APRE
Agenzia per la Promozione della Ricerca Europea

Focus on Pillar II: ICT & Digital Transformation & Resilient Industry in Horizon Europe (Cluster 4)

Turkey in Horizon 2020 Phase II,

April 8th, 2021

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APRE- Agency for the Promotion of European Research

Agenda

- Cluster 4 – Relevant Policies
- From H2020 Industrial Leadership to HE Cluster 4
- Cluster 4 related Destinations
- Cluster 4 – European Partnerships
- Complementarities with other Horizon Europe Clusters


"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

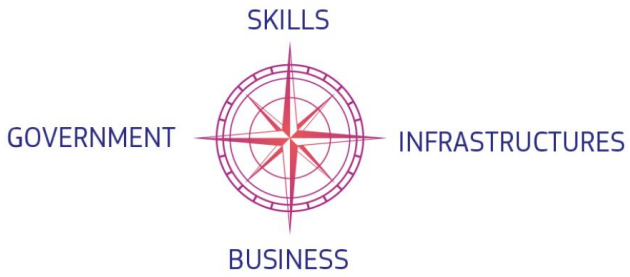
Empowering businesses to start, scale up, innovate and compete on fair terms

- 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

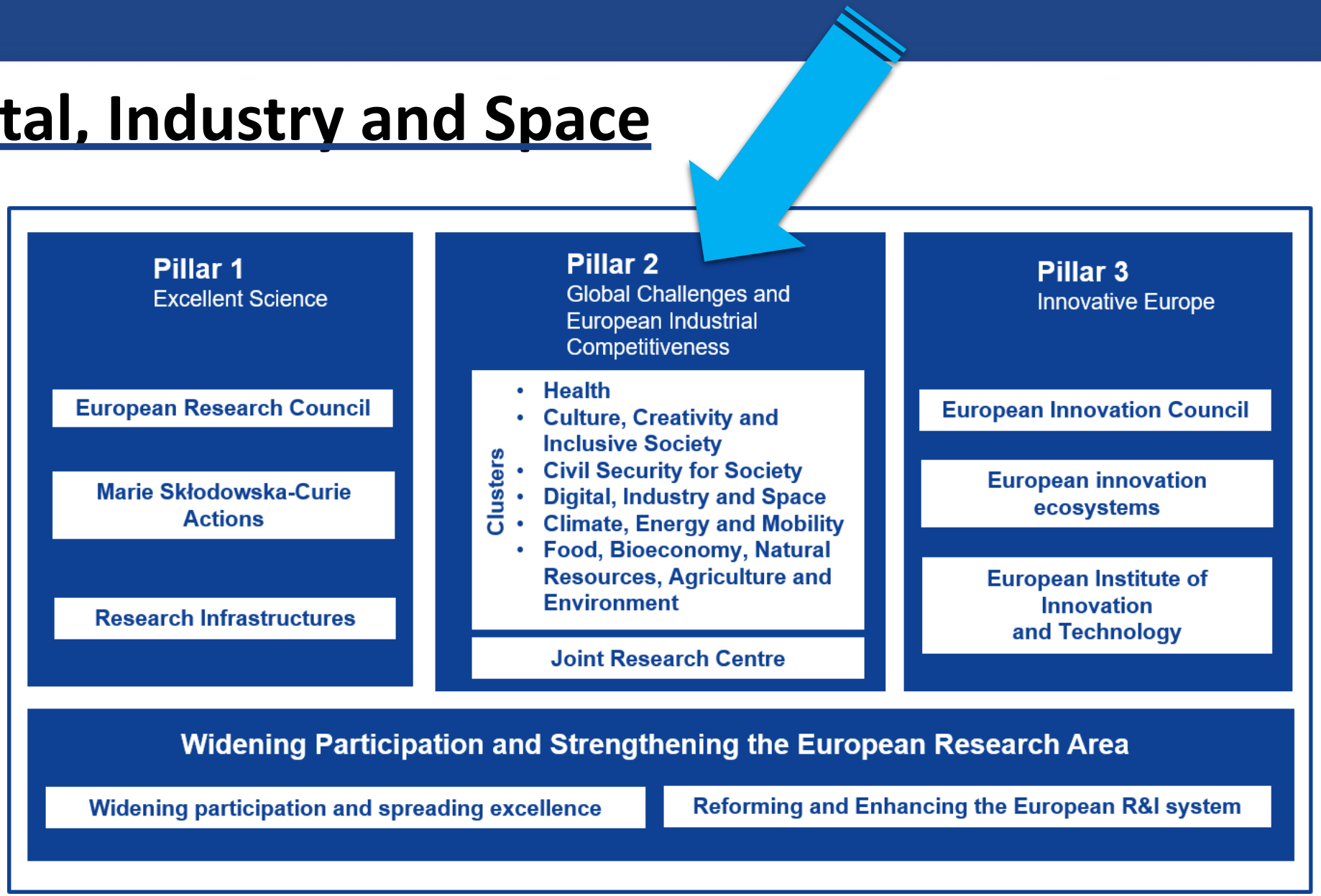
New Industrial Strategy 2020

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 2020

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

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

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Key Strategic Orientations for R&I

N Nanotechnologies

M Materials

B Biotechnologies

P Production

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

CLUSTER 6
BIOECONOMY

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

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DEI (Digitising European Industry) strategy2

NEXT Generation Internet (5g, AI, IoT)

Cybersecurity

Key Strategic Orientations for R&I

Promoting an open strategic autonomy by leading the development of key digital and enabling technologies, sectors and value chains

Cluster 4 - Digital, Industry and Space

1. Directorate Generals - DGs

DG CNECT
DG RTD

2. Policies

2 EU Priorities

Green new Deal
Europe fit for a Digital Age

4 Relevant identified policies

European Industrial Strategy
Trustworthy AI
European Data strategy & Data Governance Act
European Space Strategy

3. Partnership

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
European Partnership on Metrology
Globally competitive Space Systems

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.

Cluster 4 *Digital, Industry and Space*

Areas of intervention *EU compromised text* 2021-2027	**Expected impact** *Strategic Plan* 2021-24	**Destinations** *Work Programme* 2021-22
1. Manufacturing Technologies 2. Key Digital Technologies 3. Advanced Materials 4. Emerging Enabling Technologies 5. Artificial Intelligence and Robotics 6. Next Generation Internet 7. Advanced Computing and Big Data 8. A globally competitive Space sector 9. Circular Industries 10. Low-carbon and Clean Industries 11. New services from Space for the EU society and economy	• 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-centredand ethical development of digital and industrial technologies	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

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

Cluster 4 – Six Destinations

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

- Green, flexible and advanced manufacturing
- Advanced digital technologies for manufacturing
- A new way to build, accelerating disruptive change in construction
- Hubs for circularity, a stepping stone towards climate neutrality and circularity in industry
- Enabling circularity of resources in the process industries, including waste, water and CO2/CO
- Integration of Renewables and Electrification in process industry

1. Climate neutral, circular and digitised production

DRAFT

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

1. Climate neutral, circular and digitised production

DRAFT

- 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
- Raw materials for EU strategic autonomy and successful transition to a climate-neutral and circular economy
- Green and Sustainable Materials
- Materials for the benefit of society and the environment and materials for decarbonising Industry
- Materials and data cross-cutting actions
- Improving the resilience and preparedness of EU businesses, especially SMEs and Startups

2. A digitised, resource-efficient and resilient industry

DRAFT

- 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

DRAFT

- 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

3. World leading data and computing technologies

DRAFT

- 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)

4. Digital and emerging technologies for competitiveness and fit for the green deal 1/3

- European Innovation Leadership in Photonics
- European Innovation Leadership in Electronics
- Ultra-low power processors
- 6G and foundational connectivity technologies
- Innovation in AI, data and robotics
- Tomorrow’s deployable Robots: efficient, robust, safe, adaptive and trusted
- European leadership in Emerging Enabling Technologies
- Flagship on Quantum Technologies: a Paradigm Shift
- Graphene: Europe in the lead

From Recognised Digital Enablers
To Emerging Industrial Enablers

Digital and emerging technologies for competitiveness and fit for the green deal – 2/3

DRAFT

- 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)

Digital and emerging technologies for competitiveness and fit for the green deal – 3/3

DRAFT

- 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

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

DRAFT

Leadership in AI based on trust

From verifiable robustness and transparency approaches to human empowerment activities (to TRL 5) capable to guarantee autonomy and trustworthy intelligence

An Internet of Trust

Supporting collective intelligence for sustainability, data lakes for the media sector (focus on user generated content); Safer internet applications (NGI follow up) supported by DLTs. Int. Coop. focus

New digital interactions, 3D, augmented and virtual reality

Applied interactive and immersive technologies with focus on conversational systems (FSTP)

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 Standardisation, Arts or Demand-driven applications

Partnerships Role in Cluster 4

European Partnerships under Horizon Europe
will be drivers of green and digital transitions

WHY ARE PARTNERSHIPS NEEDED?

1

THEY BRING TOGETHER KEY ACTORS FROM ACROSS SECTORS TO JOINTLY IMPLEMENT R&I ROADMAPS.

EXAMPLE

Photonics21 has developed a roadmap for European photonics for 2021-2027 with more than 1700 companies and research organisations across Europe.

2

THEY CREATE CRITICAL SCALES OF INVESTMENT TO DEMONSTRATE RADICALLY NEW INNOVATIONS ACROSS EUROPE.

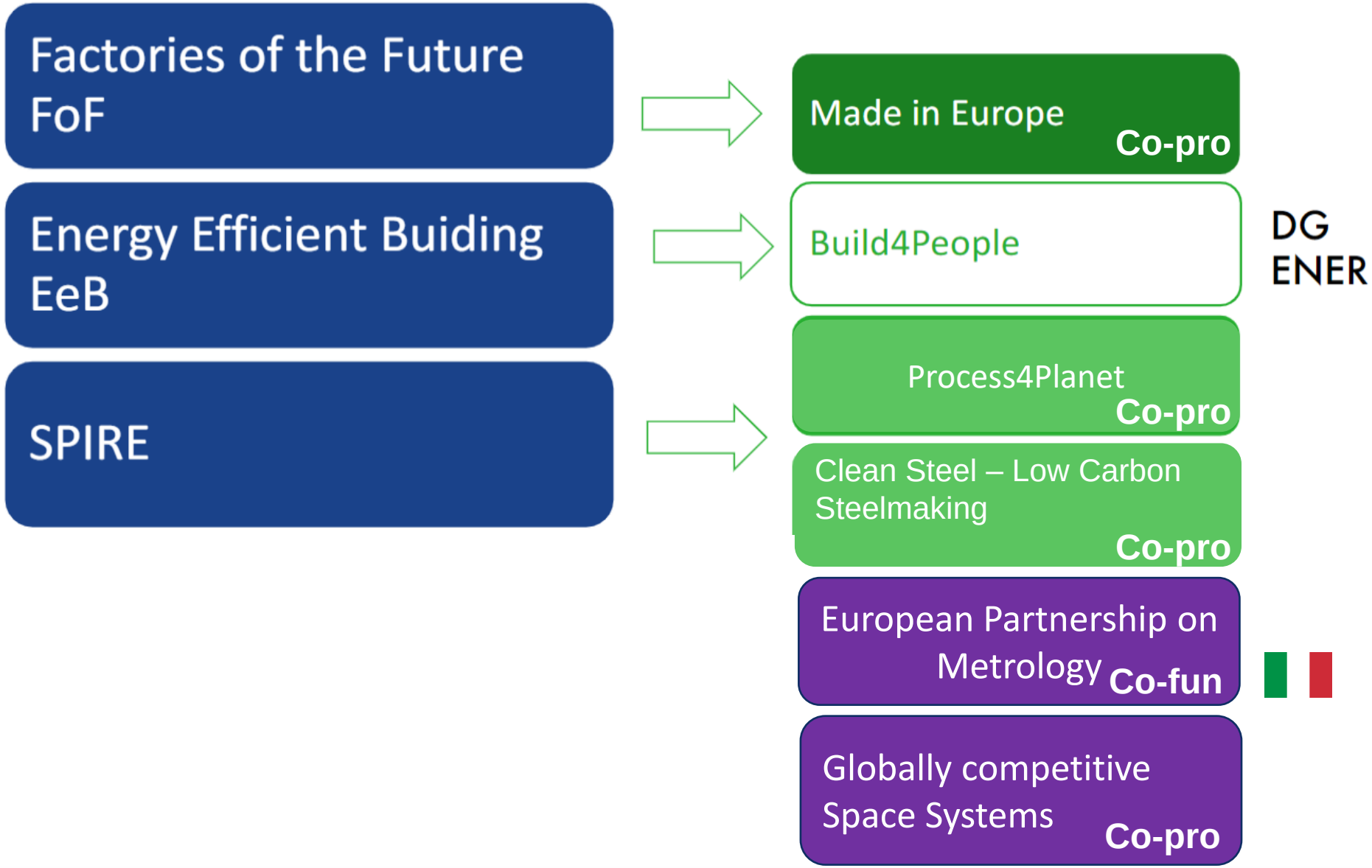
EXAMPLE

The proposed partnership on clean hydrogen aims to roll-out hydrogen technologies at scale... building on the Fuel Cells and Hydrogen Joint Undertaking's successful demonstration of zero-emission fuel cell buses and refuelling infrastructure.

Cooperation Opportunities

- Foster a personal committment to follow their work
- Being driven by EU Partnership members in HE proposals
- Read their Strategic Research and Innovation Agendas or Technology Roadmaps

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

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

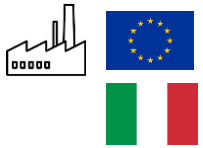
Bid Data cPPP

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**

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 Artifical Intelligence, Data and Robotics

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

European Partnership for Photonics

- Draft partnership proposal (May 2020)

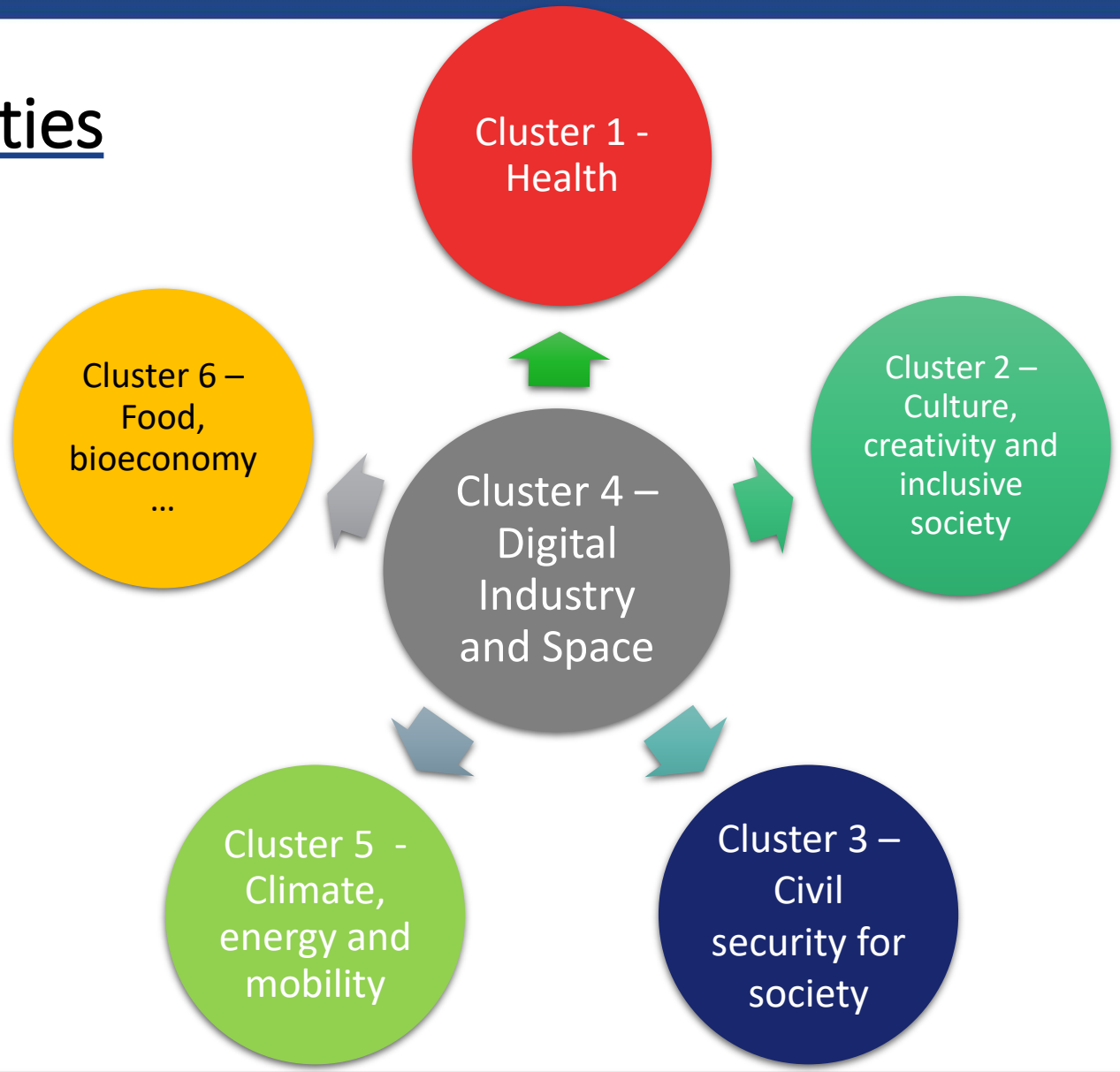
Complementarities with other Horizon Europe Clusters

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

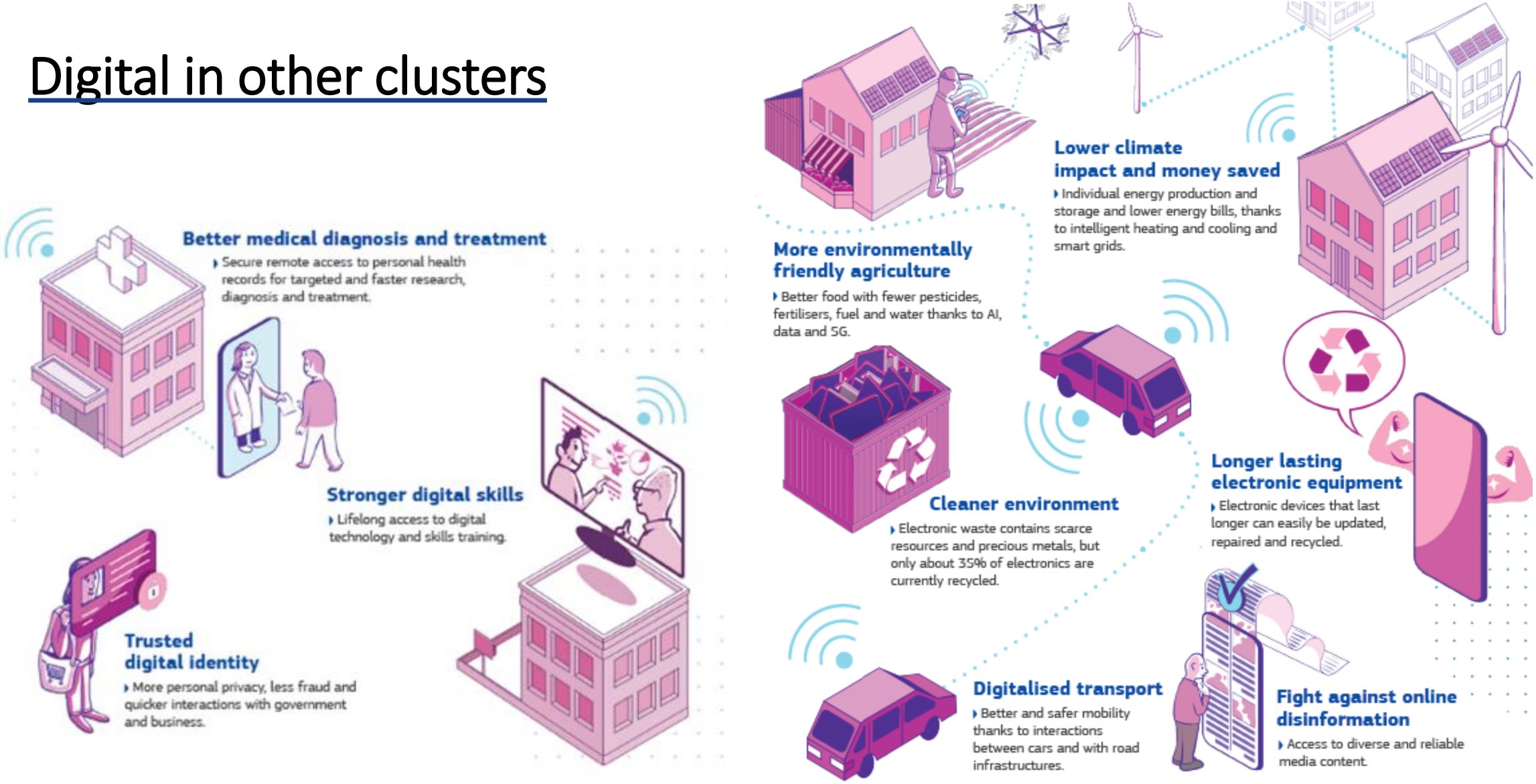
1. Circular value chains
2. Green, Sustainable and Smart Materials
3. Common European Data Spaces
4. Trustworthy AI applications
5. GNEOS, Copernicus applications



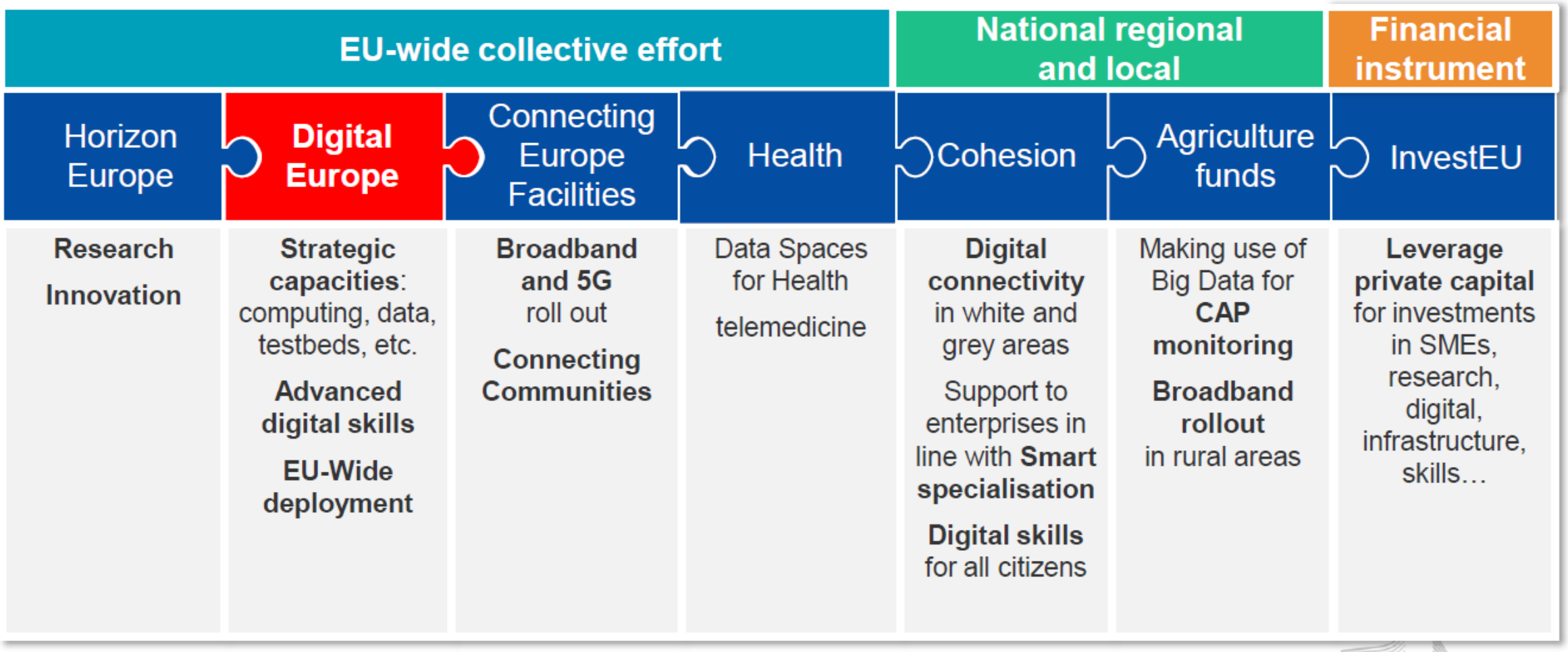
Clusters in 'Global Challenges and European Industrial Competitiveness'

Clusters	Areas of intervention	
Health	• Health throughout the life course • Non-communicable and rare diseases • Tools, technologies and digital solutions for health and care, including personalised medicine	• Environmental and social health determinants • Infectious diseases, including poverty-related and neglected disease • Health care systems
Culture, creativity and inclusive society	• Democracy and Governance • Social and economic transformations	• Culture, cultural heritage and creativity
Civil security for society	• Disaster-resilient societies • Protection and Security	• Cybersecurity
Digital, Industry and space	• Manufacturing technologies • Advanced materials • Next generation internet • Circular industries • Space, including Earth Observation • Emerging enabling technologies	• Key digital technologies, including quantum technologies • Artificial Intelligence and robotics • Advanced computing and Big Data • Low-carbon and clean industry • Emerging enabling technologies
Climate, Energy and Mobility	• Climate science and solutions • Energy systems and grids • Communities and cities • Industrial competitiveness in transport • Smart mobility	• Energy supply • Buildings and industrial facilities in energy transition • Clean, safe and accessible transport and mobility • Energy storage
Food, bioeconomy, natural resources, agriculture and environment	• Environmental observation • Agriculture, forestry and rural areas • Circular systems • Food systems	• Biodiversity and natural resources • Seas, oceans and inland waters • Bio-based innovation systems in the EU Bioeconomy

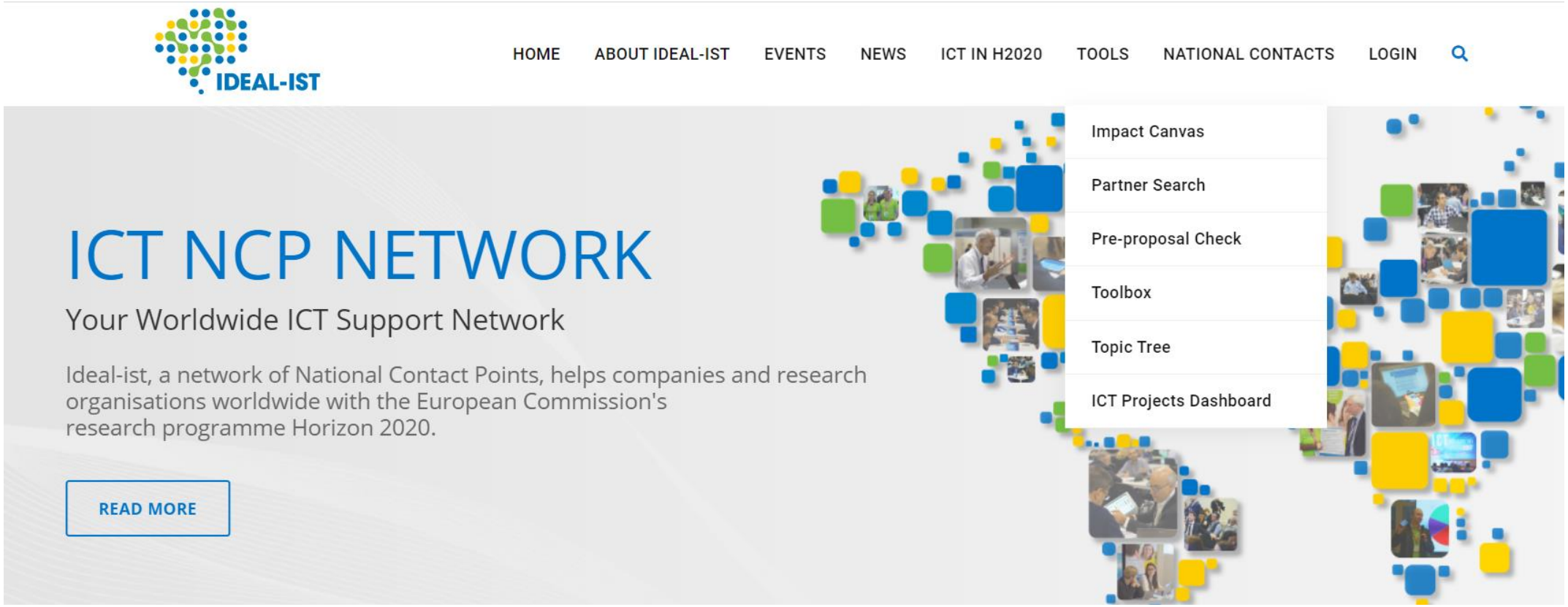
Digital in other clusters



Programmes are complementary



Some Tools



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Final Tips

- Read the European Policies: follow them and give references in your proposal!
- Twin green and digital transition is a major EU priority: focus on impact for the individual, for the society, for the economy, for the environment, with a look at technological, academic and industrial levels!
- Horizon Europe is an ambitious programme: several actions might be relevant for you.
- Read carefully the Call for Proposal you're proposing to.
- Contact your NCP to look at all the funding opportunities!

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