BIG DATA VALUE ASSOCIATION
CLAIRE
ellis
EurAi
eu ROBOTICS
European Commission

APRE

Horizon Europe
"Destinations" in Cluster 4

Short name	Full name	Topics include:
TWIN-TRANSITION	1. Climate neutral, circular and digitised production	Green, flexible, digital ; Construction; Renewable resources, waste
RESILIENCE	2. A digitised, resource-efficient and resilient industry	Materials (raw, green, sustainable); Multi-functional materials, green electronic materials
DATA	3. World leading data and computing technologies	**Data**, platforms, Cloud to Edge computing, Internet infrastructures
DIGITAL-EMERGING	4. Digital and emerging technologies for competitiveness and fit for the green deal	Electronics, Photonics, low-power processors, **AI,** 6G, **Robotics**, Quantum, Graphene
SPACE	5. Strategic autonomy in developing, deploying and using global space-based infrastructures, services, applications and data	Space, Satellite, Observation systems, space services
HUMAN	6. A human-centred and ethical development of digital and industrial technologies	**Trustworthy AI**, Ethics, Next Generation Internet, digital interaction, digital learning

DESTINATION 3: World leading data and computing technologies

Data sharing in the common European **data spaces**

Technologies and solutions for compliance, privacy preservation, green and responsible data operations (RIA)

Technologies for data management (IA)

Technologies and solutions for data trading, monetizing, exchange and interoperability (IA)

Strengthening Europe's **data analytics** capacity

Extreme data mining, aggregation and analytics technologies (RIA)

Methods for exploiting data and knowledge for extremely precise outcomes (analysis, prediction, decision support), reducing complexity and presenting insights in understandable way (RIA)

DESTINATION 4: Digital and emerging technologies for competitiveness and fit for the green deal

Innovation in AI, data and robotics (Innovation Actions (IA))

AI, data and Robotics for the Green Deal

- resource optimisation and minimisation of waste
- environmental and waste management
- robotics solutions in diverse harsh environments serving the Green Deal

AI, data and Robotics at work

- Collaborative robotics - improved working conditions (health/safety/level of stress, etc.),
- Hybrid decision-making & supporting workers

AI, data and robotics for Industry optimisation (production & services)

DESTINATION 4: Digital and emerging technologies for competitiveness and fit for the green deal

Tomorrow's deployable Robots: efficient, robust, safe, adaptive and trusted

Joining forces in scientific excellence in Robotics (RIA*)

Pushing the limit of robotics cognition (RIA)

Pushing the limit of physical intelligence and performance (RIA)

Increased robotics capabilities demonstrated in key sectors (IA**)

* RIA= Research and Innovation Action - ** IA =Innovation Action

DESTINATION 6: A human-centred and ethical development of digital and industrial technologies

Leadership in AI based on trust (RIAs)

- Verifiable robustness, energy efficiency and transparency for Trustworthy AI: **Scientific excellence** boosting industrial competitiveness
- Tackling gender, race and other biases in AI
- AI to fight disinformation
- AI for human empowerment
- European Network of **AI Excellence** Centres: towards the European AI lighthouse ➔ Next Gen AI & Secure/Safe AI + other topics in 2022

+ **CSA***: European coordination, awareness, standardisation & adoption of trustworthy European AI, Data and Robotics

*CSA = Coordination and Support Action

Cluster 4 - European Partnerships

DID YOU KNOW?

European Partnerships are initiatives where the EU, together with private and public partners, commit to jointly support the development and implementation of a programme of research and innovation activities. The partners could represent industry, universities, research organisations, bodies with a public service remit at local, regional, national or international level or civil society organisations, including foundations and NGOs. Partnerships are not new - they were first introduced in 2002 as part of the European Research Area to overcome fragmentation of research effort.

3 Istitutional partnerships

EuroHPC JU
Key Digital Technologies JU
Smart Networks and Services JU

7 Co-programmed partnerships

Made in Europe
Process4Planet - Carbon neutral Circular Industry
Clean steel
AI, Data and Robotics
Photonics
Globally competitive Space Systems

1 Co-funded partnership

European Partnership on Metrology

cPPP

Factories of the Future FoF

Energy Efficient Buiding EeB

SPIRE

Made in Europe **Co-pro**

Build4People

DG ENER

Process4Planet **Co-pro**

Clean Steel – Low Carbon Steelmaking **Co-pro**

European Partnership on Metrology **Co-fun**

Globally competitive Space Systems **Co-pro**

Green Transformation - Partnerships' Proposals

European Partnership Made in Europe

- Draft partnership proposal (August 2020)

Processes4Planet – Transforming the European Process Industry for a sustainable society

- Draft partnership proposal (June 2020)

European Partnership for Clean Steel - Low Carbon Steelmaking

- Draft partnership proposal (July 2020), Clean Steel Roadmap (July 2020)

European Partnership on Metrology

- Draft partnership proposal (June 2020)

European Partnership for Globally competitive Space Systems

- Draft partnership proposal (May 2020)

EuroHPC JU

ECSEL JU

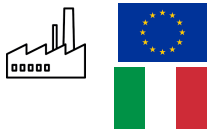
5g cPPP

Bid Data cPPP

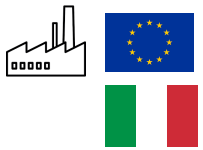
Robotics cPPP

Photonics cPPP

+ AI



European Partnership for High Performance Computing (HPC) **Inst**



European Partnership for Key Digital Technologies (KDT) **Inst**

European Partnership for Smart Networks and Services (SNS) **Inst**

European Partnership on Artificial Intelligence, Data & Robotics **Co-pro**

European Partnership for Photonics **Co-pro**

Digital Transformation - Partnerships' Proposals

European Partnership for High Performance Computing

- Draft outline of partnership proposal (May 2019, update pending), new Council regulation (Sept. 2020)

European Partnership for Key Digital Technologies (KDT)

- Draft outline of partnership proposal (Jan 2021), Impact Assessment (July 2020)

European Partnership for Smart Networks and Services

- Draft partnership proposal (July 2020)

European Partnership on Artificial Intelligence, Data and Robotics

- Draft partnership proposal (June 2020), SRIDA (Sept 2020)

European Partnership for Photonics

- Draft partnership proposal (May 2020)

Cluster 4 & International Cooperation

**To enhance exchange of know-how,
access to international value chains,
with consideration to the technological sovereignty/ autonomy, and
by promoting EU climate-neutral, clean and circular technologies.**

Examples: Materials safety methodologies and standards; Common standards and interoperability, including manufacturing, digital and AI technologies; mutual data exchange enabled by Copernicus.

→ EU-Africa partnerships on sustainable raw materials value chains

→ NGI International Collaboration - Transatlantic fellowship programme

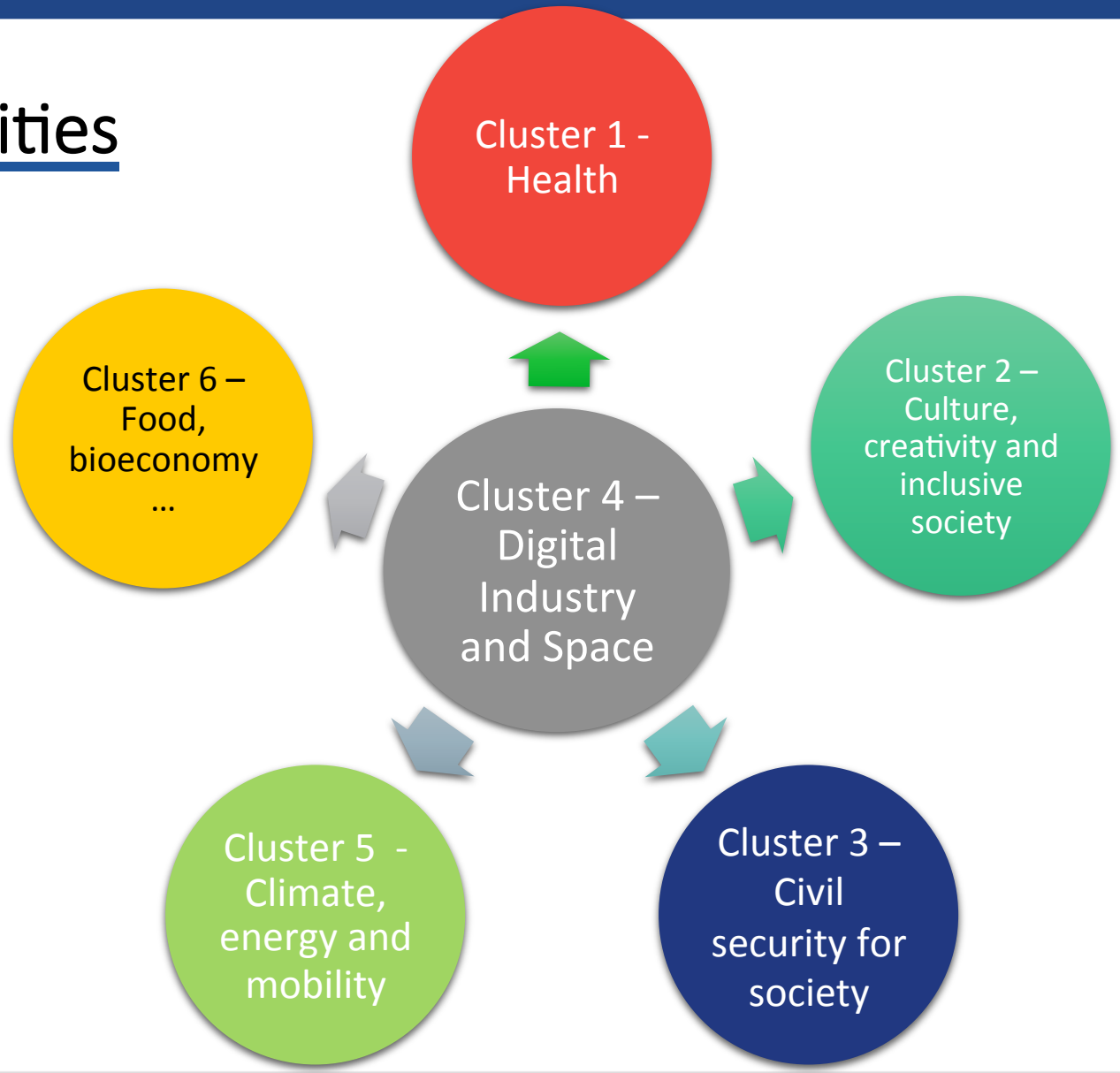
Art. 22.5 Technological Sovereignty: Participation is limited to specific countries or geographical areas (e.g. raw materials value chains, Space or Quantum Technologies)

Cross-clusters complementarities

Examples

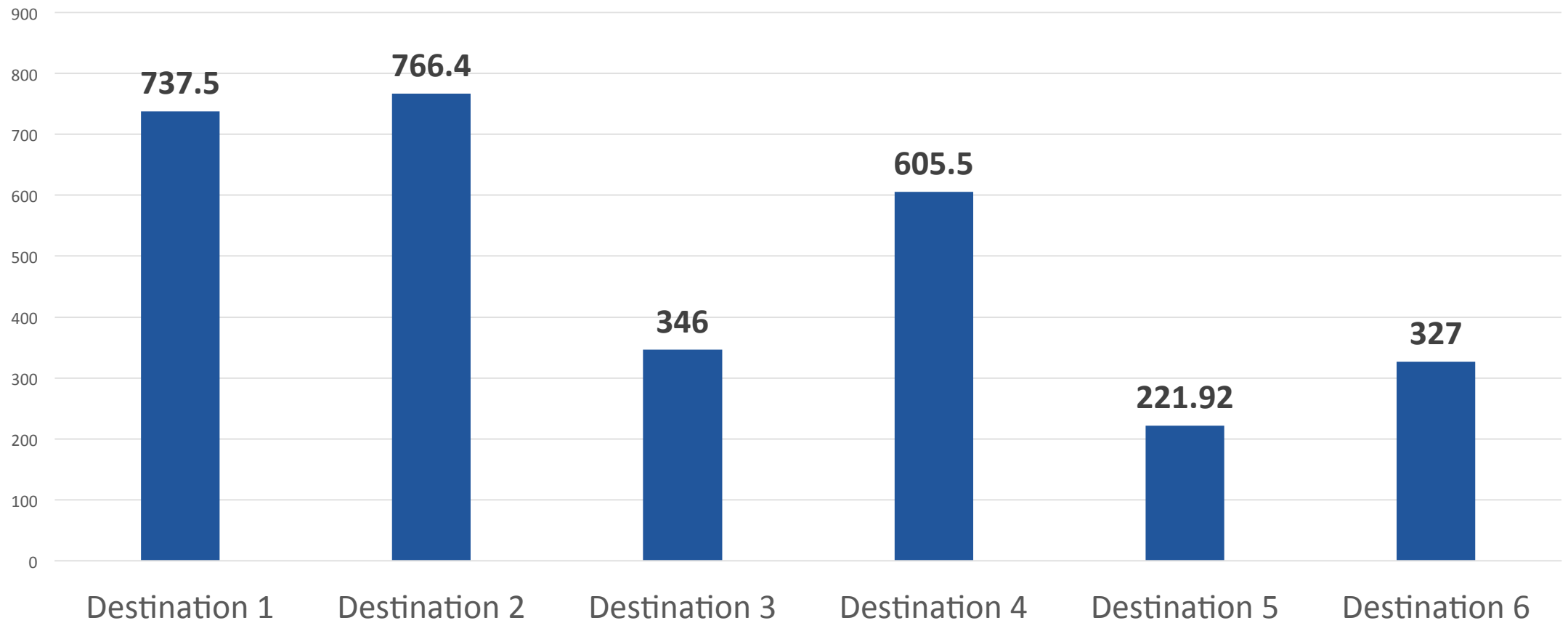
Improving the resilience and preparedness of EU businesses, especially SMEs and Startups, and value chains in key sectors and demand-driven applications

1. Circular value chains
2. Green, Sustainable and Smart Materials
3. Common European Data Spaces
4. Trustworthy AI applications
5. GNEOS, Copernicus applications

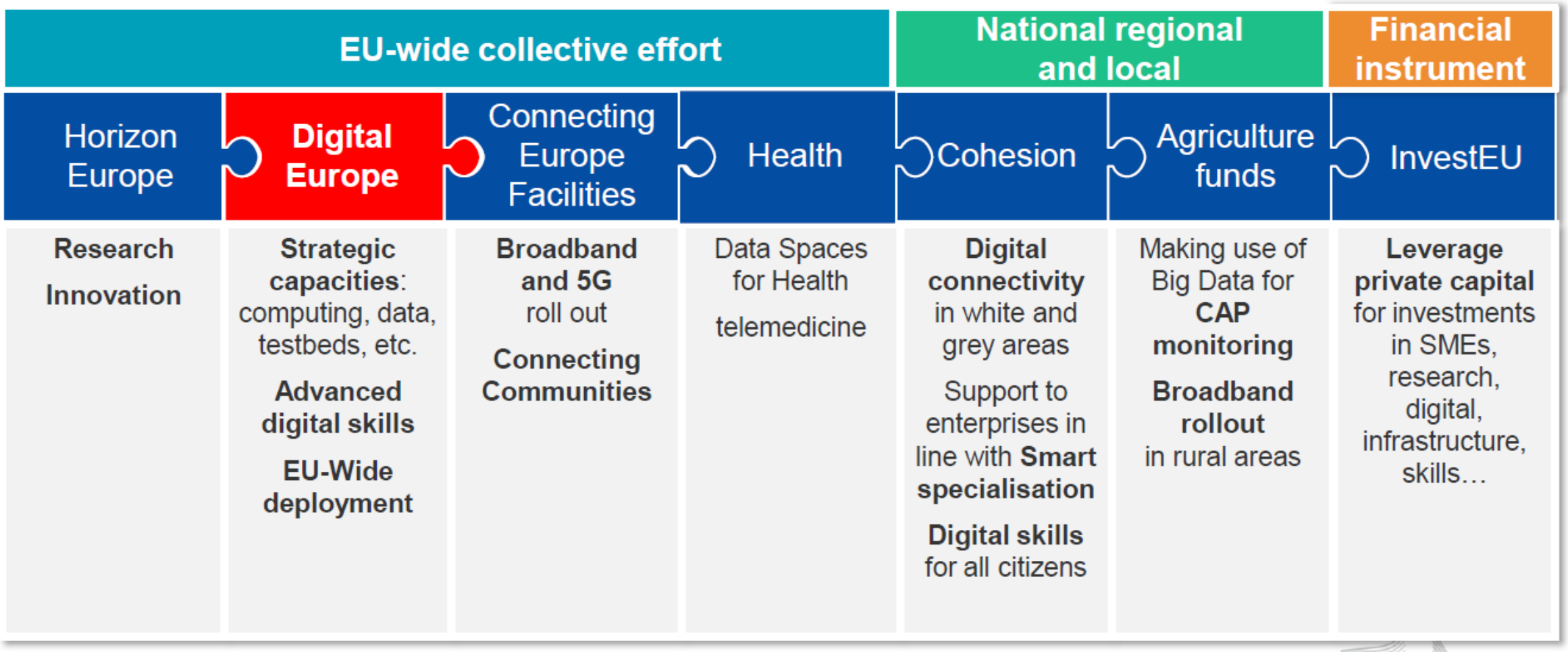


Ripartizione del budget nel Cl4 - Destinations

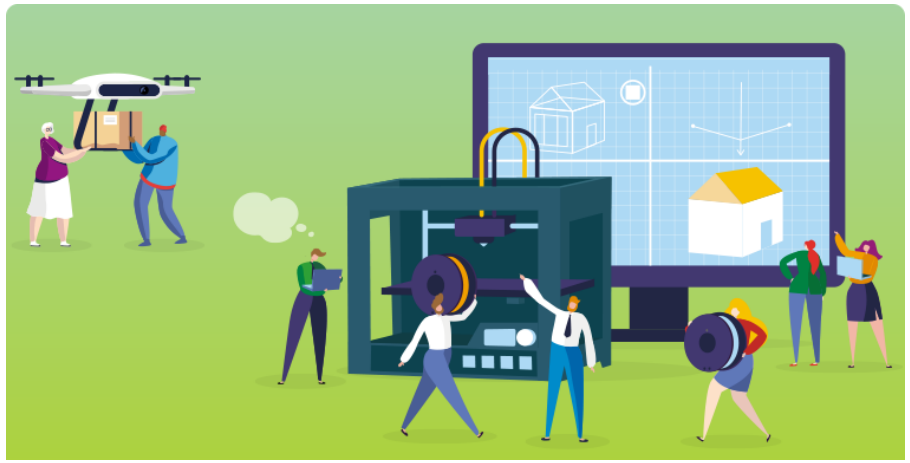
15,348 Miliardi €
16,07% del Budget HE



Programmes are complementary



Infoday Europeo Cluster 4 - 2021



- Il primo **Info day Europeo** relativo al ***Cluster 4 – Digital, Industry and Space*** si terrà on line il prossimo **29 -30 giugno 2021.**
- Sarà il primo evento ufficiale, organizzato dalla Commissione europea, relativo al *Cluster 4 – Digital, Industry and Space* nell'ambito del nuovo programma Horizon Europe.
  L' evento non prevede alcuna registrazione e risulta gratuito.
  Per seguire l' Info day europeo, visita il link.
- Sono previsti anche tre **Brokerage events** con i quali, attraverso l'organizzazione di incontri bilaterali online, si aiuterà a creare nuove partnership e consorzi in vista delle future proposte progettuali in ambito "Digital, Industry and Space".
  I Face2Face Meetings online saranno organizzati nelle seguenti date:
  – **Digital**: 24-25 Giugno 2021 Link per partecipare
  – **Industry**: 1 Luglio 2021 Link per partecipare
  – **Space**: 28 Giugno 2021 Link per partecipare

Info day nazionali sui temi e i bandi di Horizon Europe

https://apre.it/la-settimana-horizon-europe-2021/

References

- Cluster 4 – APRE Webpage: https://horizoneurope.apre.it/struttura-e-programmi/global-challenges-european-industrial-competitiveness/cluster-4/
- Horizon Europe: https://ec.europa.eu/info/horizon-europe_en
- European partnerships in Horizon Europe: https://ec.europa.eu/info/horizon-europe/european-partnerships-horizon-europe_en

2021 2027
HORIZON EUROPE

WWW.HORIZONEUROPE.IT — Info, aggiornamenti e materiali sul nuovo Programma Quadro

GIORNATE HORIZON EUROPE — Eventi sul Programma Quadro e le sue dimensioni

GUIDA A HORIZON EUROPE — Passo, passo dentro il nuovo Programma Quadro

APRE BRIEF — I factsheet sui temi e gli aspetti salienti di Horizon Europe

AGENDA HORIZON EUROPE — I principali appuntamenti nazionali ed europei sul Programma Quadro

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