



Istituto Nazionale di Fisica Nucleare

*Le nuove opportunità per
la Ricerca in Europa:
verso Horizon Europe*

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Oct 2019

What's behind Horizon 2020?

The European Union and its Research and Innovation Policy



- *500 million people & 28 countries (still!)*
- *6% of the World's population*
- *20% of world expenditure on research*
- *27% of world scientific publications*
- *32% of high-impact publications*
- *32% of patent applications*
- *Some of the best universities in the world*
- *Some of the most innovative companies in the world*

EU Research & Innovation Policy System

Legislative Framework

Basis for Cooperation: Lisbon Treaty

Instruments: coordinating policies, guidelines and indicators,
EU Research Framework Programmes, Art. 185 and Art. 187 initiatives

Policy and Strategy

Europe 2020 Strategy: EU growth and jobs strategy 2010-2020

Innovation Union: Flagship Initiative

European Research Area: contractual target

Horizon 2020

Research and Innovation Programme at EU level

Europe 2020 Strategy

3 Priorities	Intelligent Growth	Sustainable Growth	Inclusive Growth		
7 Flagship Initiatives	Innovation Union Digital Agenda Youth on the Move	Industrial Policy for the Globalisation Era Resource Efficient Europe	New Skills and Jobs European Platform against Poverty		
5 Core Objectives	75% of the population aged 20-64 employed	3% of the EU's GDP invested in R&D	20/20/20 climate/energy targets met	Under 10% early school leavers; >40% of population aged 30-34 have tertiary degree	20 million less people at risk of poverty

Context of EU R&I Funding

Why a framework programme for R&I?

- High-level research is expensive
- Borders across disciplines are more and more blurred: a coordination action is needed
- A “critical mass” must be mobilised in order to support research
- Investments by single Member State on R&I are insufficient and unbalanced
- To coordinate policies, agendas and research priorities means to coordinate research funding programmes
- Solutions and resources must be integrated and optimised in order to address common challenges
- Knowledge diffusion must be promoted and research excellences must collaborate

Why Horizon 2020?



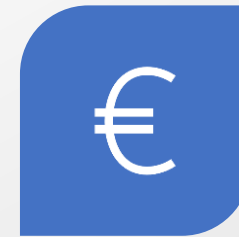
HORIZON 2020 – FRAMEWORK
FOR RESEARCH & INNOVATION
2014 – 2020 (8TH FRAMEWORK
PROGRAMME)



TO ENSURE EUROPE
PRODUCES WORLD-CLASS
SCIENCE AND TECHNOLOGY
THAT DRIVES ECONOMIC
GROWTH



TO BRING EU INVESTMENT ON
R&I UP TO 3% OF TOTAL GDP
BY 2020 (TO THE LEVELS OF US
AND JAPAN)

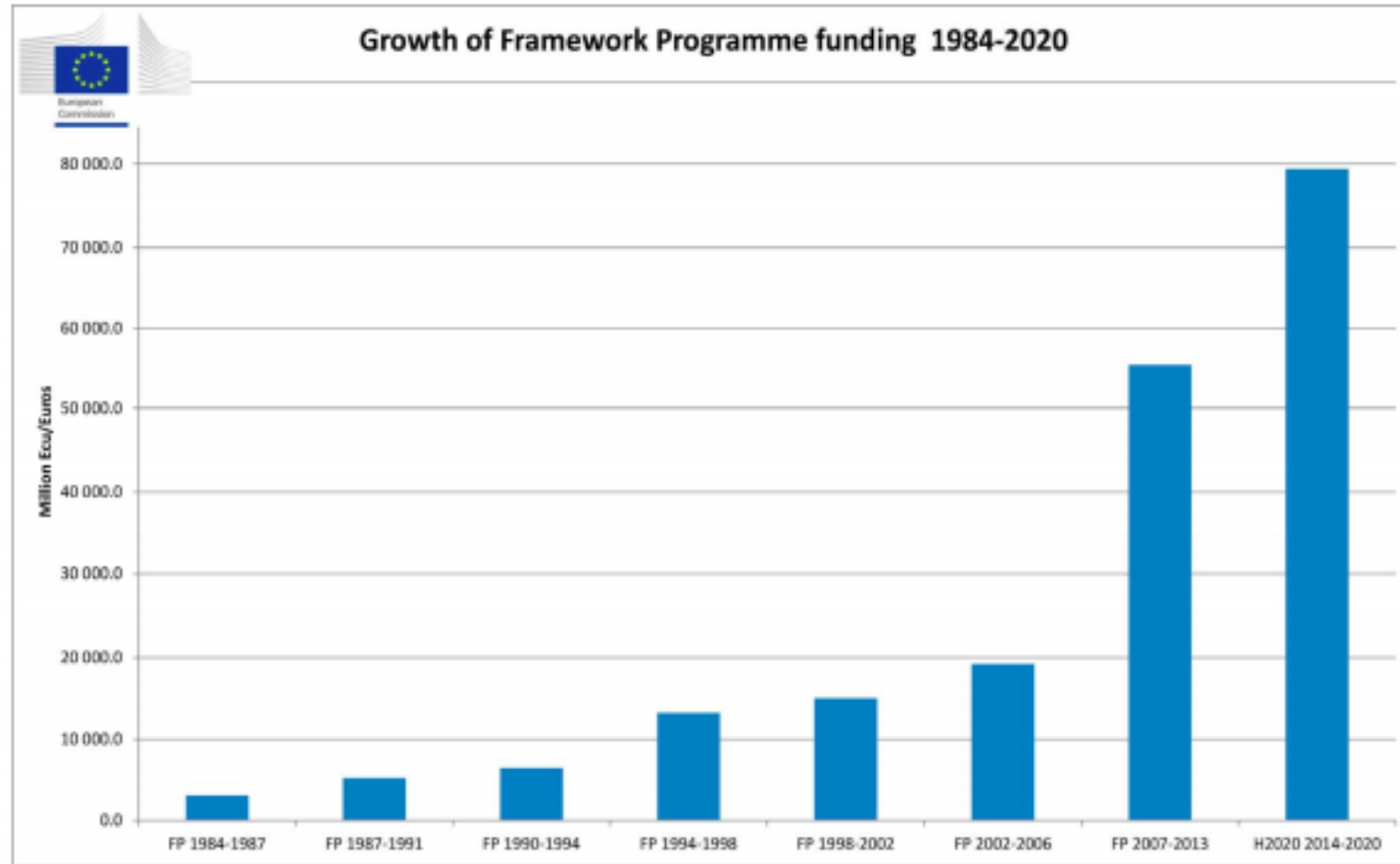


TO PROMOTE THE PRIVATE
INVESTMENT ON R&I



TO PROMOTE THE EUROPEAN
RESEARCH AREA, FOR FREE
KNOWLEDGE CIRCULATION,
RESEARCHERS AND
TECHNOLOGIES

How has EU Research and Innovation funding evolved over recent years?



(c) European Union 2013

Horizon 2020 - Specifics

- ✓ The EU Framework Programme for Research and Innovation 2014-2020
- ✓ **€87 billion (in 7 years)** - The **biggest public multinational research programme in the world**
- ✓ A single programme covering the whole innovation chain
- ✓ **Coupling research with innovation** - «from lab to market»
- ✓ **Focus on societal challenges: health, clean energy, transport, etc.**
- ✓ Transdisciplinary approach
- ✓ **Open to the World!** Participation of companies, universities, institutes from all over the world



Horizon 2020 is a part of the EU Budget 2014- 2020!

Areas financed by the EU budget
Multiannual financial framework 2014-2020
In billion € and in percentage, current prices

Economic, social and territorial cohesion
€371.4

- Research and innovation
- Information and communications technology
- Small and medium enterprises
- Low-carbon economy
- Climate change and risk
- Environment and resource efficiency
- Transport and energy
- Employment
- Social inclusion
- Vocational training
- Other



Sustainable growth: natural resources
€420

- Agriculture
- Rural development
- Fisheries
- Environment and other



Competitiveness for growth and jobs
€142.1

- Education
- Energy
- Industry and small and medium enterprises
- Networks and technology
- Research and innovation
- Transport
- Other



Administration
€69.6



Global Europe
€66.3

- Development and international cooperation
- Humanitarian aid
- Neighbourhood and enlargement
- Foreign policy instruments
- Other



Security and citizenship
€17.7

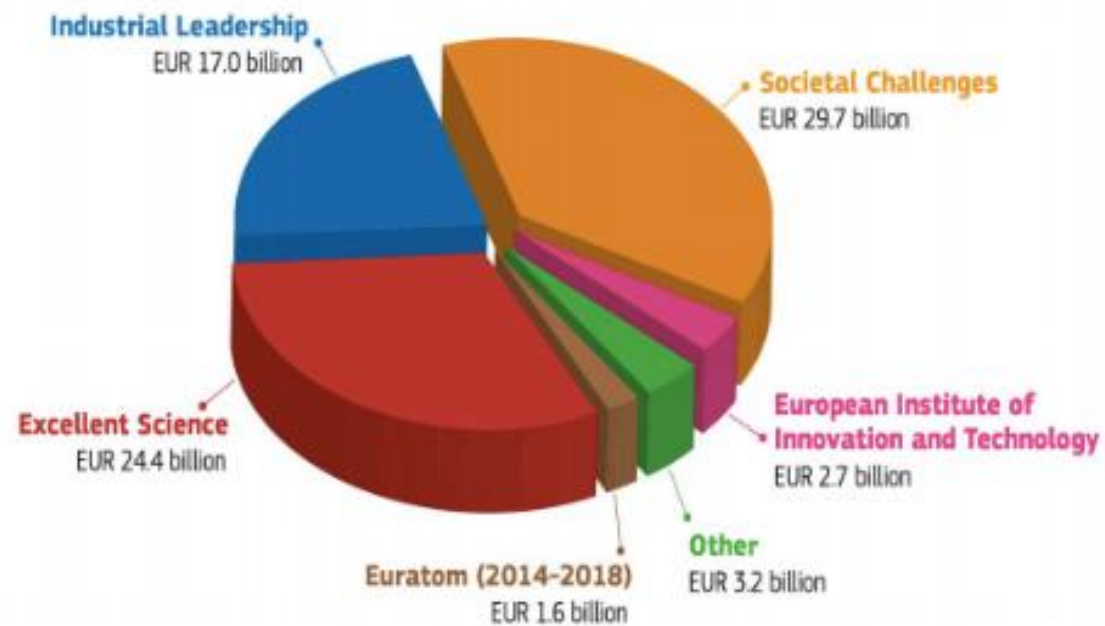
- Migration and home affairs
- Health and food safety
- Culture
- Justice
- Other



Note: Commitments; adjusted for 2018
Source: European Commission

Horizon 2020 – Structure and budget breakdown (pillars)

HORIZON 2020 BUDGET (in current prices)



Excellence Science, research driven:
Excellent science is the foundation of tomorrow's technologies, jobs and wellbeing

Industrial Leadership, industry driven:
*Strategic investments in key technologies;
Support to innovative companies*

Societal Challenges, society driven:
*Address concerns of citizens and society/EU policy objectives;
Multidisciplinary collaborations*

Horizon 2020 structure (in details)

Excellent Science

- **European Research Council**
 - Frontier research by the best individual teams
- **Future and Emerging Technologies**
 - Collaborative research to open new fields of innovation
- **Marie Skłodowska Curie actions**
 - Opportunities for training and career development
- **Research infrastructures (including e-infrastructure)**
 - Ensuring access to world-class facilities

Industrial Technologies

- **Leadership in enabling and industrial technologies**
 - ICT, nanotechnologies, materials, biotechnology, manufacturing, space
- **Access to risk finance**
 - Leveraging private finance and venture capital for research and innovation
- **Innovation in SMEs**
 - Fostering all forms of innovation in all types of SMEs

Societal Challenges

- **Health, demographic change and wellbeing**
- **Food security, sustainable agriculture, marine and maritime research & the bio-economy**
- **Secure, clean and efficient energy**
- **Smart, green and integrated transport**
- **Climate action, resource efficiency and raw materials**
- **Inclusive, innovative and reflective societies**
- **Security society**

European Institute of Innovation and Technology (EIT)

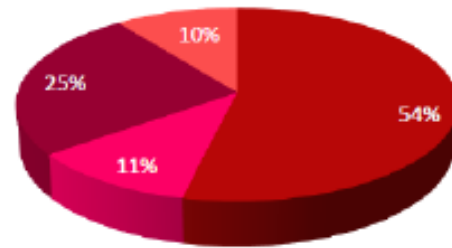
Spreading Excellence and Widening Participation

Science with and for society

Joint Research Center (JRC)

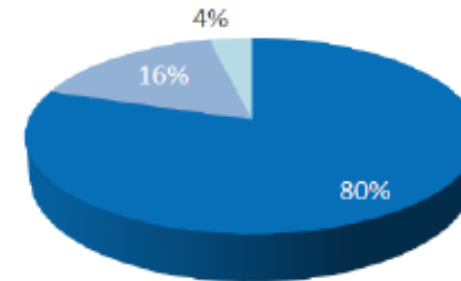
Budget breakdown in detail

Excellent Science



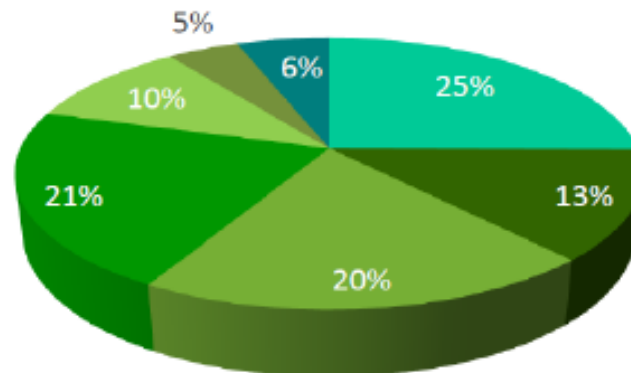
- European Research Council
- Future and Emerging Technologies
- Marie Skłodowska Curie Actions
- European Research Infrastructures (including einfrastructures)

Industrial Leadership



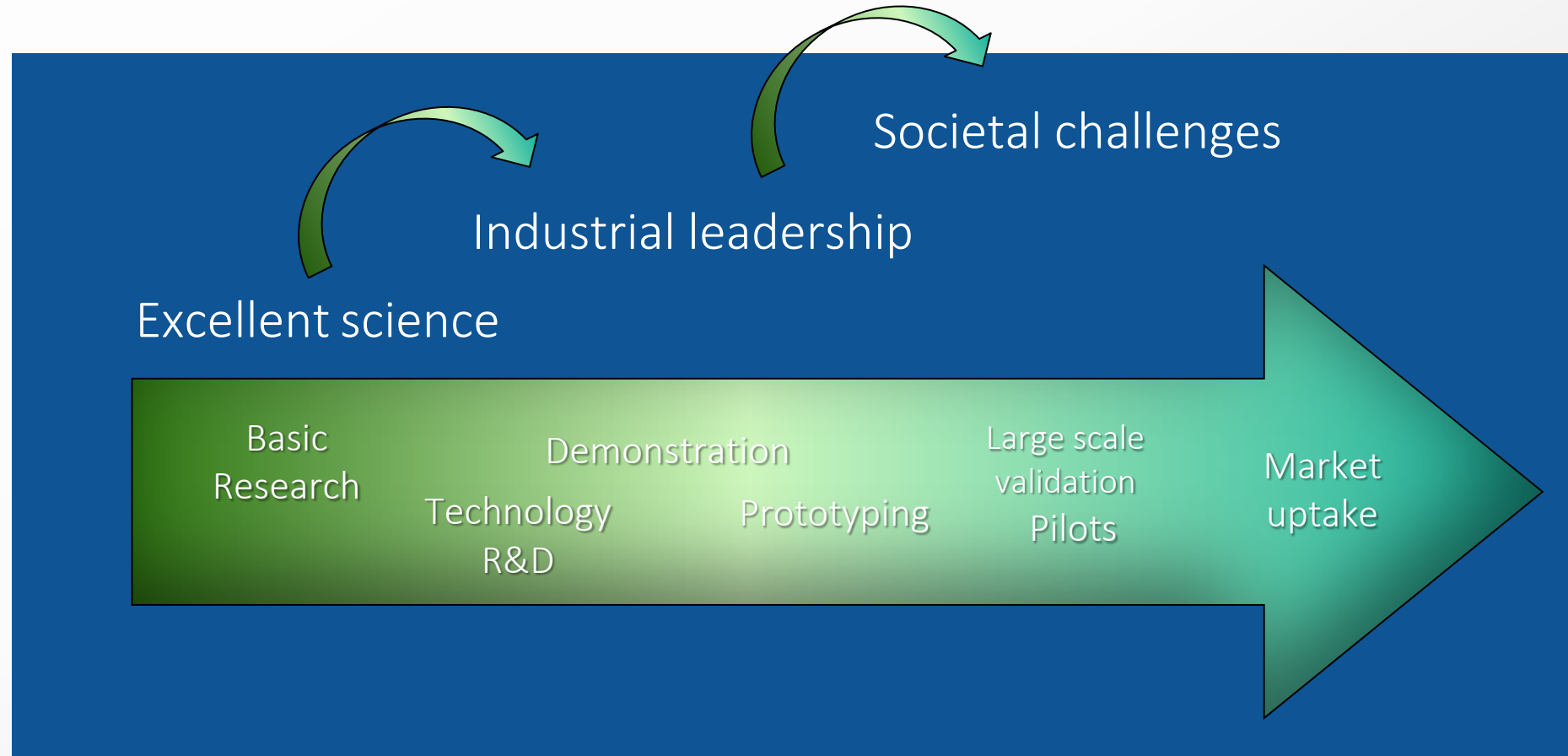
- Leadership in enabling and industrial technologies
- Access to risk finance
- Innovation in SMEs

Societal challenges

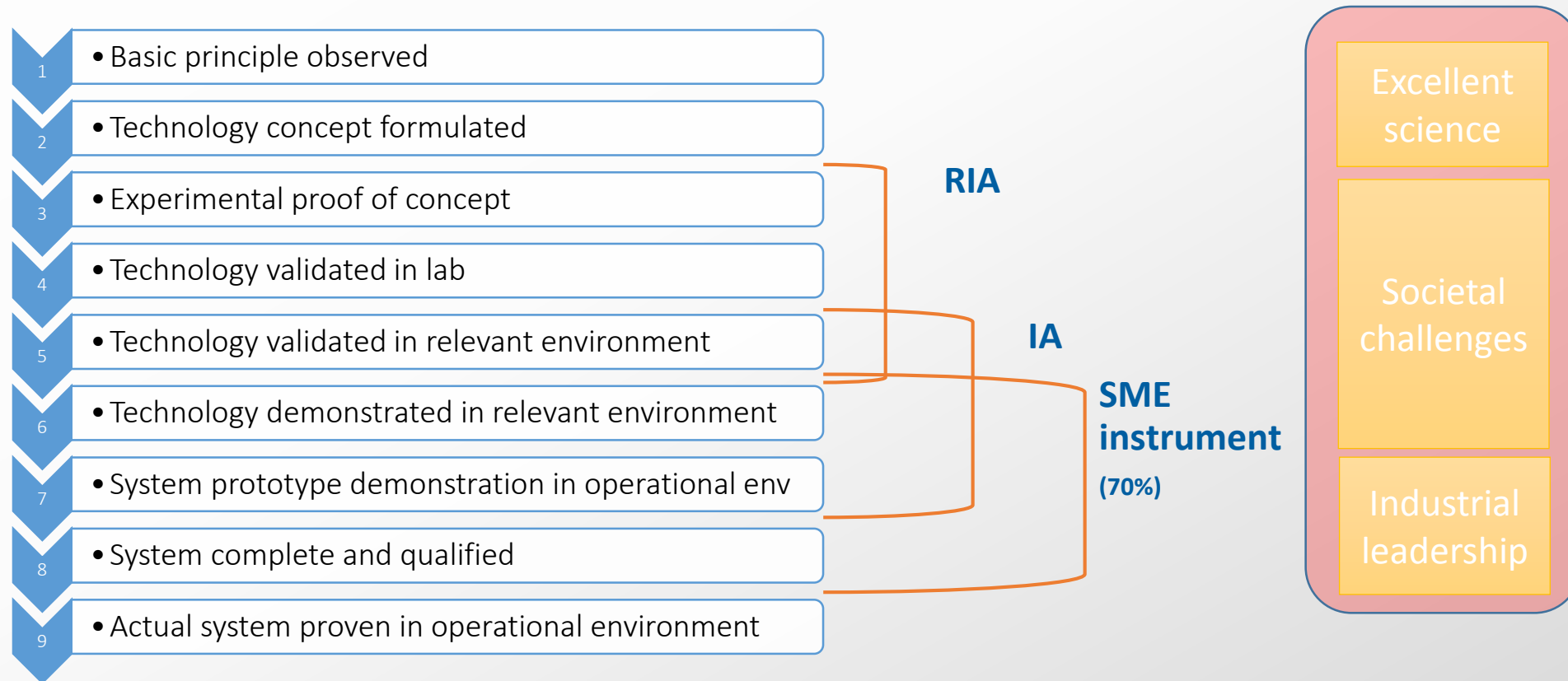


- Health, demographic change and wellbeing
- Food security, sustainable agriculture and forestry, marine and maritime and inland water research and the bioeconomy
- Secure, clean and efficient energy
- Smart, green and integrated transport
- Climate action, environment, resource efficiency and raw materials
- Inclusive, innovative and reflective Societies
- Secure Societies

Horizon 2020 Innovation Chain



Technology Readiness Level in H2020



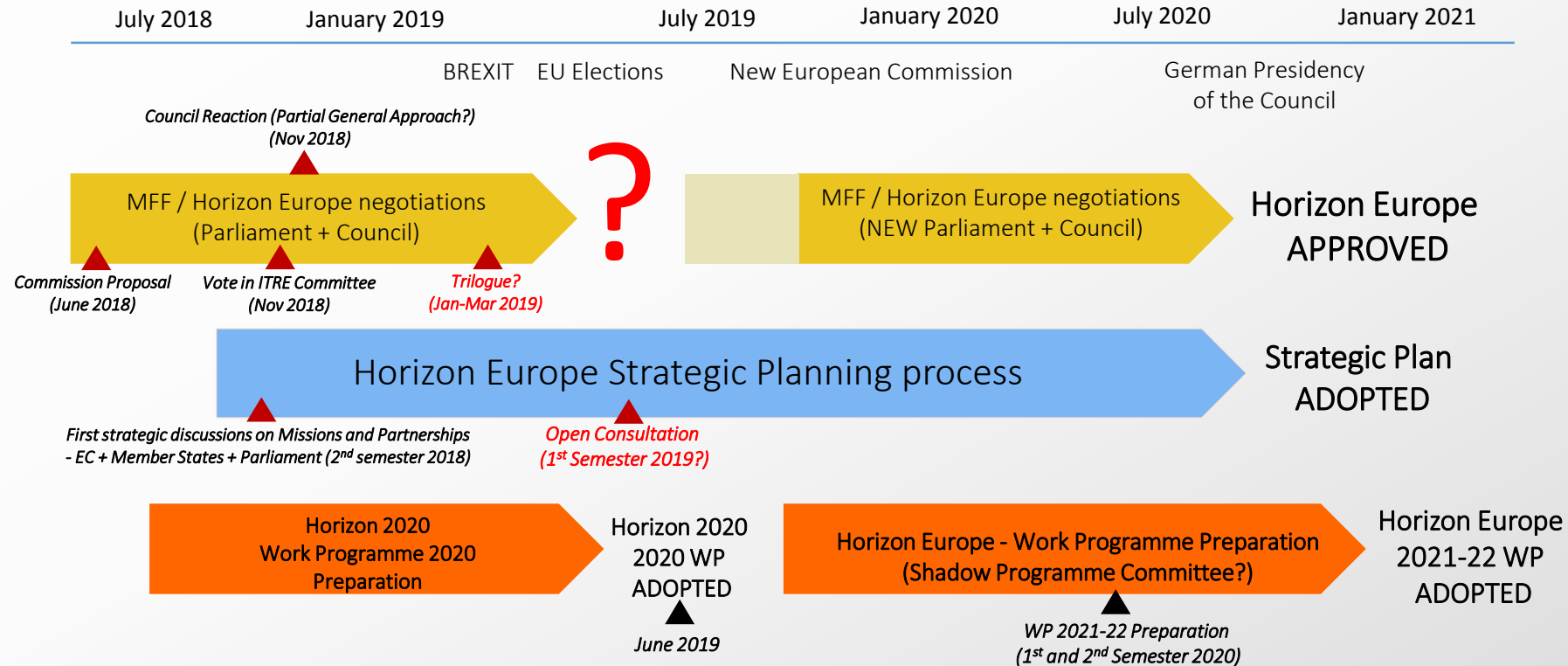


Horizon Europe

the EU R&I Framework
Programme 2021-2027

Beyond Horizon
2020...

The path towards Horizon Europe





Why Horizon
Europe?

WHY HORIZON EUROPE?

- The Programme shall maximise **Union added value** by focusing on objectives and activities that cannot be effectively realised by Member States acting alone, but in **cooperation**
- The Programme's general objective is to deliver scientific, technological, economic and **societal impact** from the Union's investments in research and innovation



OBJECTIVES

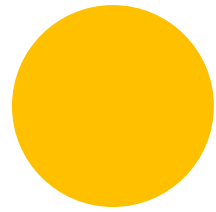
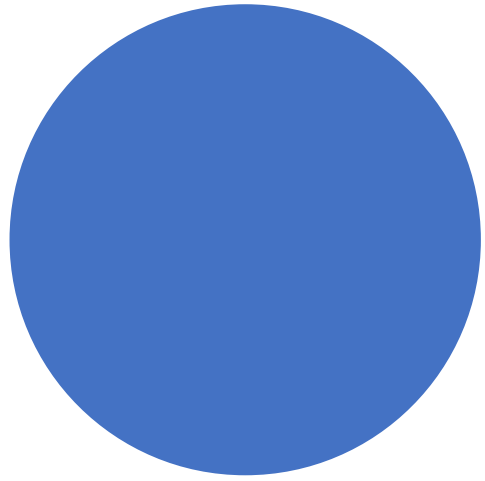
- To strengthen the scientific and technological bases of the Union
- to foster its competitiveness
- to deliver on the Union strategic priorities and contribute to the realisation of EU objectives and policies
- to contribute to tackling global challenges, the Sustainable Development Goals by following the principles of the Agenda 2030 and the Paris Agreement,
- to strengthen the European Research Area



“The Strategic Agenda for 2019 – 2024, adopted by the European Council on 20 June 2019, targets similar overarching objectives....”
Sibiu '19

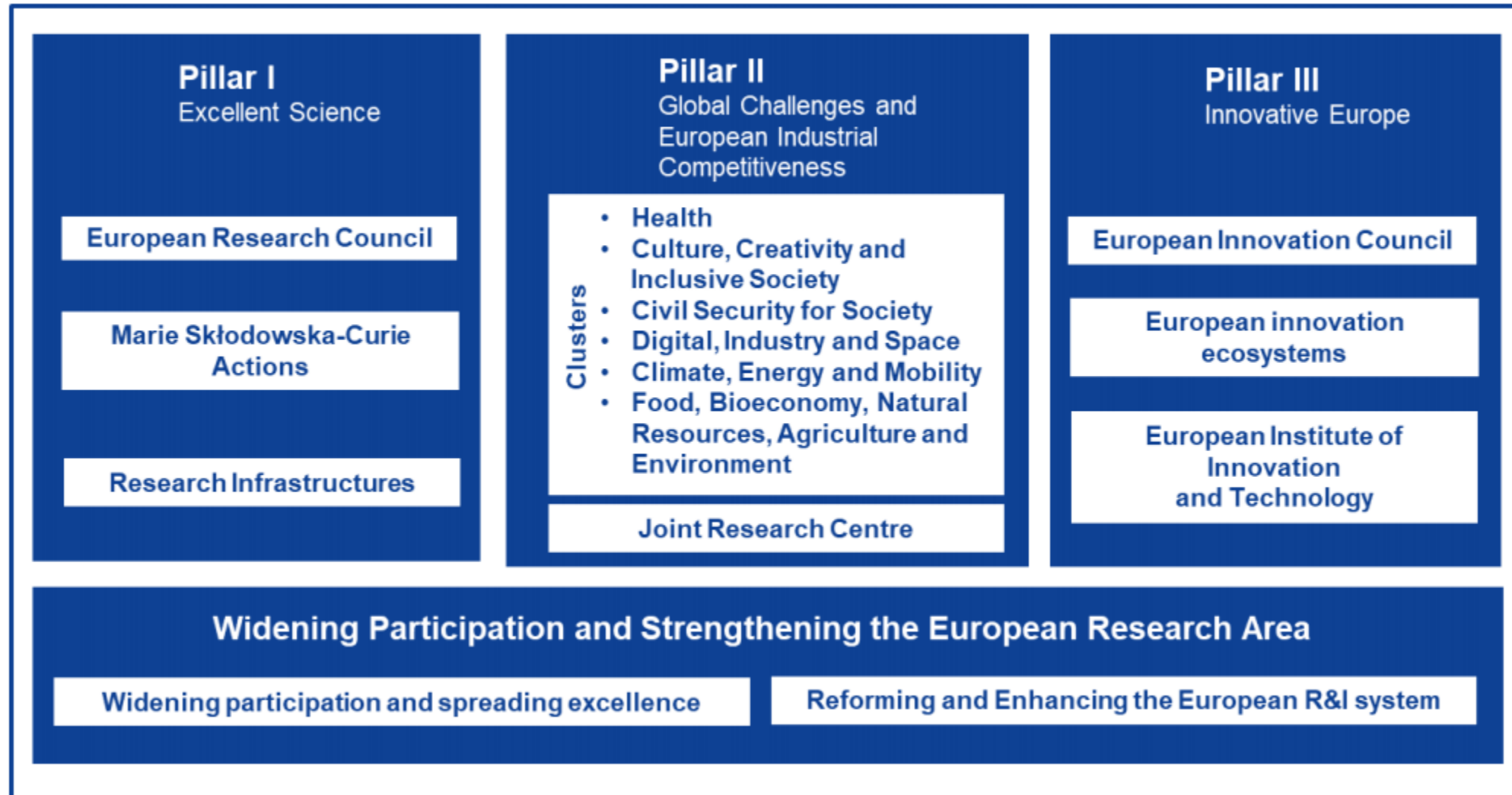
The future policy priorities for the Union are:

- 1) A **Protective Europe**, concerning security and defence policy (European Council: protecting citizens and freedoms);
- 2) A **Competitive Europe**, which focusses on research and innovation, new technologies, digital capacities and industrial policy (European Council: developing a strong and vibrant economic base);
- 3) A **Fair Europe**, which centres on social inclusion, health, rule of law and fundamental rights (European Council: building a climate-neutral, green, fair and social Europe);
- 4) A **Sustainable Europe**, regarding sustainable development, climate change, circular economy and energy (European Council: building a climate-neutral, green, fair and social Europe);
- 5) An **Influential Europe**, dealing with international cooperation, promoting European values and standards (European Council: promoting European interests and values on the global stage).



The structure vs
H2020

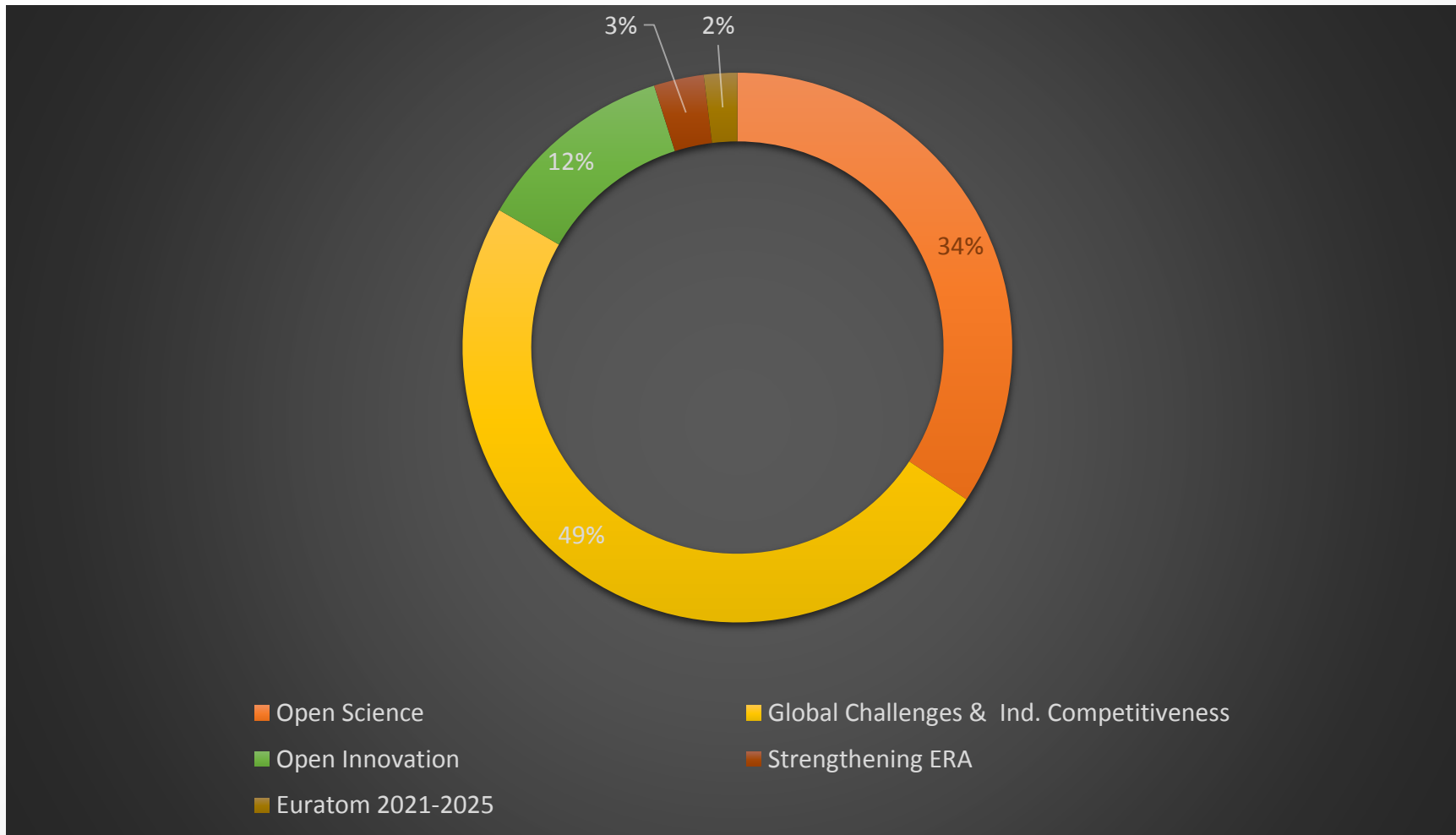
HORIZON EUROPE STRUCTURE



The budget vs H2020



Budget* EUR 100 Billion - suggested



* In addition, this envelope includes EUR 3.5 billion allocated under the InvestEU Fund.

The key novelties



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

Support to innovations with breakthrough and disruptive nature and scale up potential that are too risky for private investors.

**European
Innovation
Council**

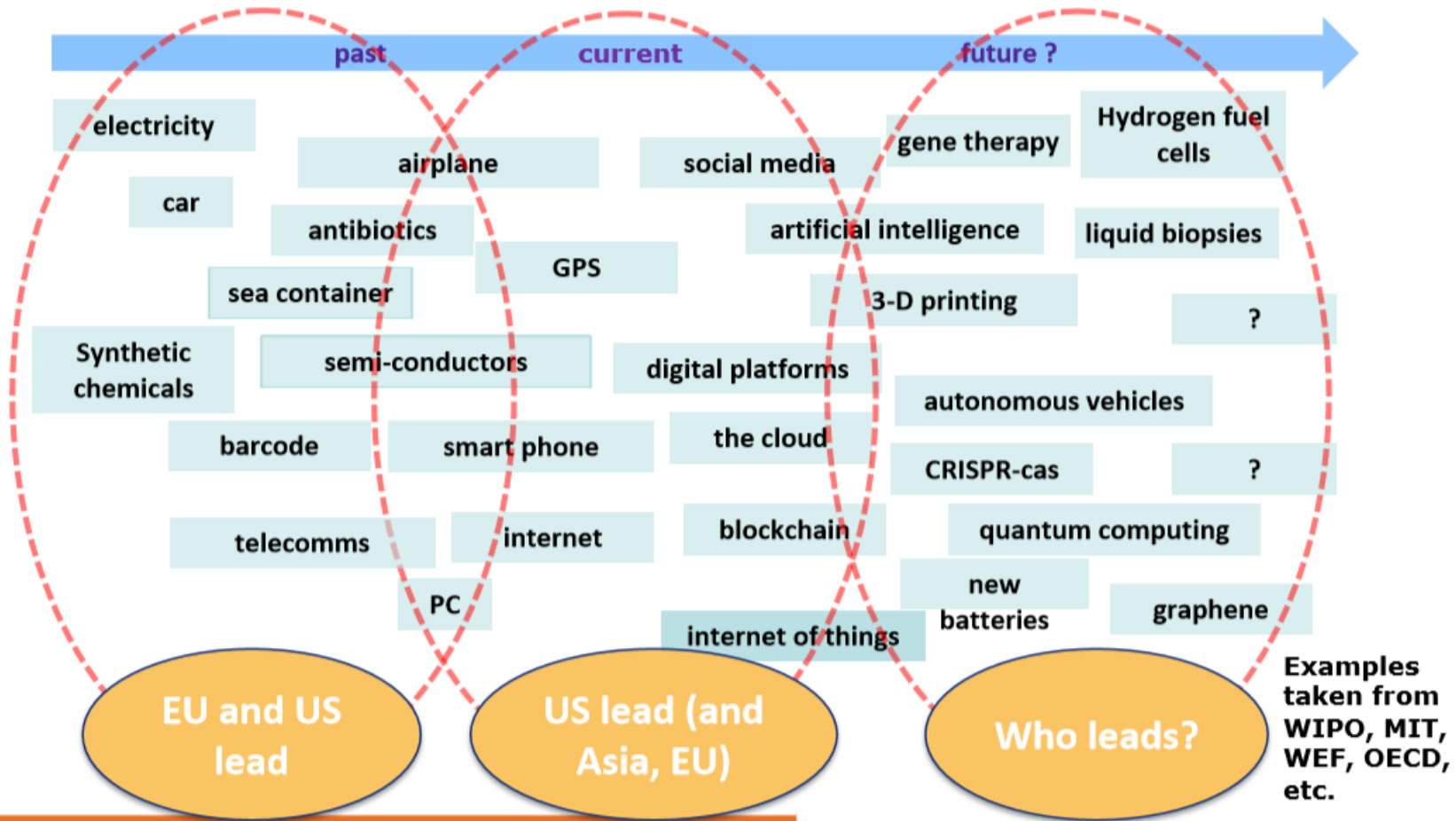
Helping innovators create markets of the future, leverage private finance, scale up their companies, Innovation centric, risk taking & agile, proactive management and follow up

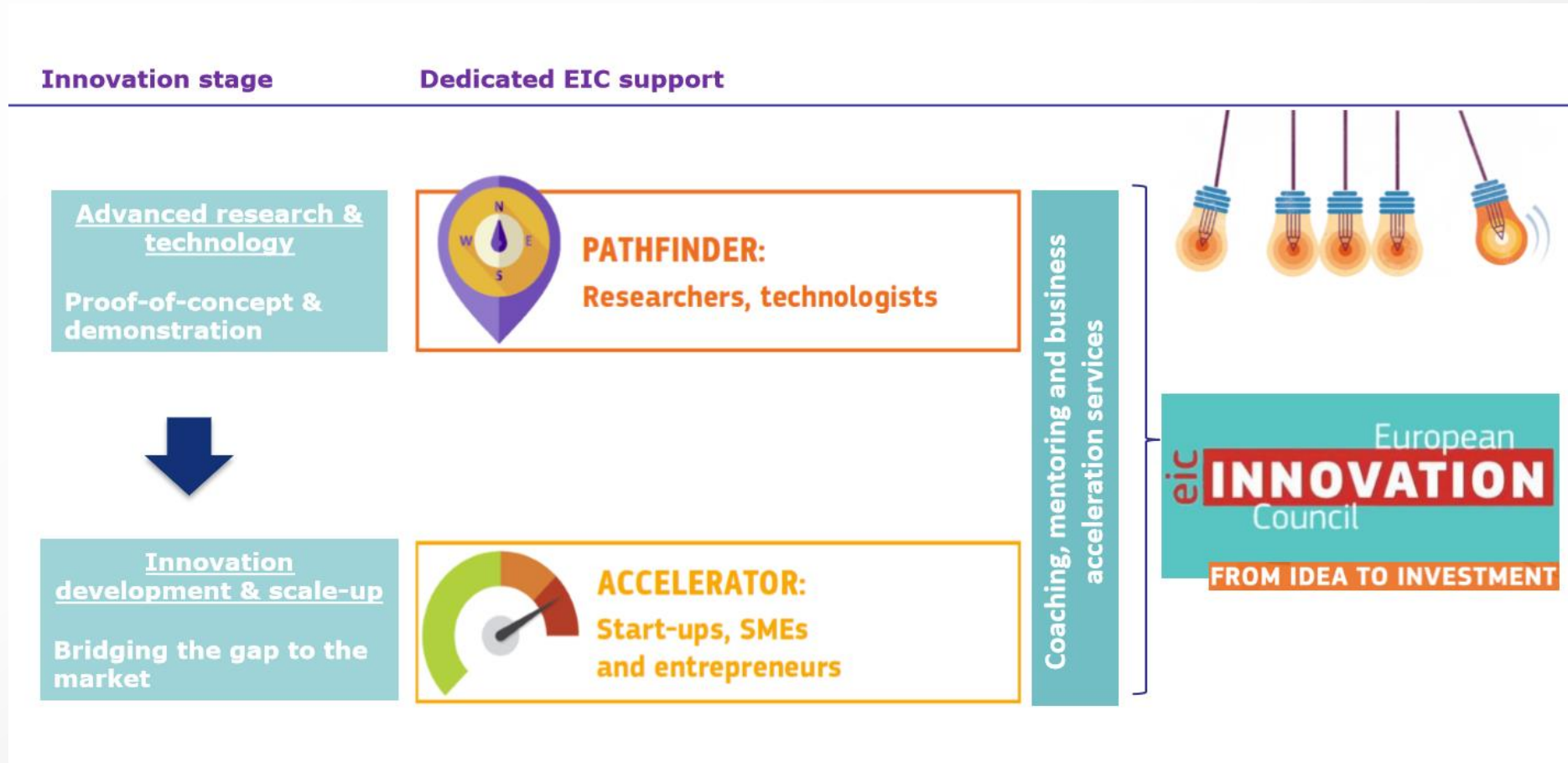
Two complementary instruments bridging the gap from idea to investable project

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

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

Who will lead the next wave of breakthrough and disruptive innovation?



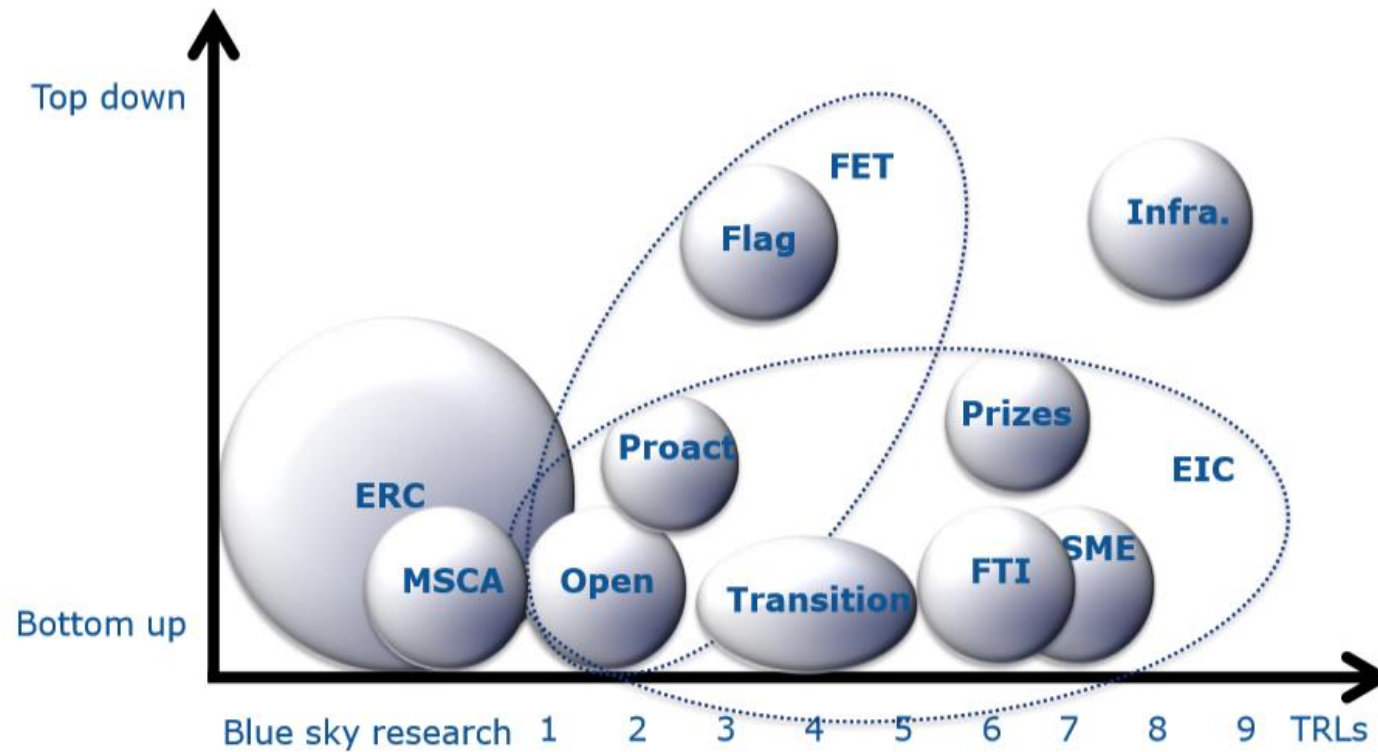


EIC Pathfinder - FET Novelties

- From early stage proof-of-concept research, up to demonstration of commercial viability
- FET Proactive integrated in the Pathfinder Pilot
- Programme managers
- Business Acceleration Services
- FET Transition to Innovation Activities



EIC covering the whole innovation chain



The *Pathfinder Pilot* for advanced research

- Aim of nurturing potential market-creating technologies, developing breakthrough and disruptive innovation
- Run by Programme Managers hired from innovation ecosystem
- Based on topics or challenges identified in the work programme and open bottom-up call for proposals
- Support for assessing business opportunities (ILP) and preparing for Accelerator funding through “Transition to innovation activities”.



> supports future and emerging breakthrough technologies with a **one-off grant**



> a project can apply for Accelerator funding **as it matures**


Pathfinder pilot builds on FET Open and Proactive!!

EIC Pilot Major novelties

Accelerator blended finance

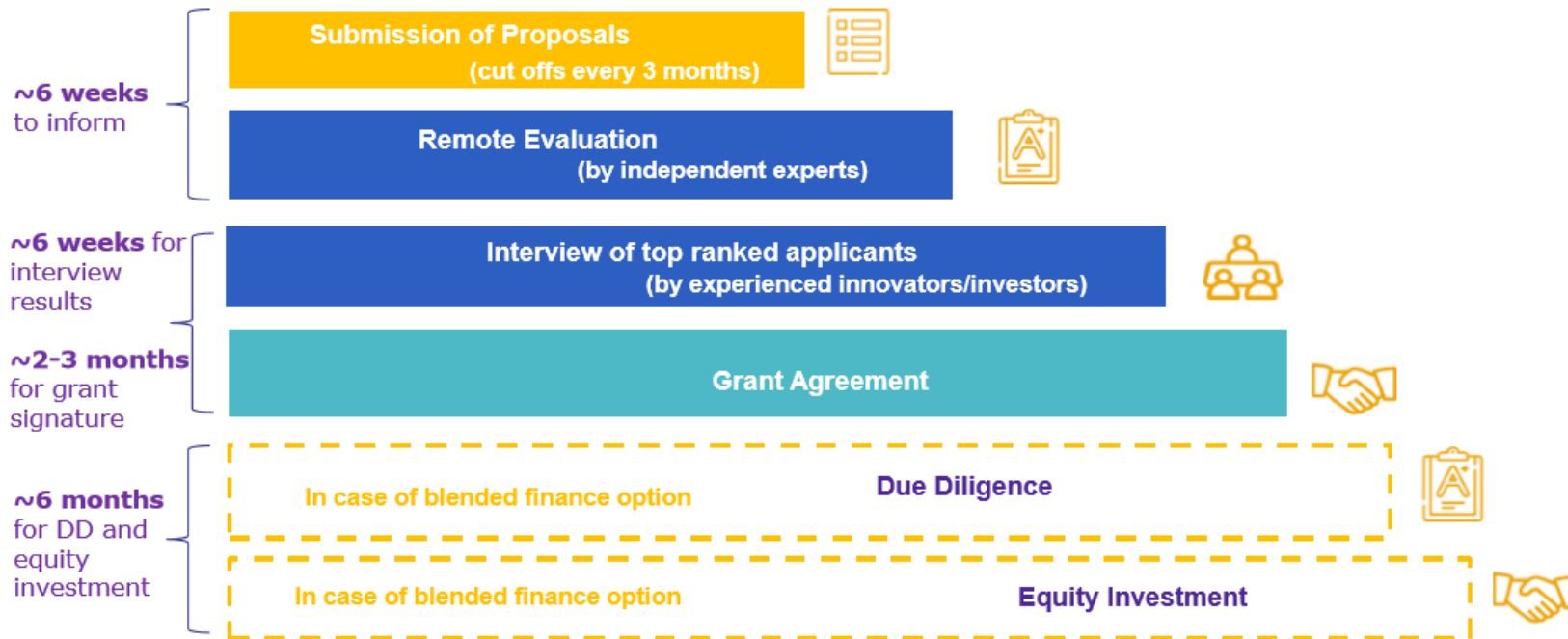
- **+€100 million in equity**
- Innovative SMEs with potential to **scale-up**
- Global **substantial support**: up to € 17.5 million (€2.5m in grant + €15m in equity)
- From early commercial to market deployment and scale-up (**TRL 6 or above**)

Responsibility

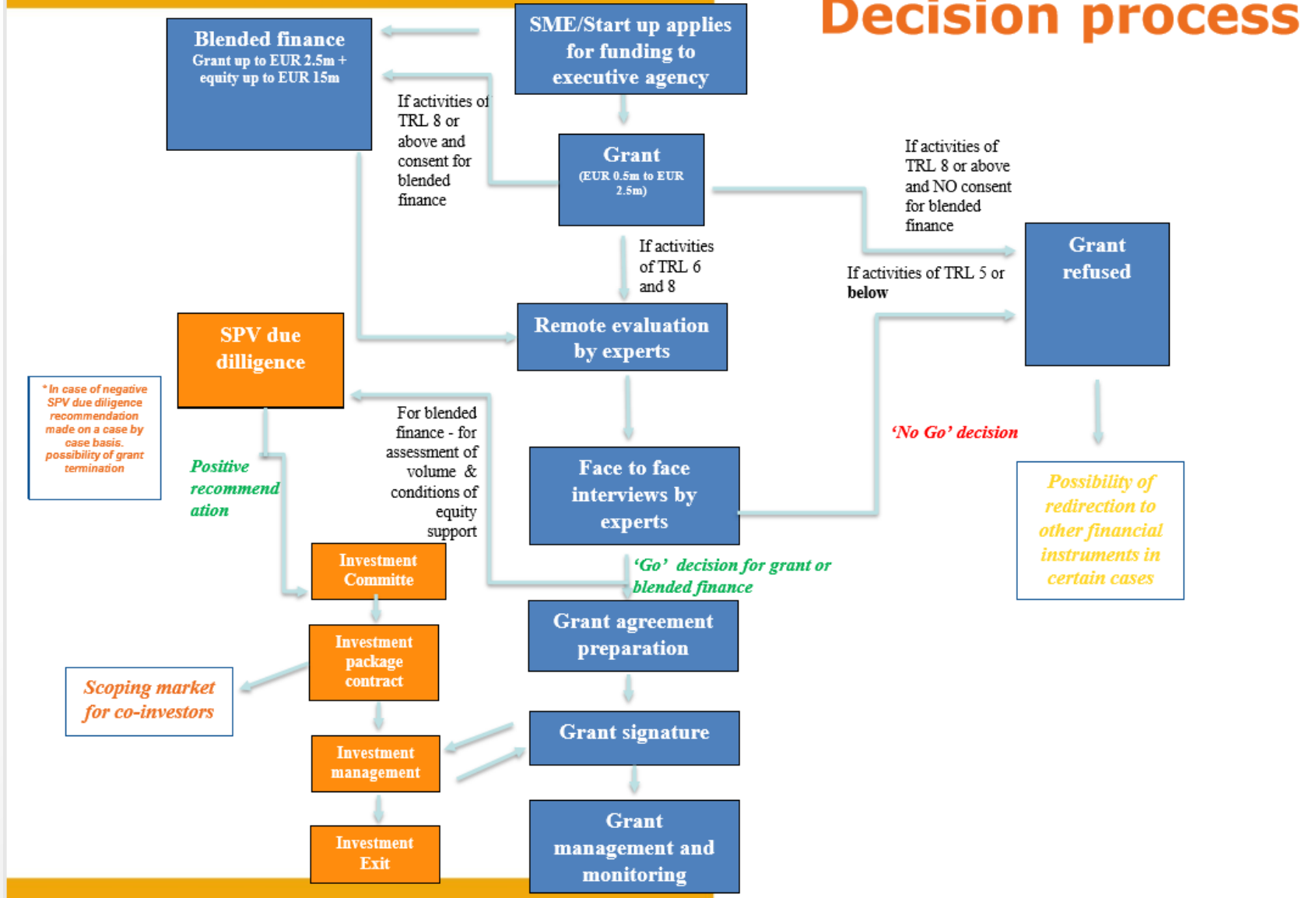
-  Applicants
-  Experts
-  EIC team
-  SPV (blended-finance only)

The EIC Accelerator pilot

A fast, simple process in transparent steps



Accelerator Pilot Decision process



Major novelties

EIC Programme managers

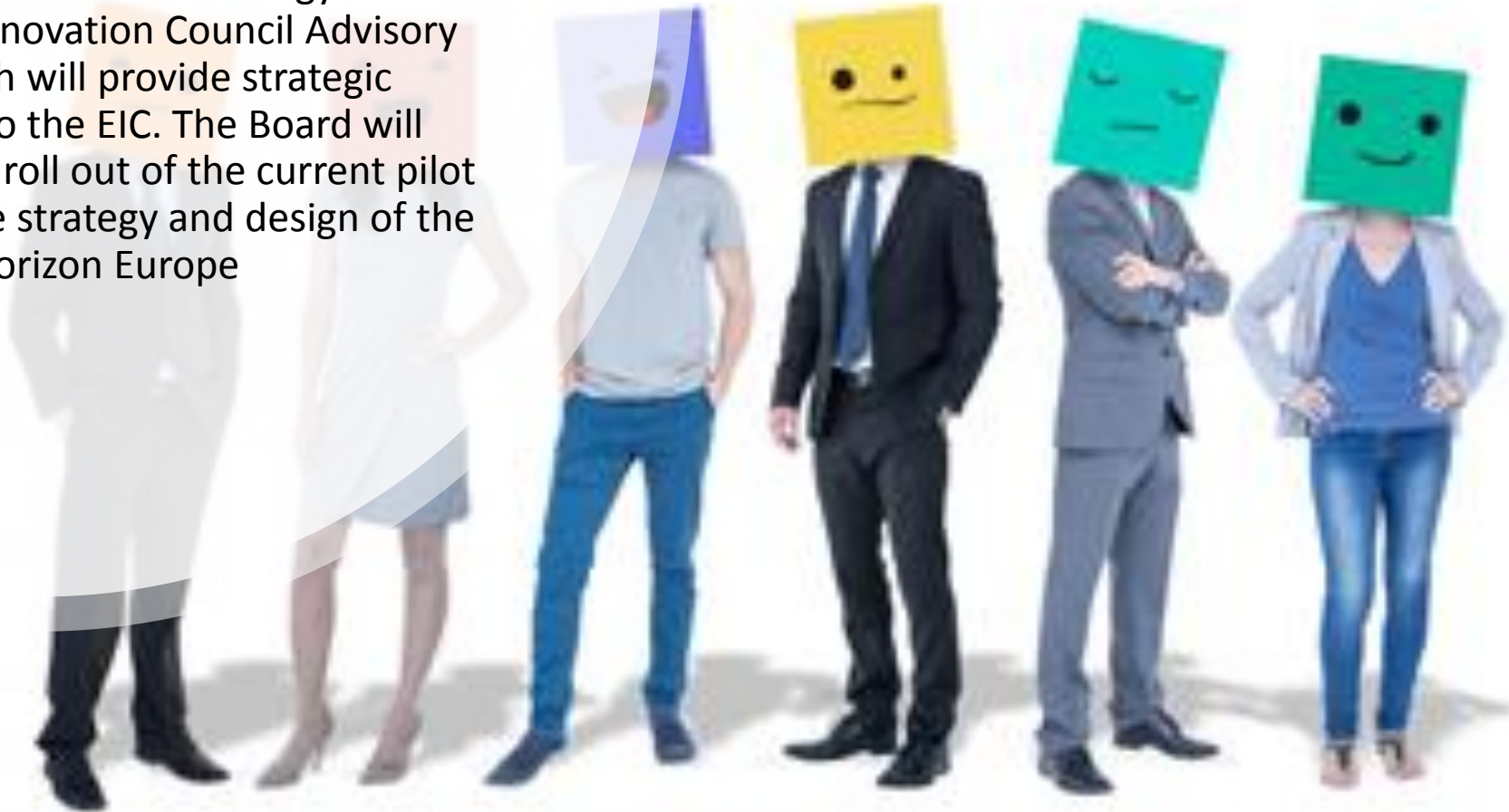
- For more **flexible and pro-active** management and steering of tech or challenge-based **portfolios**
- **3 to 5** programme managers to follow projects in **EIC Pathfinder Pilot**
- **Professionals with visionary thinking**
- Hired as a **temporary Commission staff**

Major novelties

EIC Advisory Board

- To **advise** the Commission on the design of European Innovation Council (EIC) support for innovation
- **Group of 15 to 20** entrepreneurs, investors, individuals building start-up communities, innovative researchers and academics working on innovation policy
- Will support the Commission:
 - *Developing the pilot in 2019 and 2020*
 - *Enhancing innovation eco-systems and impact*
 - *With the overall strategy under Horizon Europe*

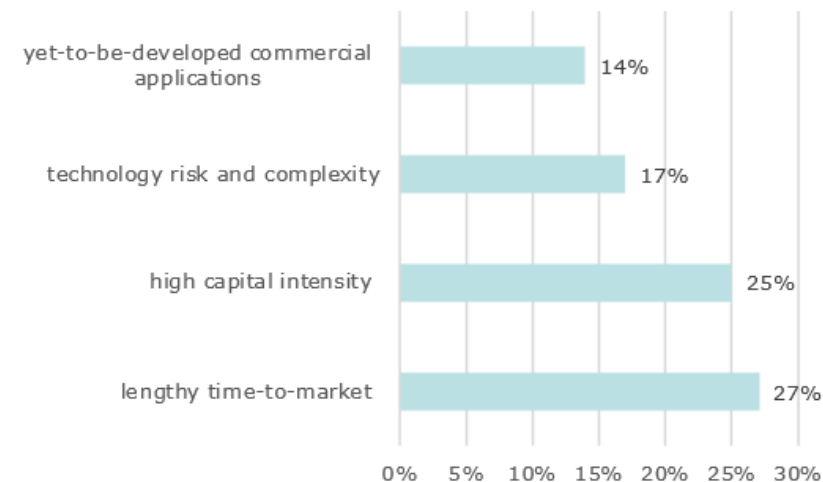
- 22 exceptional innovators from the worlds of entrepreneurship, venture capital, science and technology to the European Innovation Council Advisory Board, which will provide strategic leadership to the EIC. The Board will oversee the roll out of the current pilot and lead the strategy and design of the EIC under Horizon Europe



EIC Pathfinder Pilot Deep-tech 'made in Europe'

- **Needs a strong research base.**
- Deep-tech companies are **constantly pushing the technological frontier.**
- **Collaborations** are especially important since it lies at the crossroads of disciplines, fundamental research and industrial application.

Challenges for deep-tech startups



Source: BCG and Hello Tomorrow
Report: "From tech to deep tech"



R&I Missions

R&I Missions

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

A mission is a portfolio of actions 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 elements of governance

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)



- Bold, inspirational, with wide societal relevance;
- Targeted, measurable, and time-bound;
- Ambitious, but realistic R&I actions;
- Cross-disciplinary, cross-sectoral and cross-actor innovation;
- Drive multiple, bottom-up solutions.

R&I MISSIONS: what is
expected ?

- **Potential Mission areas** based on the consultation:
 - adaptation to climate change, including societal transformation;
 - cancer;
 - healthy oceans, seas, coastal and inland waters;
 - climate-neutral and smart cities;
 - soil health and food.

Art. 26 of the FP/RfP Regulation: *Evaluation*
Art. 5 of the SP Decision: *Missions*
Impact assessment annex 8-2

R&I Missions: how?

- A **mission board** may be established for each mission: around 15 members including end-users
- Mission Boards have an **advisory role** in designing the mission and its implementation
- Missions will be implemented through a coherent **portfolio** of projects
- Missions will be implemented **through existing executive agencies** according to the content of the mission

NEWS 4 July 2019

Commission launches work on major research and innovation missions

- **Ms Connie Hedegaard**, former European Commissioner for Climate Action, for the mission on 'Adaptation to Climate Change including Societal Transformation'
- **Professor Harald zur Hausen**, Nobel Prize Laureate in Physiology or Medicine, for the mission on 'Cancer' **Walter Ricciardi**
- **Mr Pascal Lamy**, former Trade Commissioner and Director-General of the World Trade Organisation, for the mission on 'Healthy Oceans, Seas, Coastal and Inland Waters'
- **Professor Hanna Gronkiewicz-Waltz**, former Mayor of Warsaw, for the mission on 'Climate-Neutral and Smart Cities'
- **Mr Cees Veerman**, former Dutch Agriculture Minister, for the mission on 'Soil Health and Food'.



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

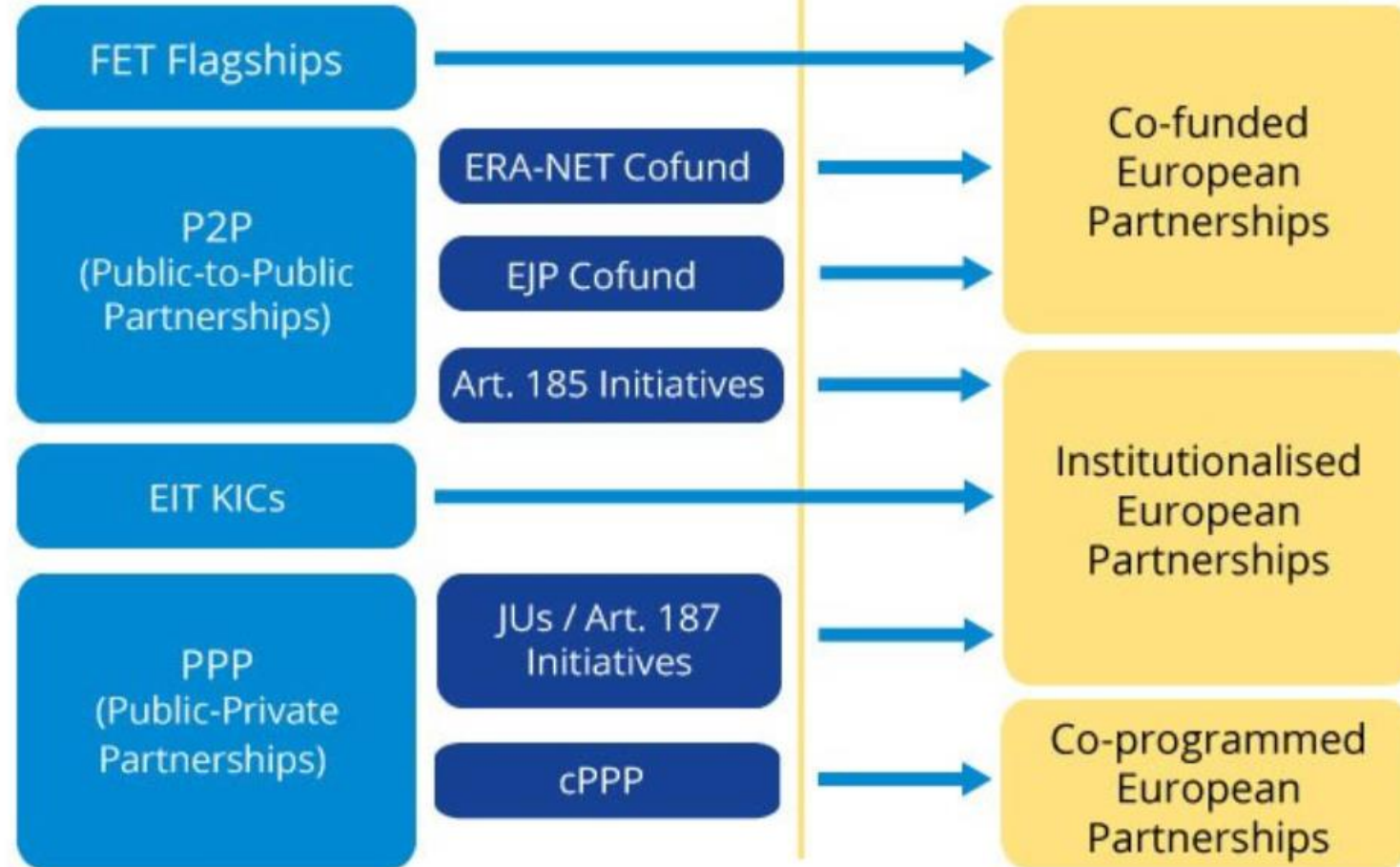
New approach to partnerships: why?

Impact Assessment annex 8-5 – current partnership landscape

Partnership approaches	Public-public partnerships (P2P)	Public-private partnerships (PPP)	EIT-KICs*	FET Flagships**
Implementation modes	ERA-NET-Cofund, EJP Cofund, Article 185, Joint Programming Initiative (JPI)	Contractual Arrangement (cPPP) Article 187	H2020 Grant agreements for different types of actions Framework Partnership Agreements (FPA)	
Currently active R&I Partnerships (Horizon 2020)	a) ERA-NETs: ~70 b) EJP Cofund: 5 c) Article 185: 6 d) JPIs***: 10	a) JUs: 7 (+HPC) b) cPPPs: 10	a) KICs: 6 (+ 2 until 2020)	a) FET-Flagships: 2 (+Quantum)
Financial contribution from H2020, estimated)	2.500 M€ (3,1% of H2020 budget)	13.450 M€ (17,5% of H2020 budget)	2.400 M€ (3,1% of H2020 budget)	1.000 M€ (1,3% of H2020 budget)
<p>*EIT-KICs: Knowledge and Innovation Communities (KICs) of the European Institute for Innovation and Technology (EIT) **FET-Flagships: Flagships of the Future and Emerging Technologies programme (FET) *** JPIs: Joint Programming Initiatives are no EU level instruments but included here as they receive EU support via ERA-NETs and/or CSAs</p>				

Horizon 2020

Horizon Europe



AREA FOR INSTITUTIONALISED* PARTNERSHIPS

1. Partnership Area 1 - *Faster development and safer use of health innovations for European patients, and global health*
2. Partnership Area 2 - *Advancing key digital and enabling technologies and their use, including but not limited to novel technologies such as Artificial Intelligence, photonics and quantum technologies*
3. Partnership Area 3 - *European leadership in Metrology including an integrated Metrology system*
4. Partnership Area 4 - *Accelerate competitiveness, safety and environmental performance of EU air traffic, aviation and rail*
5. Partnership Area 5 - *Sustainable, inclusive and circular bio-based solutions*
6. Partnership Area 6 - *Hydrogen and sustainable energy storage technologies with lower environmental footprint and less energy-intensive production*
7. Partnership Area 7 - *Clean, connected, cooperative, autonomous and automated solutions for future mobility demands of people and goods*
8. Partnership Area 8 - *Innovative and R&D intensive small and medium-sized enterprises*





Open Science across the programme

Open Science

Better dissemination and exploitation of R&I results and support to active engagement of society

- **Mandatory Open Access to publications:** beneficiaries must ensure the existence of sufficient rights to comply with open access requirements
- **Mandatory Data Management Plan for FAIR (Findable, Accessible, Interoperable, Re-usable) and Open Research Data :** for all research data with possibilities to opt-out from open access requirements
- Support to researcher skills in and reward systems for open science
- Use of European Open Science Cloud



International Cooperation

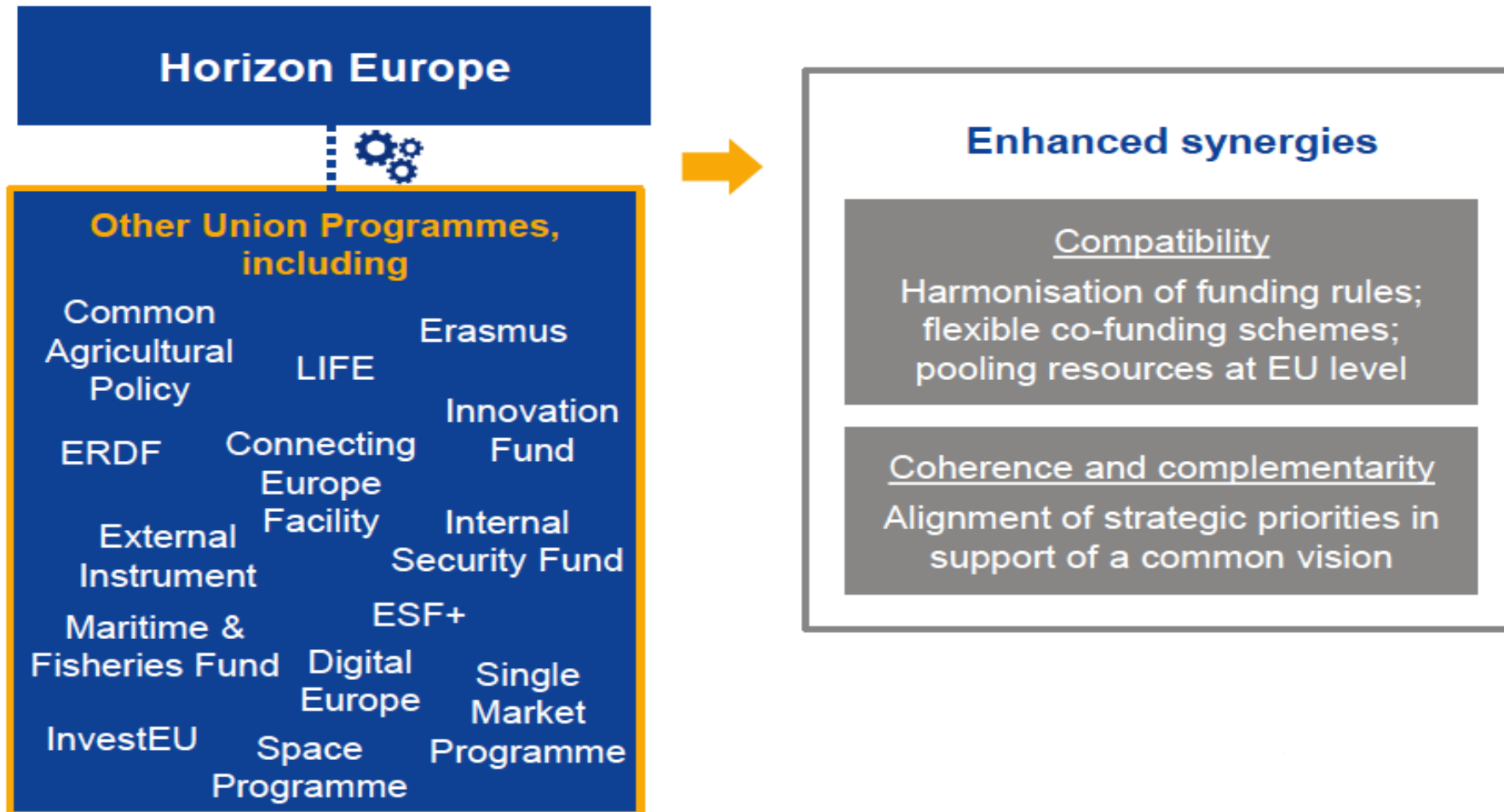
International Cooperation

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

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.)

Synergies with other Union programmes



★ SEAL OF ★
EXCELLENCE



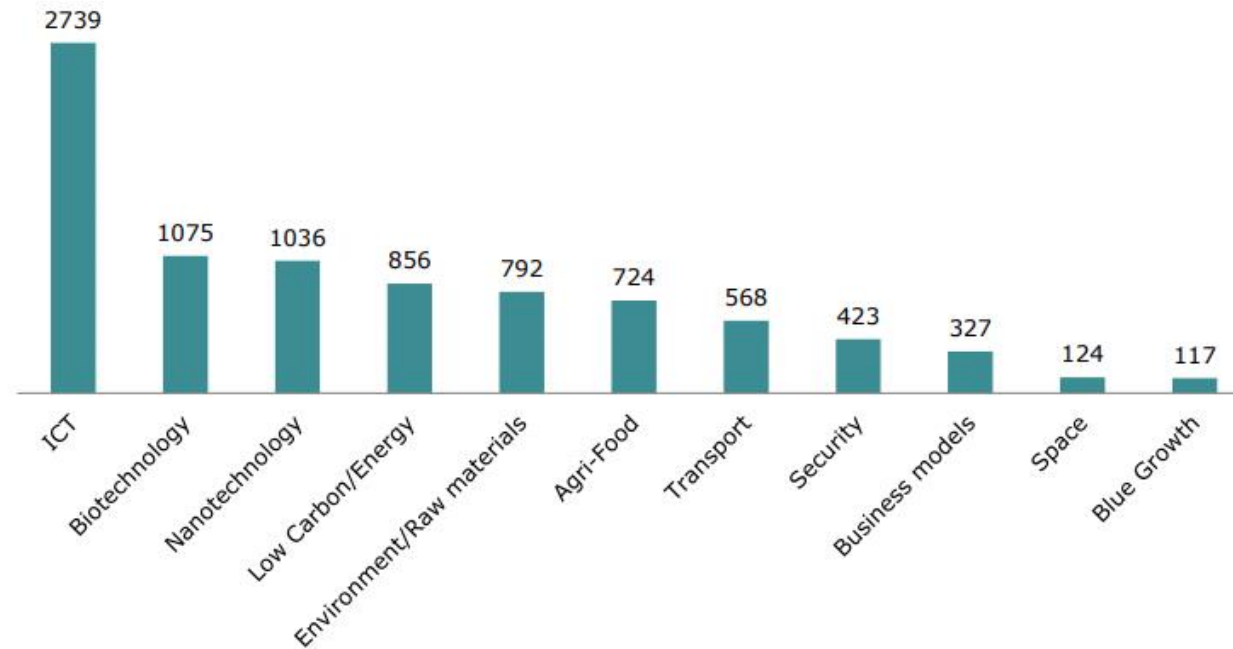
European
Commission

SEALS PER COUNTRY

Country	Phase 1	Phase 2	Total	Country	Phase 1	Phase 2	Total
ES	622	1.276	1.898	IS	32	52	84
IT	504	918	1.422	BG	31	30	61
UK	334	679	1.013	CZ	31	16	47
DE	205	517	722	EL	26	48	74
FR	156	553	709	LT	26	18	44
IL	142	438	580	LV	21	33	54
SE	121	397	518	SK	14	42	56
NL	119	315	434	RS	13	13	26
DK	88	337	425	UA	12	6	18
FI	79	377	456	RO	10	7	17
HU	77	181	258	CY	6	12	18
PT	72	160	232	HR	6	21	27
PL	69	110	179	FO	4	0	4
CH	67	59	126	AM	3	0	3
AT	63	142	205	AI	2	3	5
NO	62	171	233	LU	2	11	13
IE	55	154	209	MD	2	1	3
BE	48	122	170	MT	2	12	14
SI	42	77	119	MK	1	2	3
EE	36	108	144	VG	1	0	1
TR	33	47	80	BA	0	1	1



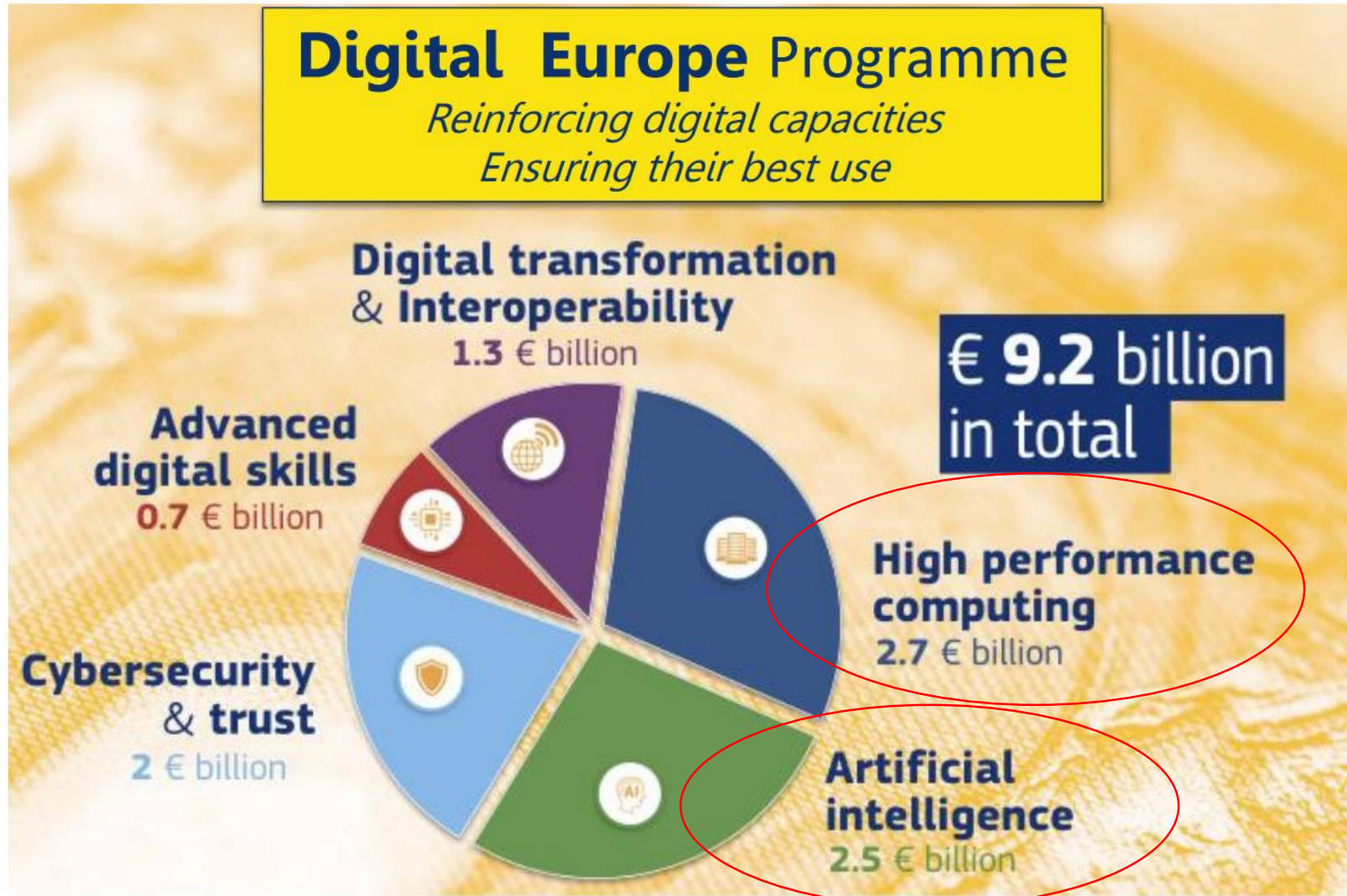
Seal of Excellence proposals by topic (November 2017 cut-offs)



Digital Europe programme: why?

- **Mismatch between demand and supply of essential digital capacities**
 - E.g. Latest computing, data and software tools to lead in digital transformation
- **A clear investment gap in such capacities and infrastructures**
 - HPC: EU scientists and engineers turn massively to computing resources outside Europe
 - Lack of large data sets for AI, lack of real scale testing facilities,..
 - Fragmentation and low investment in cybersecurity
 - Skills: more than 400,000 EU vacancies in these fields
- **Public sector does not play its role of "first mover"**
 - In deploying latest technologies to offer best services to citizens and business
- **Difficult for SMEs to acquire/access latest technologies and skills**
 - Market failure where upstream public intervention is instrumental

Digital Europe programme – What?



Three levels of intervention

1/ Co-investing with MS in high-end infrastructures

- to be made available across the EU
- **HPC**: Acquire exascale and post-exascale systems
- **Cybersecurity**: acquire advanced cybersecurity equipment and tools
- **AI**: Common data spaces, AI-platform,

2/ Reinforcing existing MS capacities

- **Networking, aggregating** - making them available across the EU
- **HPC**: upgrade MS computing facilities
- **Cybersecurity**: scale up and network existing technological capacities
- **AI**: large scale testing facilities from components to applications
- **Advanced Digital Skills**: expand the EU digitally skilled labour force

3/ Ensuring best use of capacities in public sector & industry

- Supporting broad use of capacities in areas of public interest and in industry
- **Digital Innovation Hubs**

Coordinated public investments at EU level

- Targeting areas where EU investment has clear added value
- High investment levels that no Member State can easily do alone
- Areas where there is a need to aggregate resources
 - computing power, data, expertise
- Areas where interoperability is important
 - To achieve a Digital Single Market
 - For wide diffusion across the EU



On definition:

- **NUT 2** - basic regions for the application of regional policies
- **All public**
- **Competence centers**

2014-2020

- | | | |
|--|--|---|
| <ul style="list-style-type: none"> European Fund for Strategic Investments CEF Debt Instrument CEF Equity Instrument Loan Guarantee Facility under COSME Equity facility for Growth under COSME | <ul style="list-style-type: none"> Innovfin Equity Innovfin SME guarantee InnovFin Loan Services for R&I Facility Private Finance for Energy Efficiency Instrument Natural Capital Financing Facility | <ul style="list-style-type: none"> EaSI Capacity Building Investments EaSI Microfinance and Social Enterprise Guarantees Student Loan Guarantee Facility Cultural and creative sectors Guarantee Facility |
|--|--|---|

2021-2027



SUSTAINABLE INFRASTRUCTURE



RESEARCH, INNOVATION AND DIGITISATION



SMALL AND MEDIUM-SIZED COMPANIES



SOCIAL INVESTMENT AND SKILLS

- Expanding the successful Juncker Plan model. By using guarantees from the EU budget to crowd-in other investors, the InvestEU Fund will further increase the EU's potential to support investment.
- Making EU funds go further. The use of EU budget guarantee can help increase the impact of public funds. Between 2021 and 2027, InvestEU is expected to mobilise at least €650 billion in additional investment.
- Helping Member States leverage their EU funds more effectively. Member States will have the option to channel some of their allocated Cohesion Policy Funds into the InvestEU budget guarantee, providing them with even greater flexibility.



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

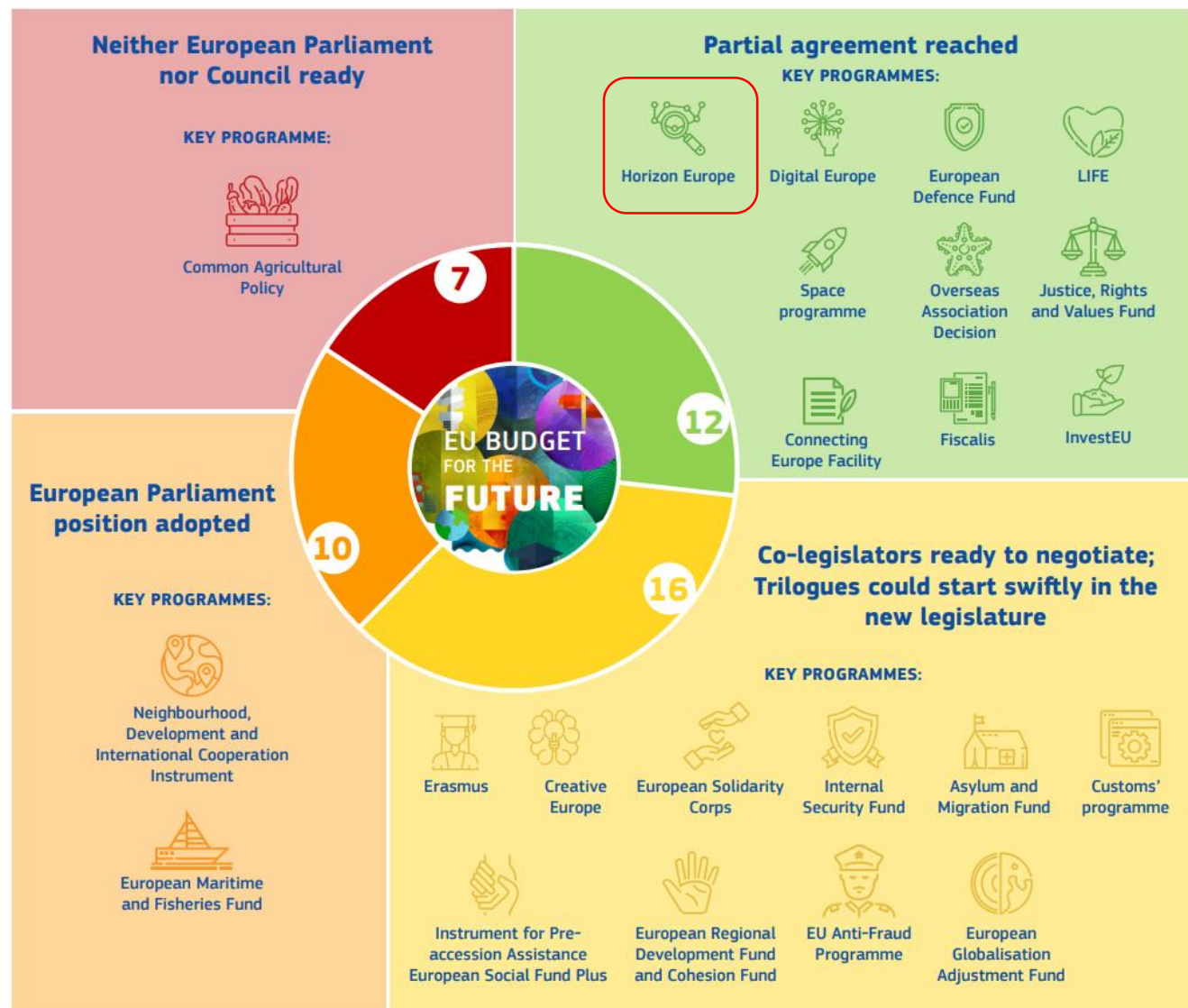
Consultation with stakeholders



Work Programmes

Multiannual Financial Framework (MFF)

CURRENT SITUATION OF SECTORAL LEGISLATIVE PROPOSALS*



USEFUL LINKS

- European Commission [website](#)
- APRE sito - blog [*Verso Horizon Europe*](#)
- Framework Programme consolidated text – [LINK](#) (27/03/2019)
- Specific Programme consolidated text– [LINK](#) (15/04/2019)



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