

Commission proposal for **Horizon Europe**

THE NEXT EU RESEARCH & INNOVATION
PROGRAMME (2021 – 2027)

#HorizonEU

Pillar II – Cluster « Digital and Industry »

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Horizon Europe

is the Commission proposal for a **€ 100 billion** research and innovation funding programme for seven years (2021-2027)



to strengthen the EU's scientific and technological bases



to boost Europe's innovation capacity, competitiveness and jobs



to deliver on citizens' priorities and sustain our socio-economic model and values

€ 4.1 billion are proposed to be allocated for defence research, in a separate proposal for a European Defence Fund

Horizon Europe – Why?

Horizon Europe: investing in R&I to shape our future

- The vision:
" a Europe that protects,
a Europe that empowers,
a Europe that defends"
Jean-Claude Juncker
- Tackling **climate change**
(35 % budgetary target)
- Helping to achieve **Sustainable Development Goals**
- Boosting the Union's
competitiveness and growth

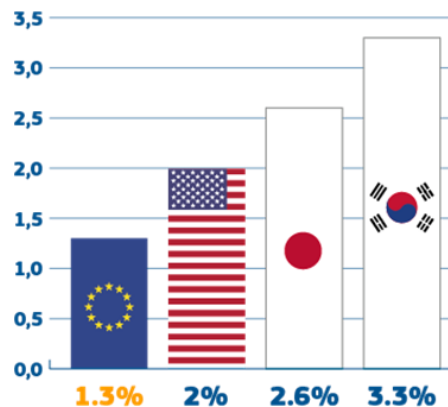


Credits: <https://www.un.org/sustainabledevelopment/sustainable-development-goals/>

While benefiting from world-class research and strong industries...

Our knowledge and skills are our main resources.

- 7% of the world's population
- 20% of global R&D
- 1/3 of all high-quality scientific publications



1.3%
EU business
R&D
investment

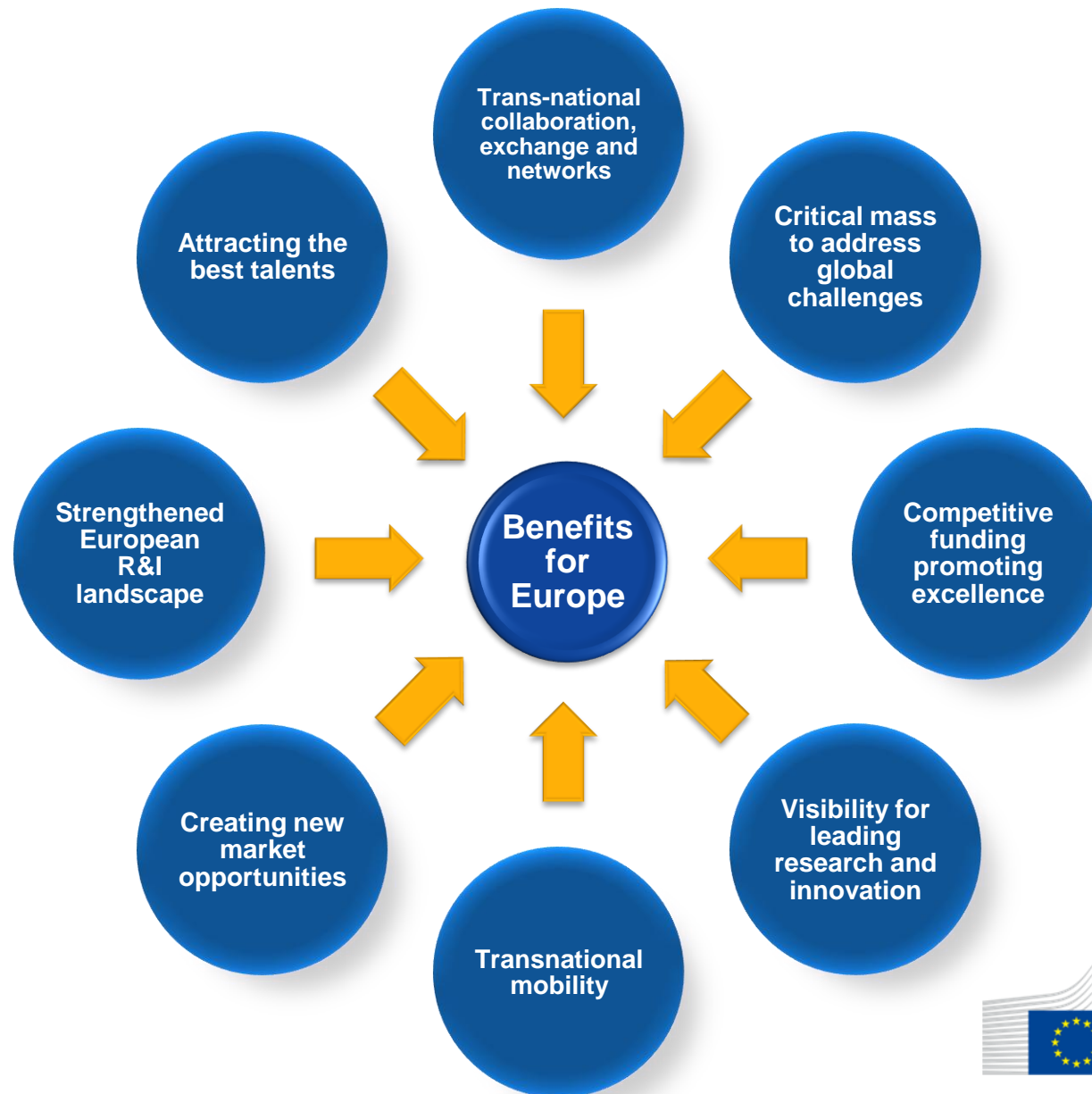
...Europe fails to transform leadership in science into leadership in innovation and entrepreneurship

We need a new level ambition and a renewed R&I agenda to be in pole position

- Ensuring essential investment and stimulating private investment
- Making regulatory frameworks fit for innovation
- Becoming a front runner in market-creating innovation
- Reconnecting R&I with citizens through EU-wide R&I missions
- Supporting the dissemination of innovation throughout the Union
- Investing in skills and empower universities to become more entrepreneurial and interdisciplinary



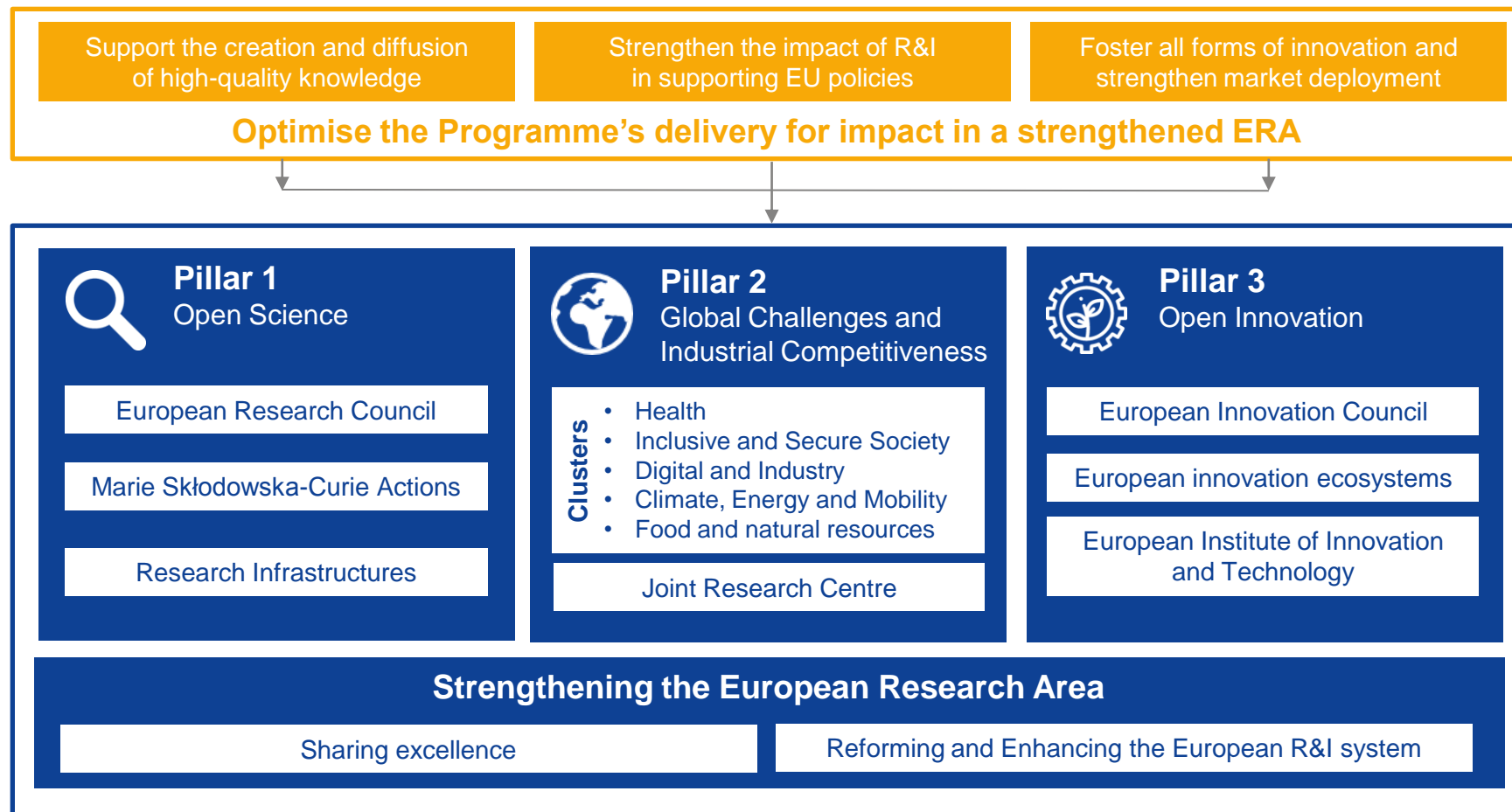
Added value through Horizon Europe:



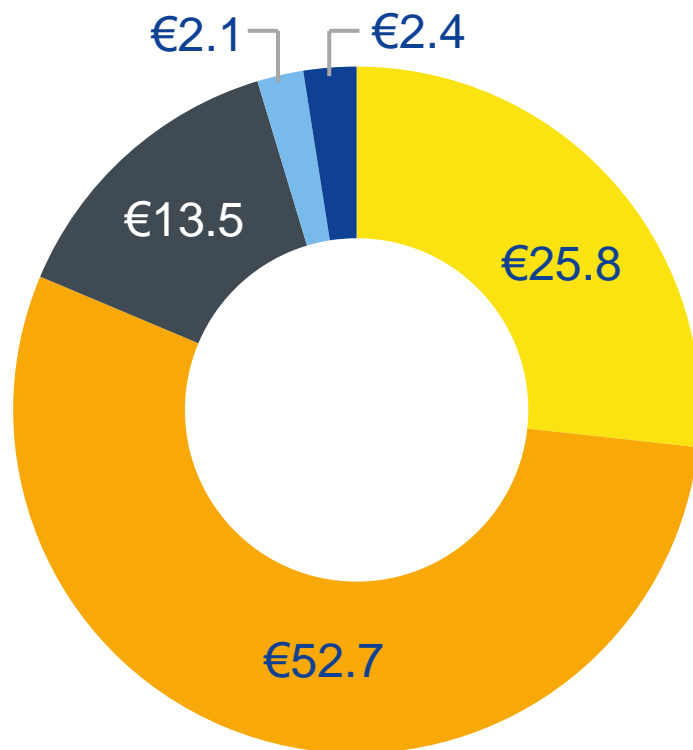
Horizon Europe – What?

Horizon Europe: evolution not revolution

Specific objectives of the Programme



Budget: €100 billion*



€ billion
In current prices

- Open Science
- Global Challenges & Ind. Competitiveness
- Open Innovation
- Strengthening ERA
- Euratom

* This envelope includes EUR 3.5 billion allocated under the InvestEU Fund.

Pillar 2

Global Challenges & Industrial Competitiveness:

boosting key technologies and solutions underpinning
EU policies & Sustainable Development Goals

Clusters implemented through usual calls, partnerships & missions	Budget (€ billion)
Health	€ 7.7
Inclusive and Secure Societies	€ 2.8
Digital and Industry	€ 15
Climate, Energy and Mobility	€ 15
Food and Natural Resources	€ 10
Joint Research Centre supports European policies with independent scientific evidence & technical support throughout the policy cycle	€ 2.2

Strengthening the European Research Area:

optimising strengths & potential for a more innovative Europe

Sharing Excellence

- Teaming
(institution building)
- Twinning
(institutional networking)
- ERA Chairs bringing excellence to institutions
- COST

€ 1.7 billion



Reforming and enhancing the European R&I system

- Scientific evidence & foresight
- Open Science
- Policy Support Facility
- Attractive researcher careers
- Citizen science
- Responsible Research & Innovation; gender equality

€ 0.4 billion

Horizon Europe – What's new?

Lessons Learned

from Horizon 2020 Interim Evaluation



Support breakthrough innovation



Create more impact through mission-orientation and citizens' involvement



Strengthen international cooperation



Reinforce openness



Rationalise the funding landscape



Key Novelties

in Horizon Europe

European Innovation Council

R&I Missions

Extended association possibilities

Open science policy

New approach to Partnerships



European Innovation Council

The EIC will support innovations with breakthrough and disruptive nature and scale up potential that are too risky for private investors.

**European
Innovation
Council**

**Helping innovators create markets of the future,
leverage private finance, scale up their
companies,
Innovation centric, risk taking & agile, pro-
active management and follow up**

Two complementary instruments bridging the gap from idea to investable project

Pathfinder: grants
(from early technology
to pre- commercial)

Accelerator:
grants & blended finance
(from pre-commercial
to market & scale-up)



New approach to European Partnerships

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

Key features

- Simple architecture and toolbox
- Coherent life-cycle approach
- Strategic orientation

Co-programmed

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

Co-funded

Based on a joint programme agreed by partners; commitment of partners for financial and in-kind contributions & financial contribution by Horizon Europe

Institutionalised

Based on long-term dimension and need for high integration; partnerships based on Articles 185 / 187 of TFEU and the EIT-Regulation supported by Horizon Europe



R&I Missions

R&I Missions

Connecting to citizens: Missions will relate EU's research and innovation to society and citizens' needs, with strong visibility and impact

A mission will consist of a portfolio of actions intended to achieve **a bold and inspirational as well as measurable goal** within a set timeframe, with impact for science and technology, society and citizens that goes beyond individual actions

Horizon Europe proposal defines mission characteristics and criteria

Specific missions will be **co-designed with Member States, stakeholders and citizens** and programmed within the Global Challenges and Industrial Competitiveness pillar (drawing on inputs from other pillars)



Open Science across the programme

- Encouraging uptake of **Open Science practices** through earmarked funding, including to enhance **researcher skills** in Open Science and support **reward systems** that promote it
- **FAIR (findable, accessible, interoperable, re-usable) and Open Data:** research data is open by default (with opt-out possibilities) and a data management plan is obligatory
- **Open Access** to publications: no reimbursement of article processing charge (APC) for publications in hybrid journals
- **Monitoring system** to ensure compliance with Horizon Europe provisions



International Cooperation

International Cooperation

Will ensure effective tackling of global societal challenges; access to the world's best talents, expertise and resources; enhanced supply and demand of innovative solutions

Extended openness to association

- Third countries with good capacity in science, technology and innovation
- Taking into account objective of driving economic growth in Europe through innovation
- General opening for international participation
- Intensified targeted actions (flagship initiatives, joint calls, etc.)

Horizon Europe – How?

Simple and fit for purpose rules

- Further alignment to the Financial Regulation
- Increased use of **simplified forms of grants** where appropriate (building on the H2020 lump sum pilot experience)
- Broader acceptance of **usual cost accounting practices**
- Enhanced **cross-reliance on audits** benefiting beneficiaries taking part in several Union programmes

while ensuring continuity and consistency for beneficiaries by maintaining

- Attractive H2020 funding model, including up to 100% funding rate
- Single set of rules principle

Strategic planning to define multiannual work programmes and calls for proposals

- Transparency and stakeholder involvement
- Prioritisation and flexibility to align to political priorities
- Internal programme coherence & synergies with other programmes

Multiannual Strategic R&I Plan

*** Multiannual orientations and priorities in one document**

*** Areas for partnerships and missions**

Strategic discussions with Member States and European Parliament

Consultation with stakeholders

Work Programmes

Next steps



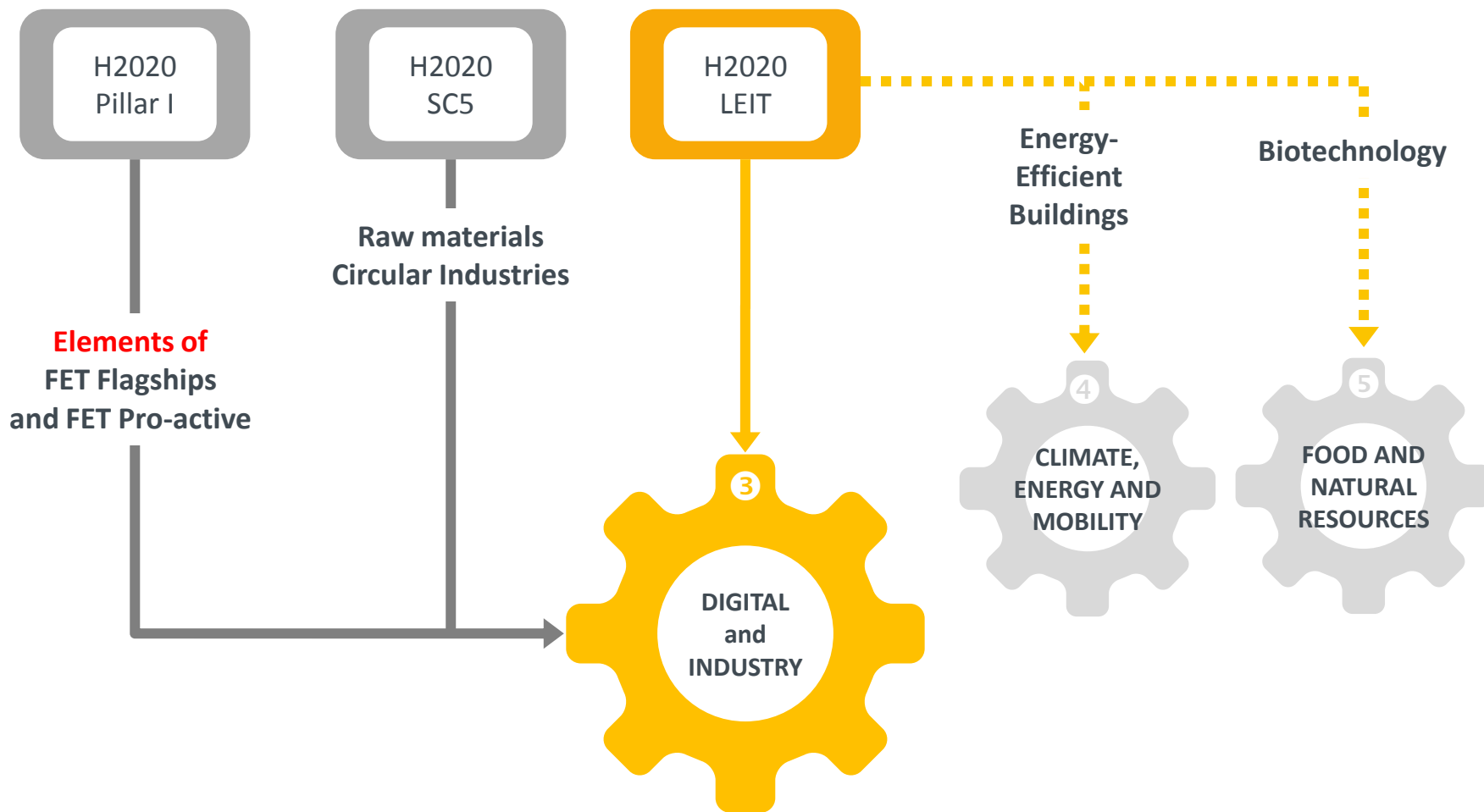
Pillar II – Cluster 3

Digital and Industry

CLUSTER 3 Digital and Industry: why combined in a cluster?

- These are the sciences and technologies that **enable** other clusters: underpinning, all-pervasive
- **Digitisation, Key Enabling Technologies** and **Space** are major drivers and enablers
- This cluster will develop **technological and industrial capacities** for industrial competitiveness and the capacity to address the global challenges
- It will support the **digitised, circular, low-carbon** and **low-emission economy**
- **Universities and research institutes** remain of the essence (in these parts in H2020, they get 50% of the budget)

CLUSTER 3 – What moves in / out



CLUSTER 3 Digital and Industry: facts and figures

- EU industry provides 1 out of 5 jobs, 80% of EU exports, two thirds of private sector R&D
- ICT sector: 5 % of the EU economy, 25 % of total business expenditure is ICT-related. Leading in next generation digital technologies is vital
- Investments in ICT account for 50 % of all European productivity growth
- The Circular Economy: 580,000 EU jobs and possibly € 600 billion in savings for EU businesses (8% of their annual turnover)
- Energy-intensive industries: 20% of global greenhouse gas emissions. Require new breakthrough technologies to meet climate action targets
- The space sector: 230,000 EU jobs, € 46 - 54 billion. Space technologies are key enablers

CLUSTER 3 Digital and Industry: what's new?

- This cluster brings together the technologies that enable other clusters to tackle global challenges.
- Attention for European social and ethical values, e.g. the human element in manufacturing, the skills needed, AI and citizens, protecting privacy
- New attention for raw materials: after creating a research community in H2020, more emphasis on piloting, large scale demonstrators and finding alternatives for critical raw materials
- Space: R&I actions will be streamlined to support the proposed single Space Programme in the MMF, which gathers under one umbrella earth observation, geolocalisation, space surveillance and tracking and secure governmental communication

CLUSTER 3 Digital and Industry: Priorities

- Reshaping economies and societies through key enabling technologies (KETs) and digital transformation
 - for Sovereignty and
 - for addressing global challenges
- Industry producing in Europe / Human centred ecosystem
- Industry reducing green-house gas emissions
- Industrially-oriented infrastructures (KETs / digital)
- Use of enabling, digital and space technologies
- Generation and valorisation of big data
- “... by design” / Life Cycle Analysis

CLUSTER 3 Digital and Industry

Cluster 3 contributes to many Sustainable Development Goals



CLUSTER 3 Digital and Industry: how will it link to other EU programmes?

- The **Digital Europe Programme** (DEP) will use public procurement to deploy the digital technologies and infrastructures (in particular in artificial intelligence, cybersecurity and high-performance computing)
- The European **Space** programme will feed R&I priorities into this cluster, will pick up results for applications in e.g. agriculture, climate monitoring
- The **InvestEU** Fund can finance innovators and innovations coming from this cluster, to enable their roll-out and scale-up
- The **European Regional Development Fund** (ERDF) may support the take-up of results emerging from this cluster
- The **Connecting Europe Facility** (CEF) supports the large-scale roll-out and deployment of innovative new technologies and solutions in transport, energy and digital-physical infrastructures
- The **Single Market Programme** will support the competitiveness of SMEs and entrepreneurship (e.g. Enterprise Europe Network)

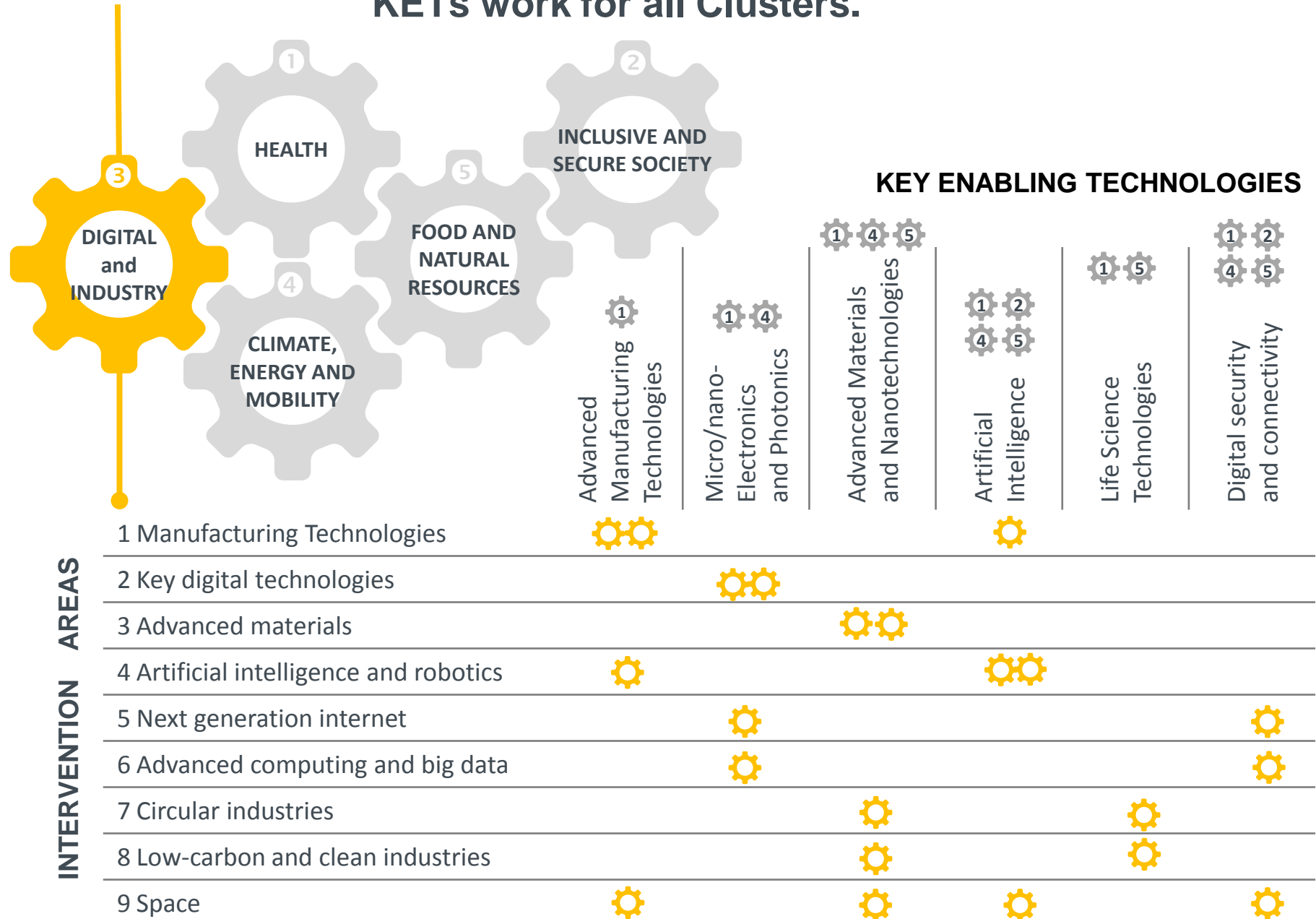
CLUSTER 3 Digital and Industry: what?

9 intervention areas:

- Manufacturing technologies
- Key digital technologies
- Advanced materials
- Artificial intelligence and robotics
- Next generation internet
- Advanced computing and big data
- Circular industries
- Low carbon and clean industries
- Space

CLUSTER 3 works for all KETs

KETs work for all Clusters.



CLUSTER 3 Digital and Industry: intervention areas in keywords

Manufacturing technologies, broad lines:

- additive manufacturing, robotics
- different enabling technologies across value chain
- skills
- flexible zero-defect and zero-waste plants
- construction, pre-fabricated components

CLUSTER 3 Digital and Industry: intervention areas in keywords

Key digital technologies, broad lines:

- nano-electronics
- sensing technologies, part of the Internet of Things
- alternative technologies such as neuromorphic computing or quantum computing
- computing architectures and low-power processors for a wide range of applications
- computing hardware designs, security-protection
- photonics
- system engineering technologies for autonomous systems
- software technologies
- emerging technologies

CLUSTER 3 Digital and Industry: intervention areas in keywords

Advanced materials, broad lines:

- materials with new properties
- integrated materials processes and production
- enablers like characterisation, modelling
- infrastructures for uptake by SMEs of key technologies
- analysis of trends in advanced materials
- solutions for users, also for creative industries

CLUSTER 3 Digital and Industry: intervention areas in keywords

AI and robotics, broad lines:

- enabling AI technologies such as machine learning
- robotics
- user-driven AI technologies
- research competences for AI
- technologies for open AI platforms like algorithms

CLUSTER 3 Digital and Industry: intervention areas in keywords

Next generation internet, broad lines:

- network and service infrastructures, enabling e.g. IoT, blockchain
- next generation internet applications
- middleware incl. distributed ledger technologies, embedding AI

CLUSTER 3 Digital and Industry: intervention areas in keywords

Advanced computing and big data, broad lines:

- high performance computing
- big data
- reduced carbon footprint of ICT

CLUSTER 3 Digital and Industry: intervention areas in keywords

Circular industries, broad lines:

- industrial symbiosis
- life-cycle assessment of materials
- products for enhanced life-cycle performance
- recycling industry
- elimination of substances of concern
- sustainable supply of raw materials

CLUSTER 3 Digital and Industry: intervention areas in keywords

Low-carbon and clean industries, broad lines:

- process technologies without greenhouse gasses
- industrial CO2 valorisation
- electrification within industrial plants
- industrial products with low or zero carbon emissions

CLUSTER 3 Digital and Industry: intervention areas in keywords

Space, broad lines:

- Galileo and EGNOS (positioning)
- Copernicus (earth observation)
- Space situational awareness
- Secure satellite communications for EU governments
- Space Technologies supporting EU global competitiveness
- Independence for critical components
- Space science and exploration



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**'With growing international competition, Europe needs to act urgently on research and innovation.
The proposed € 100 billion for the next EU research and innovation programme would be a huge boost.'**

Carlos Moedas, Commissioner, 15/05/2018

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

European Innovation Council

<http://ec.europa.eu/research/eic>

EU budget for the future

http://ec.europa.eu/budget/mff/index_en.cfm





Thank you!

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