APRE
Agenzia per la Promozione della Ricerca Europea

Cluster 4 – Digital, Industry and Space

Sapienza Università di Roma
13 Maggio 2021

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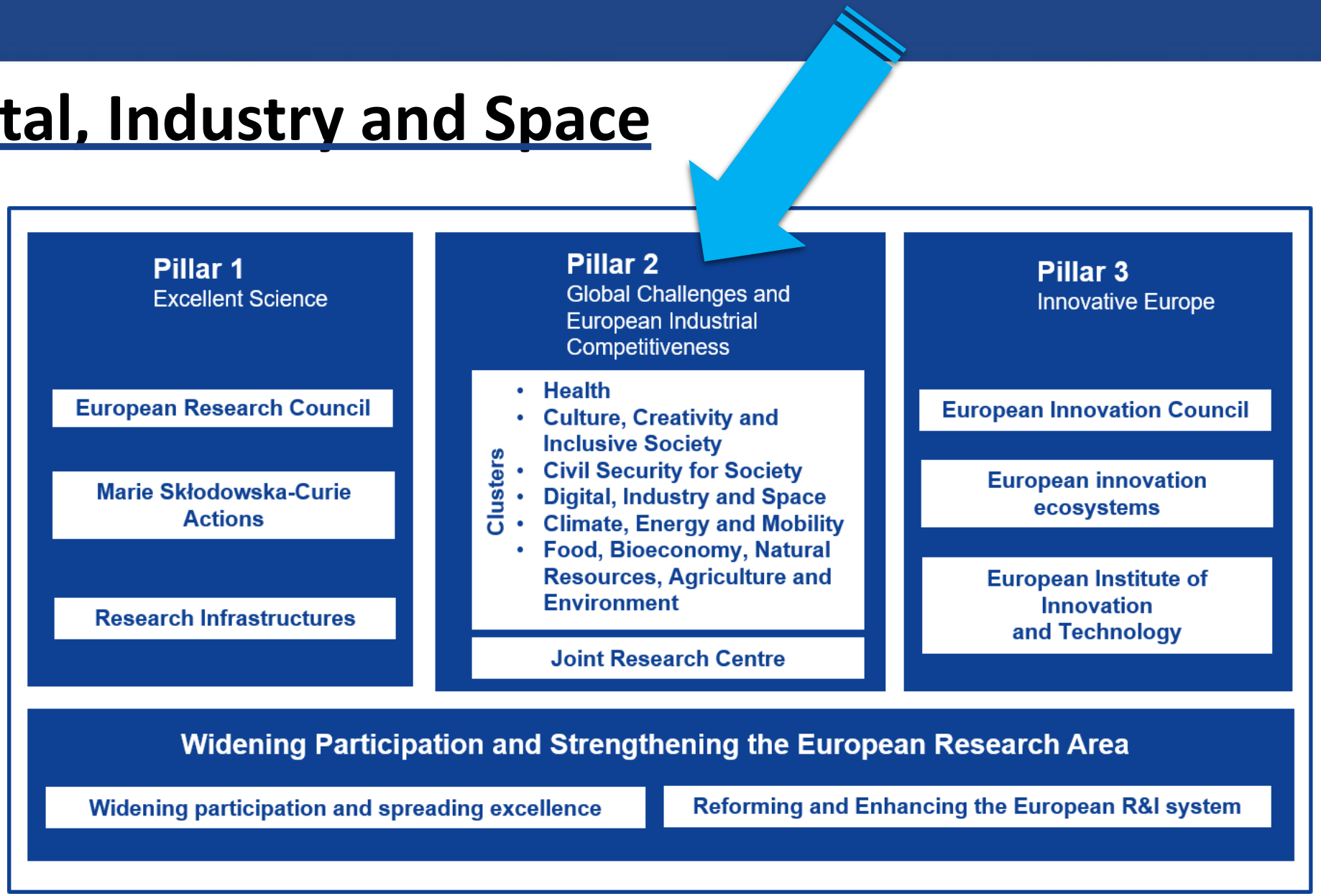
APRE- Agency for the Promotion of European Research

Agenda

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

Digital, Industry and Space



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
- 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 ResearchArea

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


"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

RELEVANT EU STRATEGIES AND POLICIES FOR DIGITAL TRANSFORMATION

A Europe fit for the digital age

- Excellence and trust in Artificial Intelligence – AI Regulatory Package

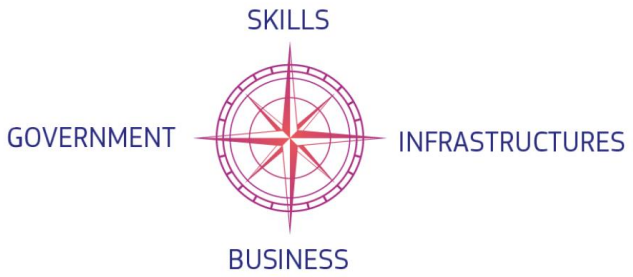
Empowering businesses to start, scale up, innovate and compete on fair terms

- 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

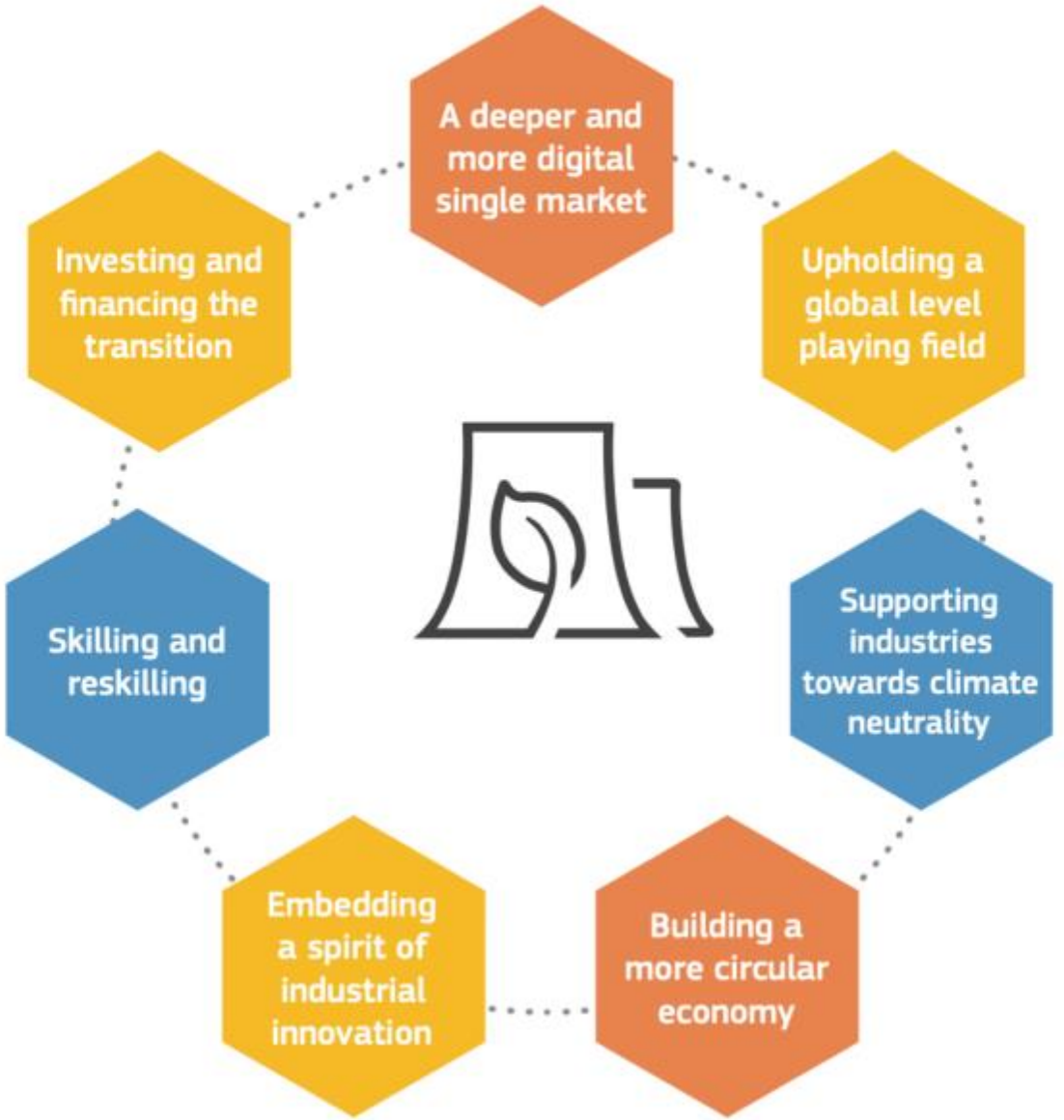
With its new industrial strategy, the European Commission aims to ensure that European businesses remain fit to achieve their ambitions, while coping with global competition.

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
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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

1 Climate neutral, circular and digitised production

Advanced digital technologies for manufacturing

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

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

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

DRAFT

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)

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

2 A digitised, resource-efficient and resilient industry

- Novel paradigms to establish resilient and circular value chains

Ensuring circularity of composite materials to Circular and low emission value chains through digitalisation

- 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 (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

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

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); data, exchange and interoperability (focus on trading & monetizing); to data management

Strengthening Europe's data analytics capacity

From Extreme-scale data mining, aggregation and analytics technologies (from TRL 5) to analysis, prediction, decision support for their exploitation (to TRL 5)

From Cloud to Edge to IoT for European Data

From Edge Operating System and Platforms, with specific reference to Smart edge Nodes to Cognitive Cloud (Community building and research-driven approaches) and combined systems based on IoT at the edge (to TRL 5)

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

- European Innovation Leadership in Electronics

Functional electronics for green and circular economy

- 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 Photonics

From research-driven approaches on integrated photonics circuits to optical communication components and advanced multi-sensing systems

- Innovation in AI, data and robotics

Industry optimisation for combined AI and robotics applications (focus on green deal) (from TRL 5)

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

Robotics cognition and physical intelligence to key sectors applications (healthcare or critical infrastructures), NoE

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

6G and foundational connectivity technologies

Coordination of European Smart Network actions

European leadership in Emerging Enabling Technologies

Advanced Spintronics, and bio-intelligent manufacturing & characterisation methodologies to assess and predict the health and environmental risks of nanomaterials

Flagship on Quantum Technologies: a Paradigm Shift

Support to the development of quantum computers and simulators, focus on communication for QInternet and Qsensing technologies. Testing and first production for Qtechnologies; Int. Coop.

Graphene: Europe in the lead

Safe-by-design 2D materials production (focus on composites, coatings, foams), manufacturing and exploitation of 2D materials-based devices

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

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- **Foster competitiveness of space systems**

From end-to-end satellite communication to On-Orbit operations; 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)

- **Evolution of Space and ground infrastructures for Galileo/Egnos**

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

- **Evolution of services of the EU Space Programme components Galileo, EGNOS and Copernicus**

Copernicus services evolution (Marine, Anthropogenic CO_2 Emissions and Land monitoring)

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

- 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; space science and exploration technologies (to TRL5)

- Development of applications from the EU Space Programme components

  EGNSS applications (focus on GD, Digital, Safety and Crisis management, Smart Mobility); Galileo/Copernicus for the PA; space-based & Copernicus downstream applications, Large-scale Copernicus data uptake with AI and HPC; GOVSATCOM Service developments and demonstrations

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

Leadership in AI based on trust

From verifiable robustness and transparency approaches, AI for human empowerment, tackling AI biases and approaches to fight disinformation to EU AI excellence Centres (to TRL 5) and community building

An Internet of Trust

Trust & data sovereignty on the Internet (Trustworthy open search and discovery); Next Generation Internet community-building and Tech Review – Int. Coop. ; Internet architecture and decentralised technologies; Safer internet techs

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

Digital learning technologies, including upskilling of the workforce

Digital education and learning from personalised tools in application areas to inclusiveness for re-skilling in workforce and unemployed. Focus on green transition.

Cross-cutting topics

IP Mng; Standardisation; Arts; Testing solutions on local communities

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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 – Specific elements

European Partnerships

International Cooperation

Cross- complementarities with Clusters and Programmes

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

Process4Planet **Co-pro**

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

European Partnership on Metrology **Co-fun**

Globally competitive Space Systems **Co-pro**

DG ENER

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

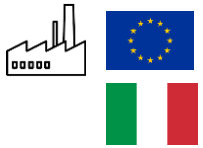
Bid Data cPPP

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

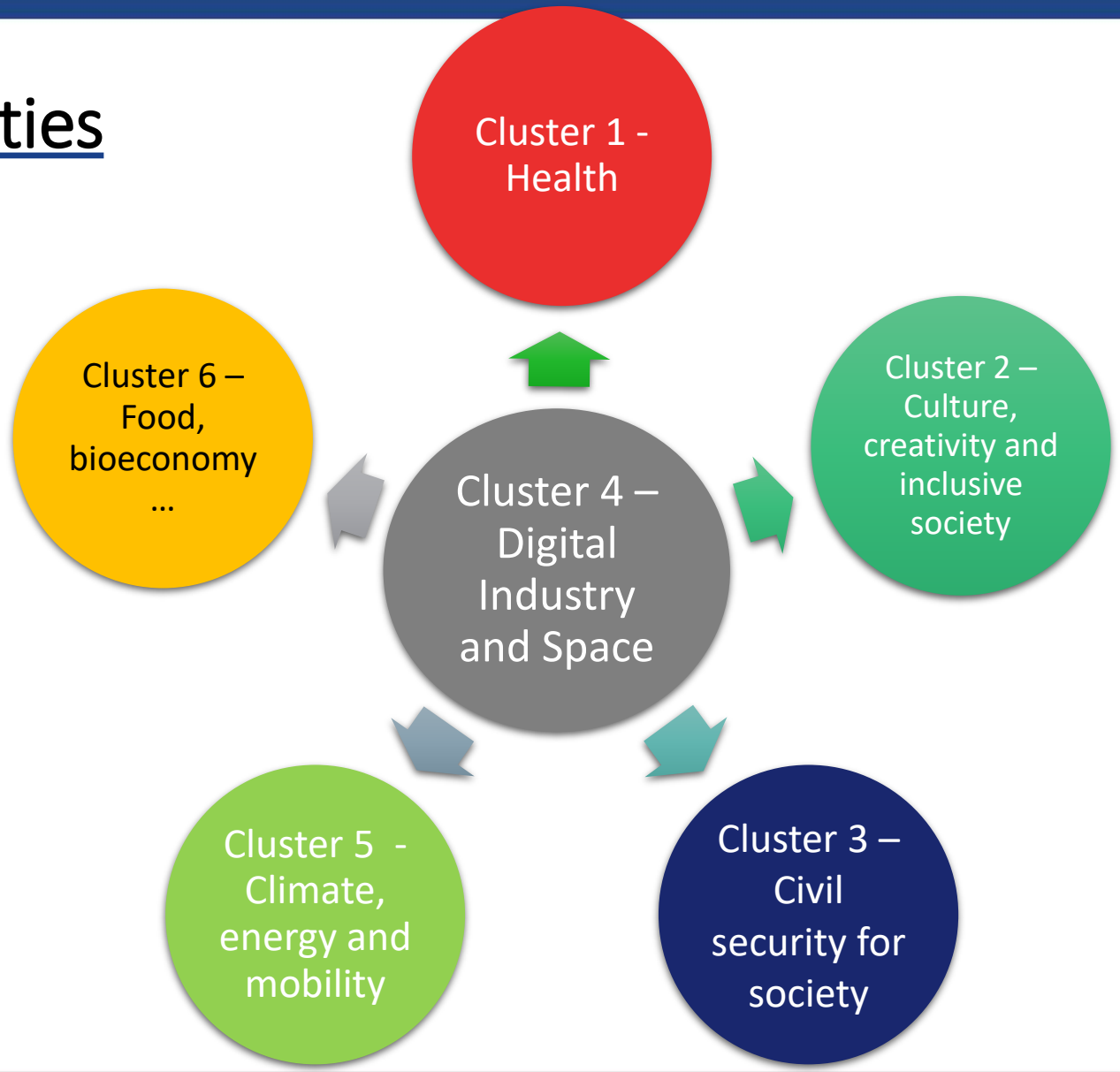
Art. 22.5 Technological Sovereignty: Participation can be allowed to specific countries or geographical areas (e.g. processing value chains, Space or Quantum Technologies)

Cross-clusters complementarities

Examples

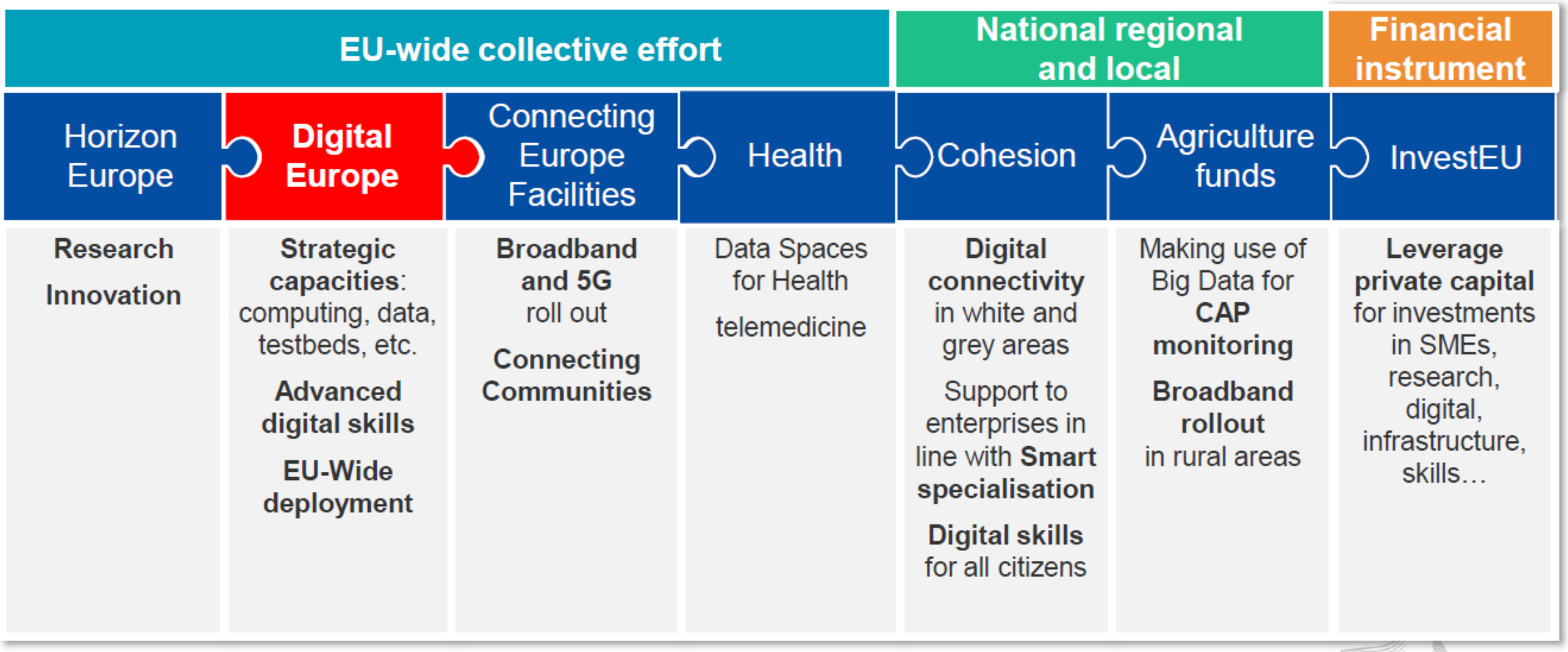
Improving the resilience and preparedness of EU businesses, especially SMEs and Startups, and value chains in key sectors and demand-driven applications

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



	HE (MFF)	NGEU	TOTALE	
Tema	*Miliardi €*	*Miliardi €*	*Miliardi €*	*% sul totale*
Pillar I	**25,013**	**0,000**	**25,013**	**26,19%**
ERC	16,004	0,000	16,004	16,75%
MSCA	6,603	0,000	6,603	6,91%
Reasearch Infrastructures	2,406	0,000	2,406	2,52%
Pillar II	**49,458**	**4,059**	**53,517**	**56,03%**
Clusters	47,488	4,059	51,547	53,96%
1. Health	6,893	1,353	8,246	8,63%
2. Culture Creativity Inclusive Society	2,281	0,000	2,281	2,39%
3. Civil Security for Society	1,597	0,000	1,597	1,67%
4. Industry Digital Space	13,995	1,353	15,348	16,07%
5. Cimate Energy Mobility	13,770	1,353	15,123	15,83%
6. Food, Bioeconomy, Natural Resources, Agriculture, Environment	8,952	0,000	8,952	9,37%
JRC	1,970	0,000	1,970	2,06%
Pillar III	**12,246**	**1,353**	**13,599**	**14,24%**
EIC	8,752	1,353	10,105	10,58%
Innovation Ecosystems	0,528	0,000	0,528	0,55%
EIT	2,966	0,000	2,966	3,11%
Strengthening ERA	**3,393**	**0,000**	**3,393**	**3,55%**
Widening participation spreading exc.	2,955	0,000	2,955	3,09%
EU R&I System	0,438	0,000	0,438	0,46%
TOTALE	**90,110**	**5,412**	**95,522**	**100,00%**

Programmes are complementary



LEADING THE DIGITAL DECADE - 2021

Day 1

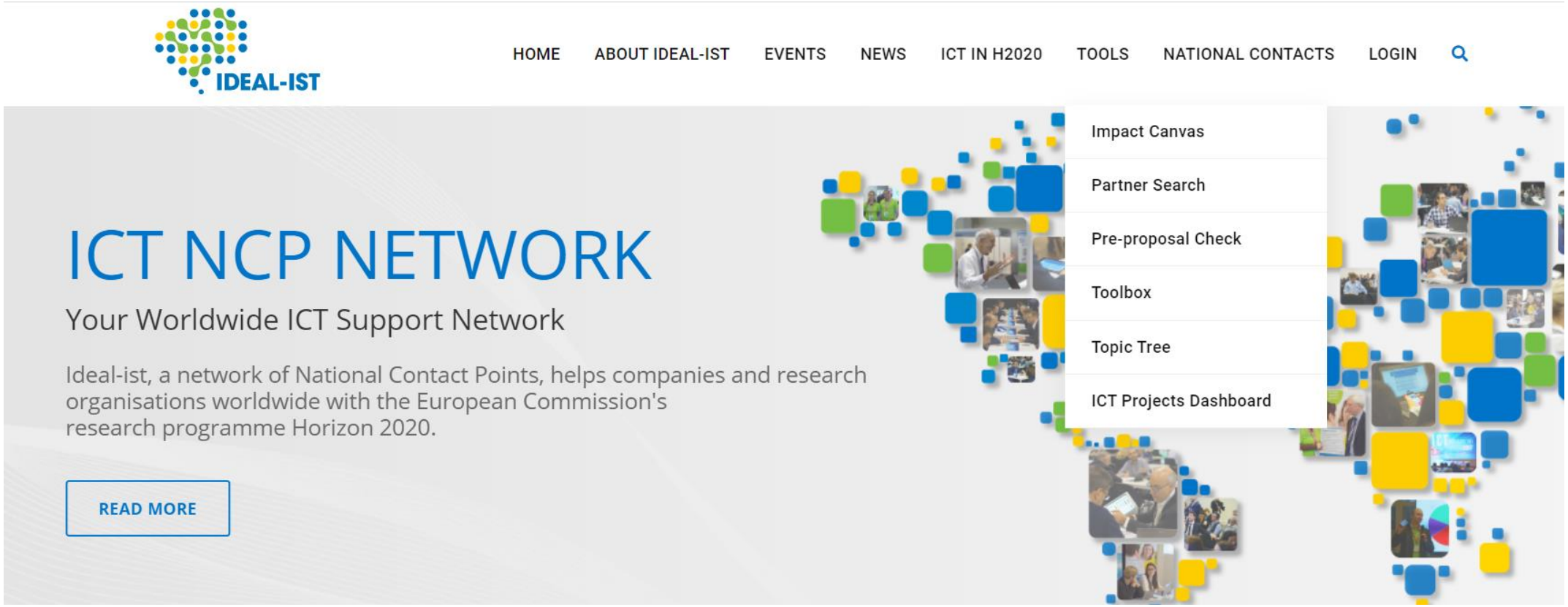
- The starting point of the first day's debate is the Communication 2030 Digital Compass: the European way for the Digital Decade. Its vision is clear: everyone in Europe can and should benefit from digital.

Day 2

- The second day will be dedicated to the launch of the Digital Europe Programme, the first financial instrument of the EU to specifically finance European projects on digital. The Digital Europe Programme will accelerate the economic recovery and shape the digital transformation of Europe benefiting citizens and businesses.

Get Registered at: https://digital-strategy.ec.europa.eu/en/policies/leading-digital-decade

Some Tools



https://www.ideal-ist.eu/

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- A Europe fit for the digital age: https://ec.europa.eu/info/strategy/priorities-2019-2024/europe-fit-digital-age_en
- Digital Compass 2030: https://ec.europa.eu/info/strategy/priorities-2019-2024/europe-fit-digital-age/europes-digital-decade-digital-targets-2030_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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