



# ICT Research and Innovation in Horizon 2020

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*DG CONNECT*  
*European Commission*



# What is Horizon 2020?

*Commission proposal for an ~80 billion Euro R&I funding programme (2014-20)*

*Part of proposals for next EU budget, complementing Structural Funds, education, etc.*

*A core part of Europe 2020, Innovation Union & European Research Area*

*-> Growth, Jobs & Competitiveness*

# What is new?

*A single programme (FP7 + CIP + EIT)*

*Strong focus on societal challenges (game changing for ICT...)*

*More innovation*

- **Reaching out to non-traditional actors**
- **More risk taking**
- **Strengthened support for high-tech SMEs**
- **More open, light & fast schemes**

*Overall budget (Multiannual Financial Framework) still under discussion (~70B€ for H2020 TBC)*

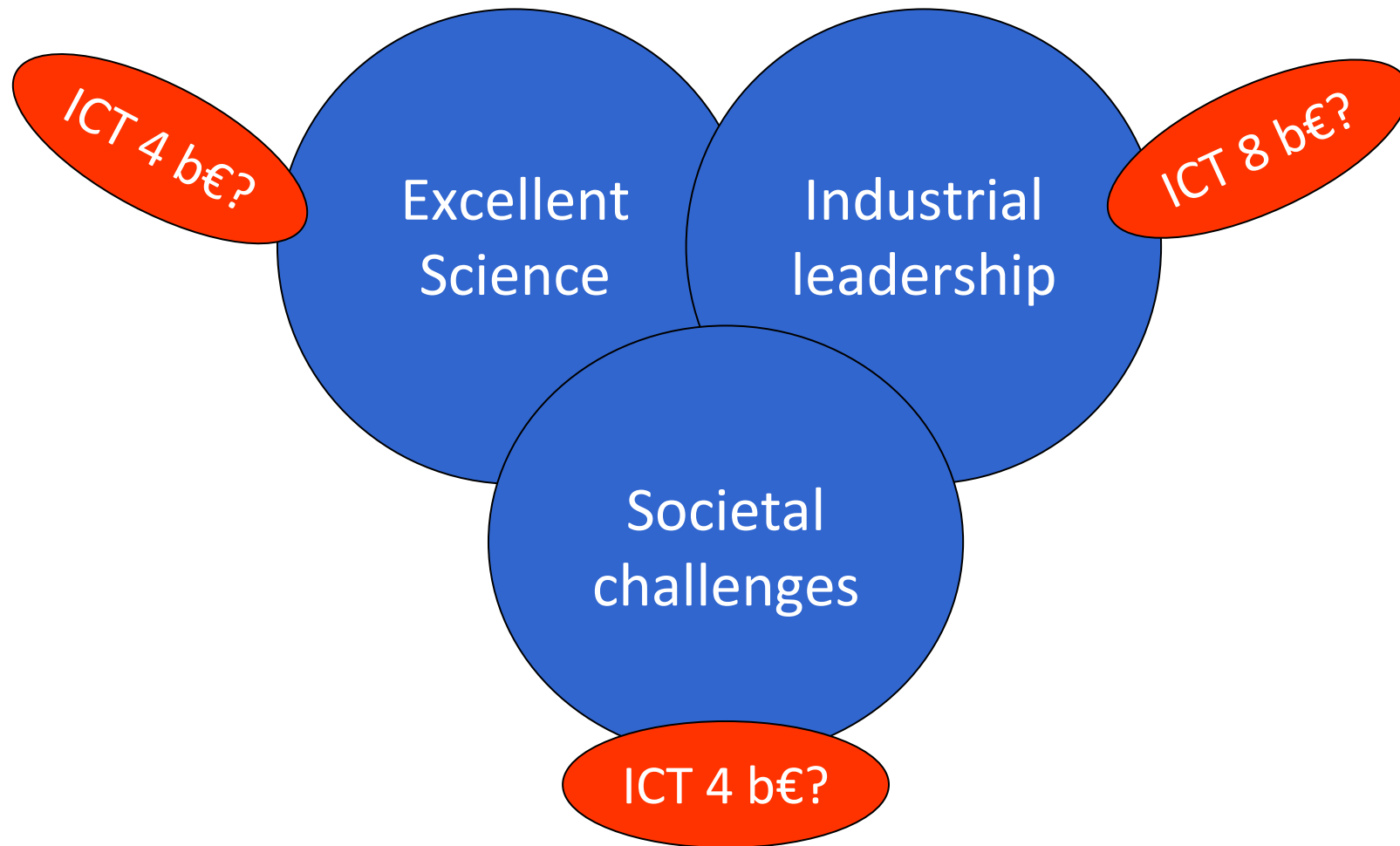
*Triologue (EP/Council/Commission) on legislative proposal ongoing*

*First discussions with MS took place*

*Advisory Groups are being setup*

*Commission services are setting up governance structure*

# A stronger, clearer focus

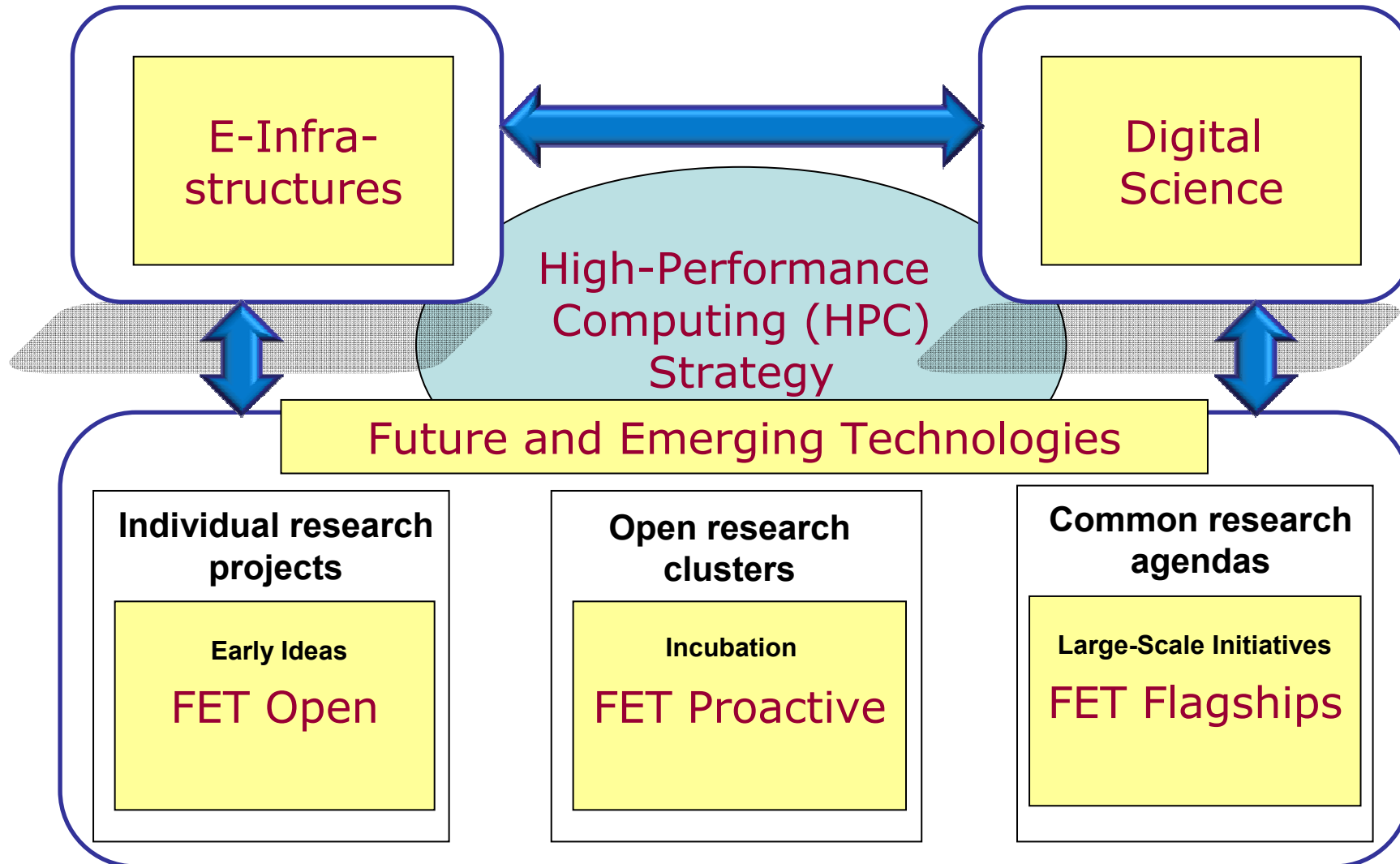


# Excellent science

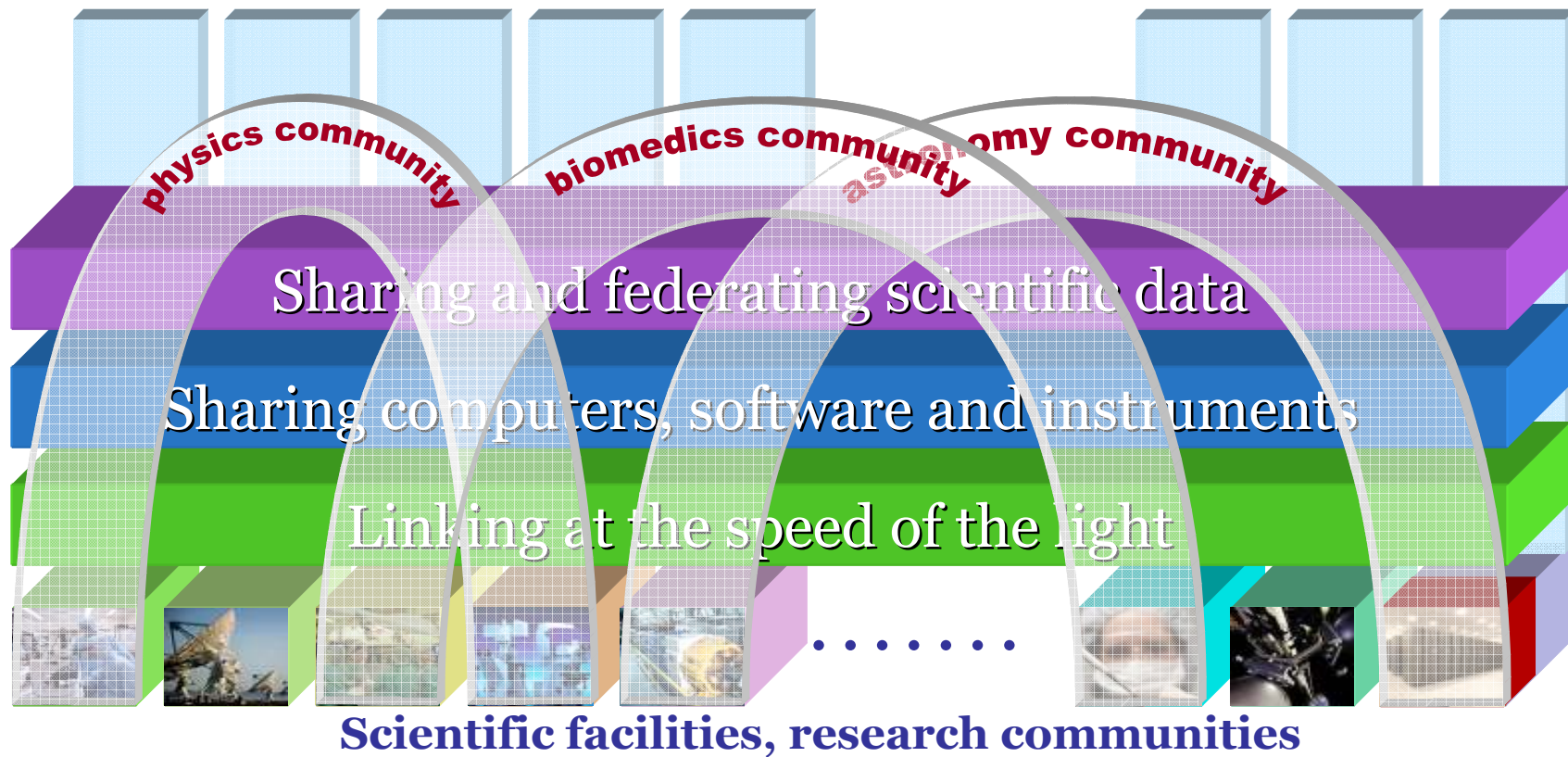
- **World class science** is the foundation of tomorrow's technologies, jobs and well-being
- Europe needs to develop, attract and retain **research talent**
- Researchers need access to the best **infrastructures**

European Research Council	13 268
<i>Frontier research by the best individual teams</i>	
Future and Emerging Technologies	3 100
<i>Collaborative research to open new fields of innovation</i>	
Marie Curie actions*	5 752
<i>Opportunities for training and career development</i>	
Research infrastructures (including e-infrastructure) Ensuring access to world-class facilities	2 478

# ICT in Excellent Science



**e-Infrastructures Vision:**  
*to make every researcher digital, through the  
development and deployment of e-infrastructures –  
achieve the digital ERA*







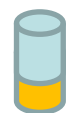


# E-Infrastructure Main Priorities

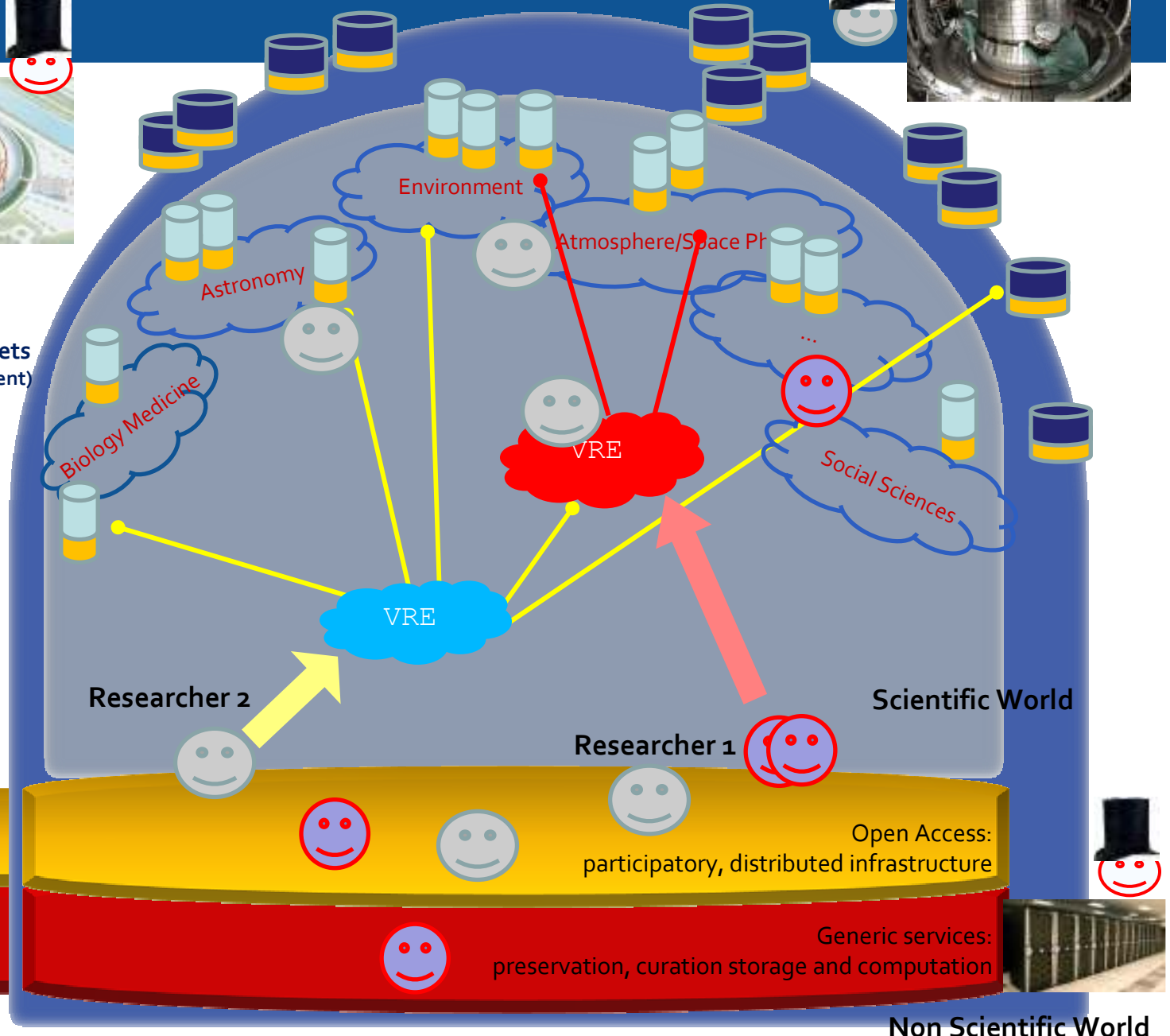
- *Implementing the e-infrastructure needed for **riding the wave of "big data"**, supporting seamless access, use, re-use, and trust of data*
- *Providing support to the e-infrastructure for **Open Access** as defined in the Communication on Scientific Information, and **federating researcher electronic identities** as defined in the ERA Communication*
- *Implementing the **HPC strategy**, through a PPP that brings together the development of services (PRACE), applications (Centres of Excellence) and exa-scale technology development (ETP for HPC)*
- *Implementing the recommendations of the **GÉANT** Expert Group aiming at developing GÉANT as the European communications commons*

# E-Infrastructure Priorities

- Data-centric science and engineering
  - ✓ Infrastructure for open access, management of extremely large research datasets, persistence and trust, as well as community-driven data infrastructures, and global coordination for research data
- Computational infrastructure
  - ✓ Support to setting up of HPC Centres of Excellence, deployment of HPC Tier-0 services, support to open computing platforms and services
- GÉANT
  - ✓ Continued development and operation of the GÉANT infrastructure, support to international links and opening and strengthening innovation activities
- e-Infrastructures for virtual research environments/communities
  - ✓ Supporting VRE's as an open call (bottom-up)
- Policy development and international cooperation
  - ✓ Global reach and connectivity; governance; sustainability; coordination with MS; e-IRG



-  Aggregated Data Sets (Temporary or Permanent)
-  Other Data
-  Scientific Data (Discipline Specific)
-  Workflows
-  Aggregation Path



Non Scientific World

## A new level of ambition

*Pathfinding Europe's technological future*

*Bootstrapping new R&I eco-systems*

*Prominent large-scale partnering initiatives*

- FET Flagships
- High-Performance Computing (HPC-PPP)

*A new actor in the S&T funding landscape*

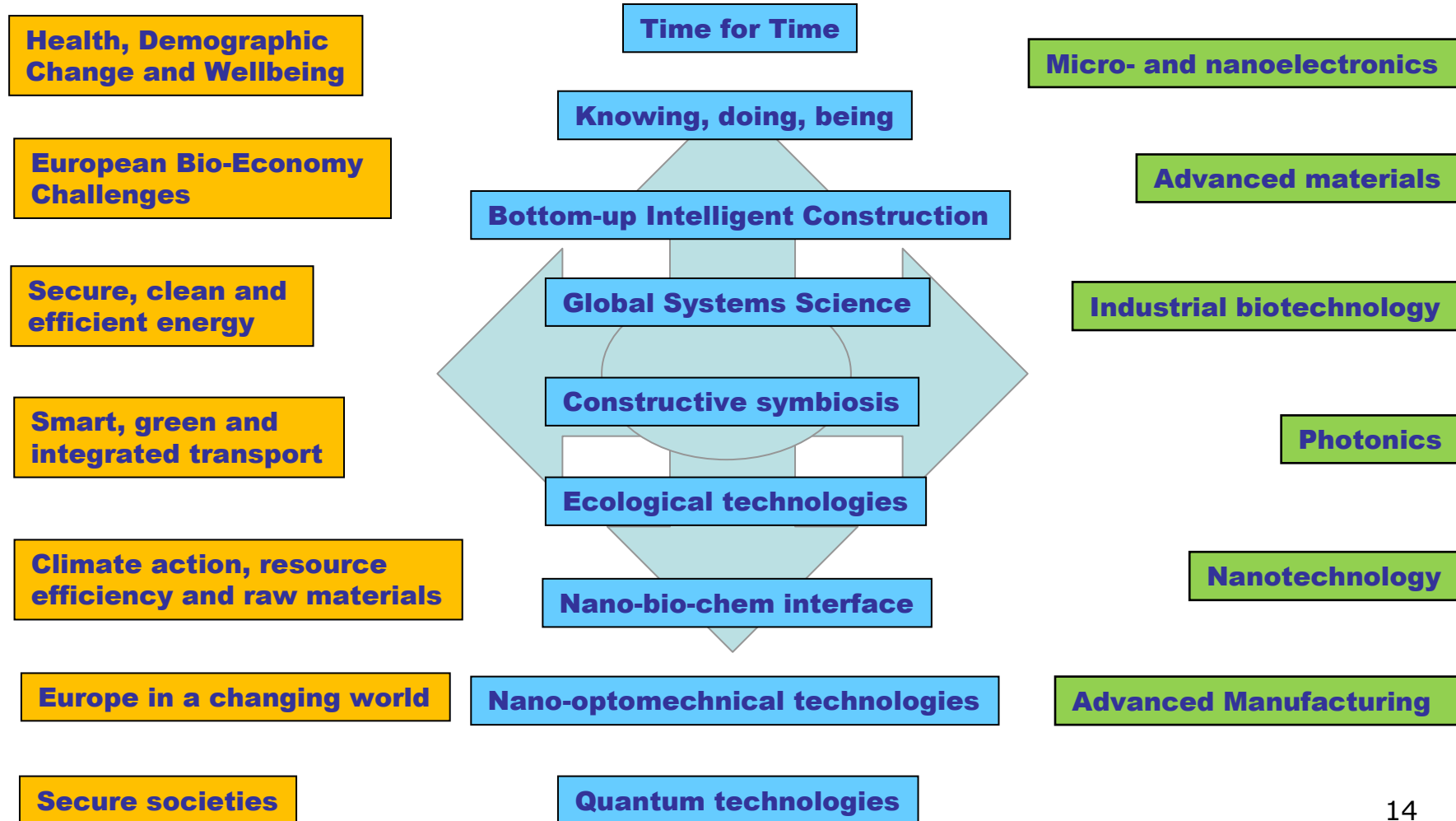
- Pathfinding
- Dialogue
- Engagement

## *Fostering new ideas*

- support embryonic science and technology research
- exploring new foundations for radically new future technologies by challenging current paradigms and venturing into unknown areas.
- **A bottom-up selection process widely open to any research ideas**
- **Attractive to new and high-potential research and innovation players**
- **Mechanisms for early detection and encouragement of promising new areas, developments and trends**
- **Modelled on FP7 Xtrack**

# FET Proactive working list

**Indicative**



## Partnerships for scientific leadership

→ To tackle grand S&T challenges requiring a common European effort and long term support (up to 10 years)

- Visionary and highly ambitious initiatives in terms of S&T challenges addressed and resources to be deployed
- Large-scale, science-driven, multidisciplinary endeavours with a unifying goal

→ To enable alignment of national, regional and EU actions and initiatives

→ To deliver transformational impact on science, technology, economy and society



Vice-President Neelie Kroes announced at a Press event on 28.01.13 the two winners of the FET Flagships competition

The image is a screenshot of a news article from Science World Report. At the top, there are logos for 'WIENER ZEITUNG .at', 'LE TEMPS', and 'SCIENCE WORLD REPORT sciencewr.com'. Below the logos is a navigation bar with categories: Home, Space & The Future, Nature & Environment, Health & Medicine, Tech, Physics, and Human. The main headline is 'Brain Simulation and Graphene Research Receive Billion Euro Each'. Below the headline are social media sharing options: 0 Comments, Like (7), Tweet (3), and Share. The author is Mark Hoffman, and the post date is Jan 28, 2013 09:57 AM EST. The article text states that the European Commission has selected two research projects to receive a one billion Euro grant. The first project is the Human Brain Project, led by Henry Markram at EPFL, and the second is the Graphene Project, led by Jari Kinaret at Chalmers University. On the left side of the screenshot, there is a sidebar with a 'nature' logo and a sub-headline 'Brain-simulation and graphene research competition' by Alison Abbott, dated 23 January 2013. There is also a small image of a neuron and a photo of a man in a suit.

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Home Space & The Future Nature & Environment Health & Medicine Tech Physics Human

## Brain Simulation and Graphene Research Receive Billion Euro Each

0 Comments Like 7 Tweet 3 Share E-mail Print

Mark Hoffman First Posted: Jan 28, 2013 09:57 AM EST

The result of the highly anticipated decision of which two research projects will receive a one billion Euro research grant, the largest single research award ever, from the European Commission were announced by the European Commission's Vice-President Neelie Kroes today.

The first project is the [Human Brain Project](#), led by neuroscientist Henry Markram at the Swiss Federal Institute of Technology (EPFL) in Lausanne, which aims to simulate the human brain in a supercomputer, in order to aid medical advancement in brain disorders.

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The second, called [Graphene Project](#), is led by theoretical physicist Jari Kinaret at Chalmers University of Technology in Gothenburg, Sweden. Its goal is to develop the awesome **particulier dans l'intelligence**

Brain-simulation and graphene research competition

European Commission favour

Alison Abbott

23 January 2013

After a two-year contest, the European Commission has selected two research projects that it will fund to the tune of half-billion Euro each.

The Human Brain Project, led by Henry Markram, a neuroscientist at the Swiss Federal Institute of Technology (EPFL) in Lausanne, which aims to simulate the human brain in a supercomputer, in order to aid medical advancement in brain disorders.



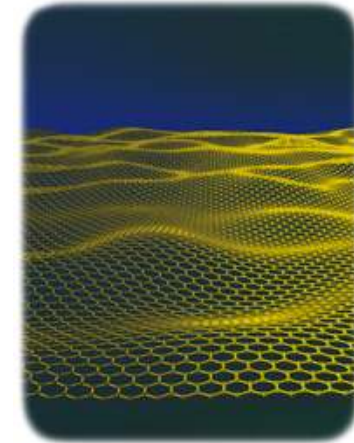
**Graphene, is a 2D material , a single layer of carbon atoms, stronger than diamond, yet lightweight and flexible** and an exceptional electricity conductor.

The Graphene Flagship will bring graphene, and related 2D materials, **from academic labs to industry, manufacturing and society.**

Examples of products:

- ✓ **electronic paper**
- ✓ **bendable smartphones**
- ✓ **enhanced solar cells and batteries**
- ✓ **lighter and more energy efficient airplanes.**

On the longer term, graphene is expected to give rise to new computers and revolutionary medical applications such as artificial retinas.



*Artistic impression of a corrugated graphene sheet  
Credit: Jannik Meyer*



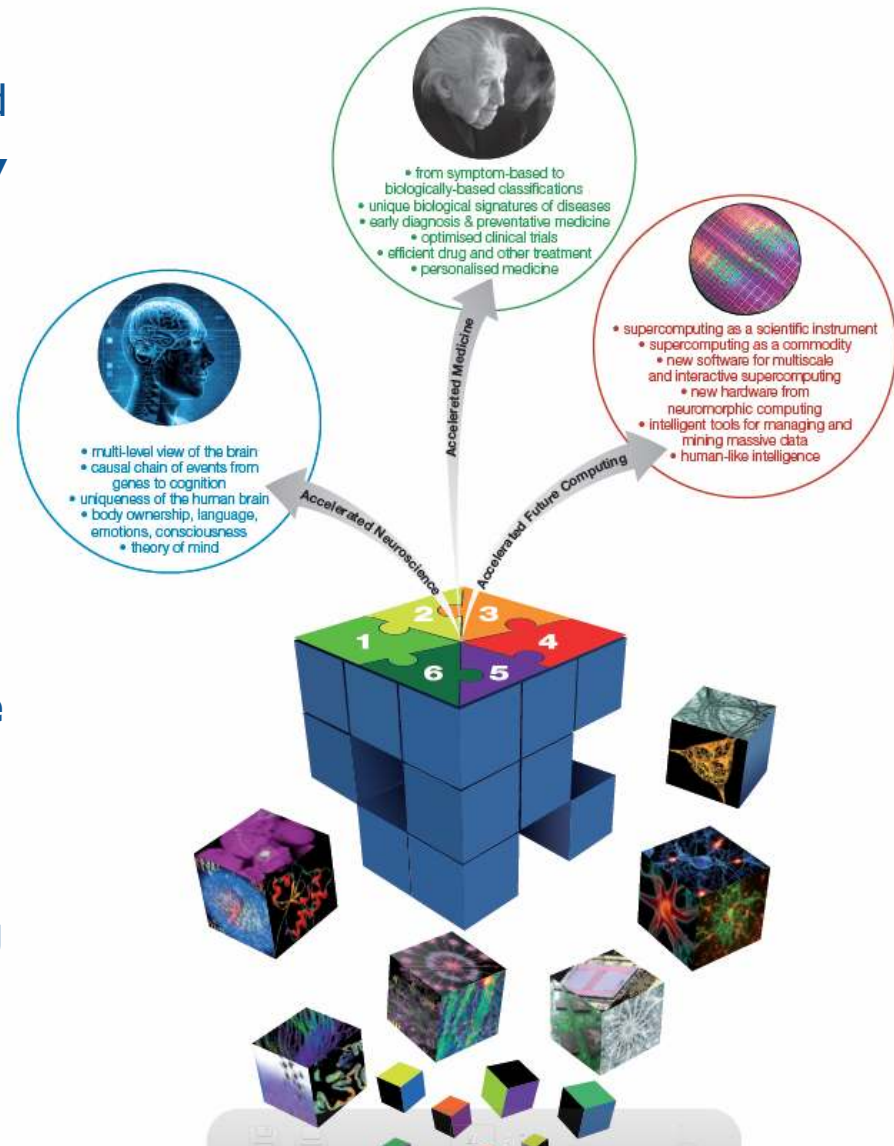
*Nokia Morph concept - Credit: Nokia Research Center*

The Human Brain Project (HBP) will build a **realistic model of the human brain, from genes to mind**, understanding how the brain really works.

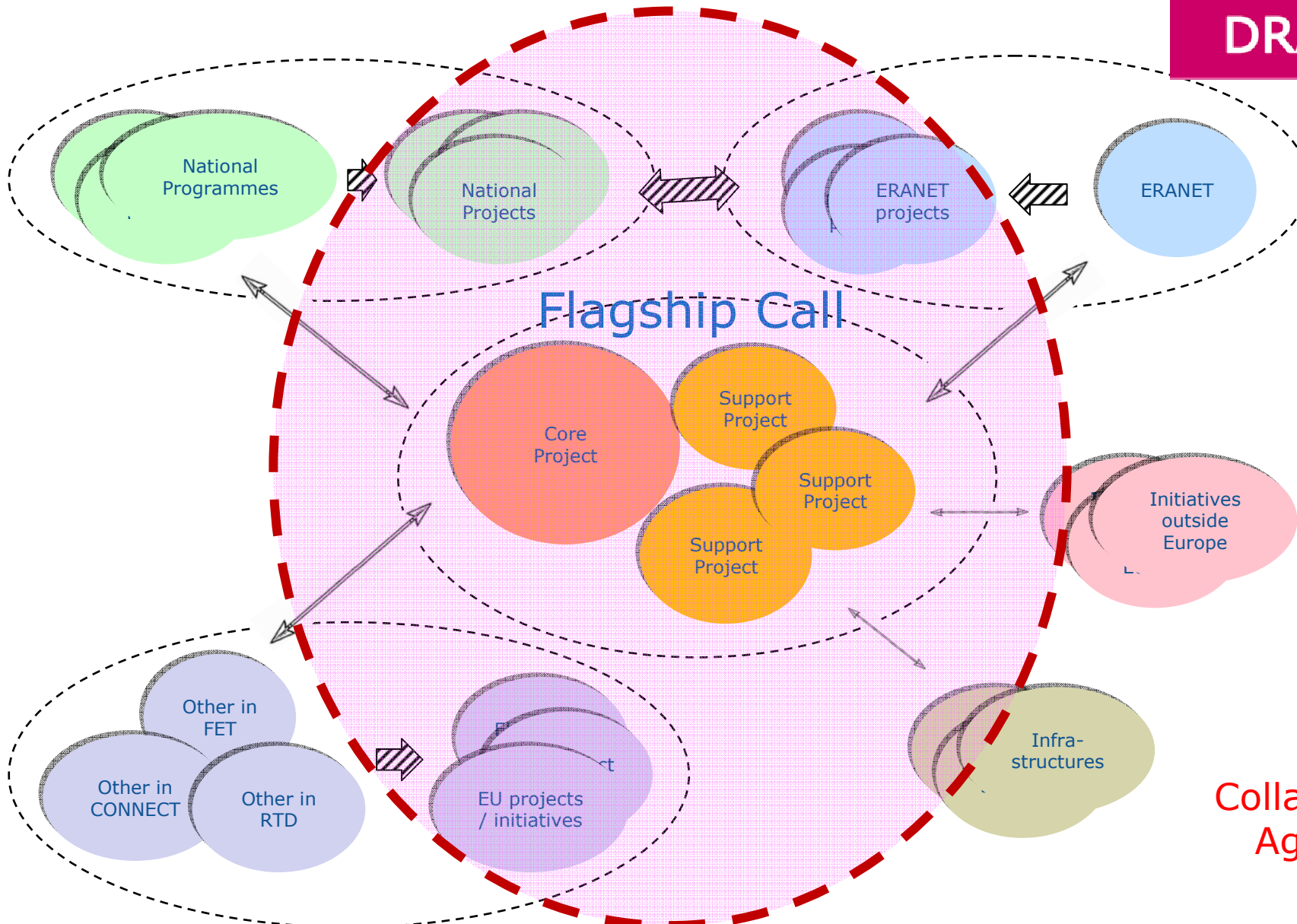
HBP will produce a complex simulation and visualization facility that will run on the most powerful supercomputers in Europe.

HBP will produce **brain-inspired 'neuromorphic' computing hardware** that could drastically reduce power-consumption and costs.

In healthcare, HBP will identify new drug targets and **treatment in response to the urgent need to combat brain disease** and its associated costs to society.



DRAFT



Collaboration  
Agreement



## An integrated approach to HPC in Horizon 2020 Excellent Science pillar

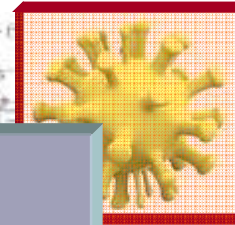
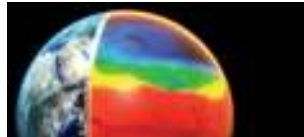
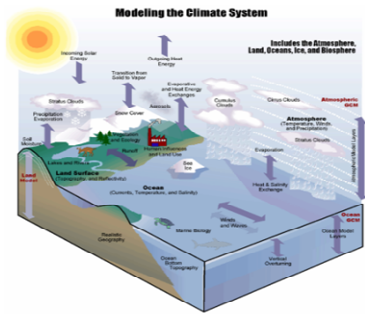
- HPC has a fundamental role of in driving innovation leading to societal impact through better solutions for societal challenges and increased industrial competitiveness.
- Vision: to ensure European leadership in the supply and use of HPC systems and services by 2020 in a strategy combining:

FET

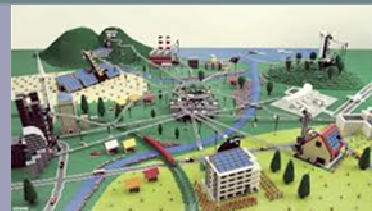
- (a) developing the next generation of HPC towards exascale;  
*(transition to exascale requires revolution –not evolution-  
of fundamental science and technology developments)*
- (b) providing access to the best supercomputing facilities and  
services for both industry and academia; *(world-class  
HPC infrastructure –PRACE- for the best research)*
- (c) achieving excellence in HPC applications;  
*(scientific/industrial HPC applications in (new) domains  
that are most important for Europe )*



# HPC: What for?

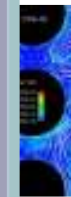
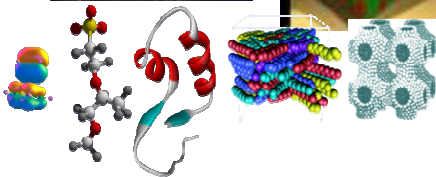


**Weather, Climate & I**



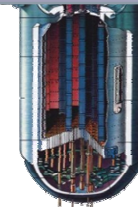
**/Life  
ences**

**New applications  
e.g. Health, Big data**

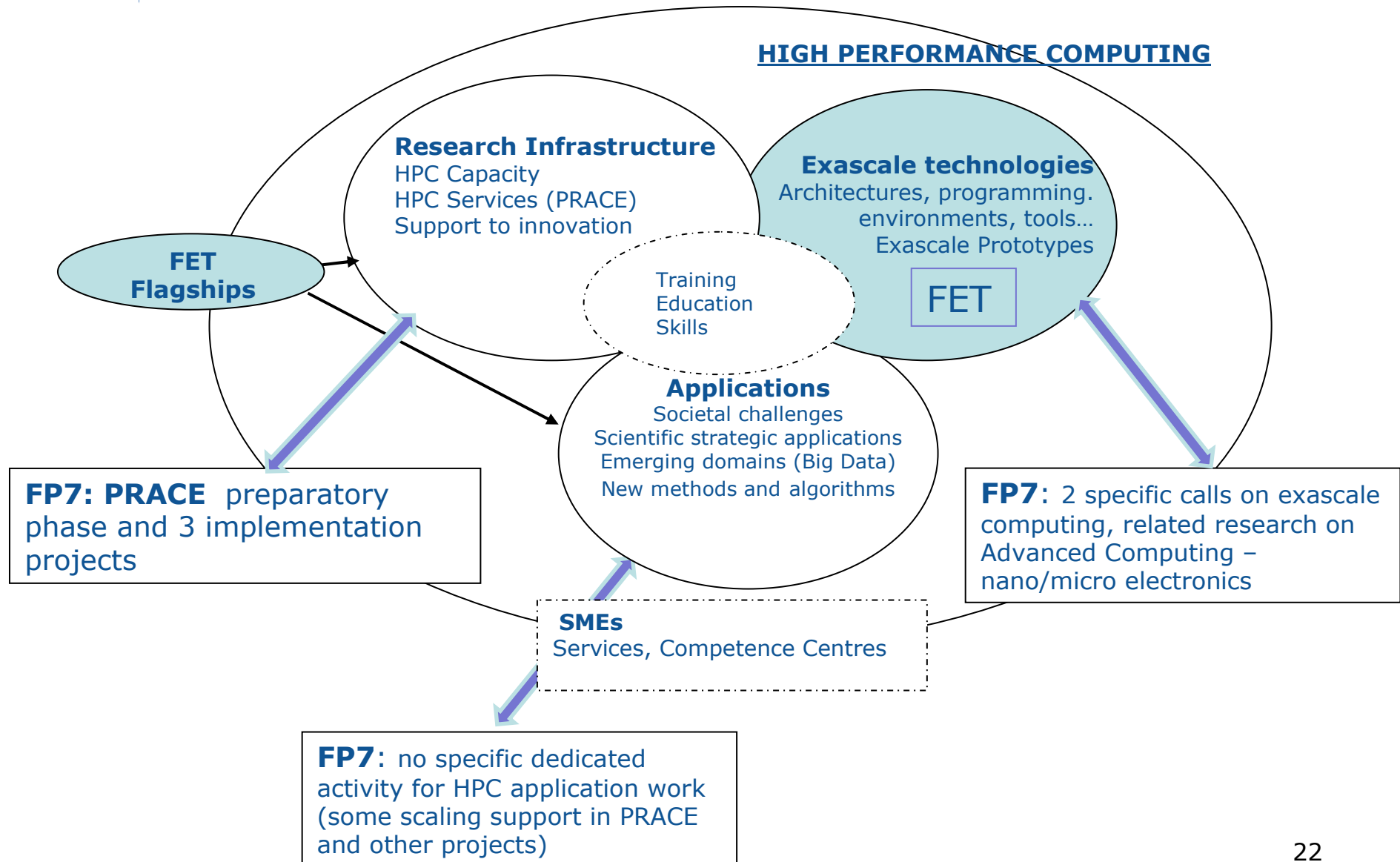


**Fundamental sciences: Physics, Chemistry, Material Sciences, Astrophysics Applications.**

**Industrial & Engineering Application (e.g. transport, energy)**



# HPC strategy in Horizon2020



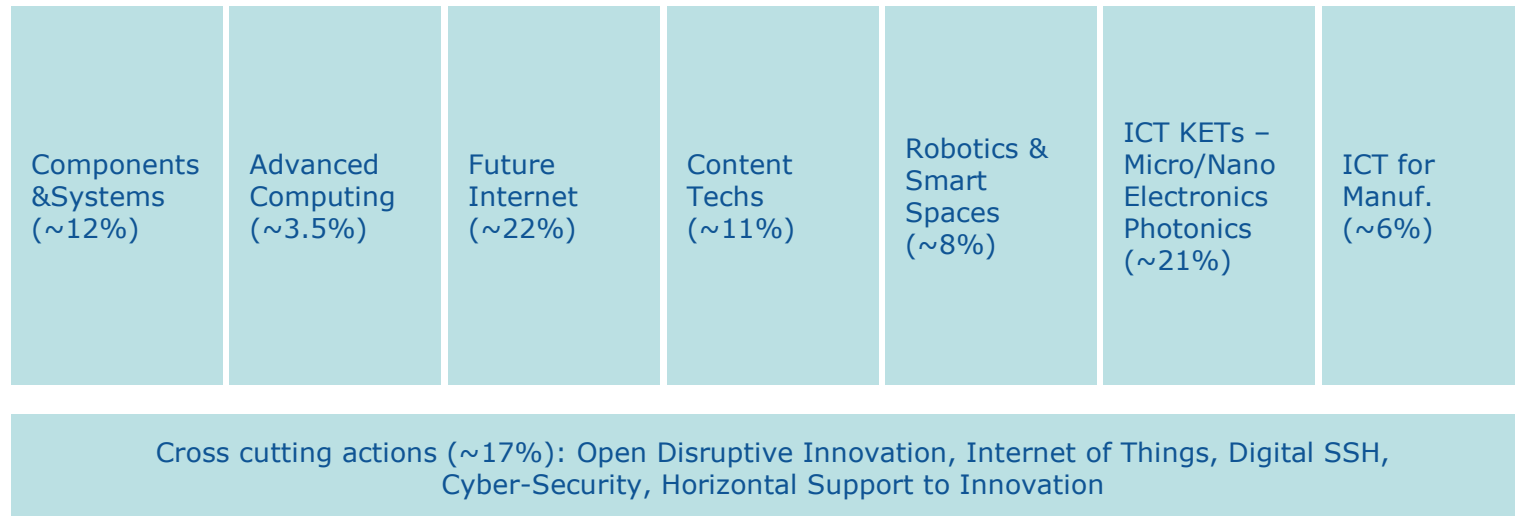
# Industrial leadership

- **Key technologies** (e.g. advanced manufacturing, micro-electronics) underpin innovation across existing and emerging sectors
- Europe needs to attract more **private investment** in research and innovation
- Europe needs more **innovative SMEs** to create growth and jobs

Leadership in enabling and industrial technologies (ICT, nanotechnologies, materials, biotechnology, manufacturing, space)	13 781
Access to risk finance Leveraging private finance and venture capital for research and innovation	3 538
Innovation in SMEs Fostering all forms of innovation in all types of SMEs	619

# ICT in LEIT

## Societal Challenges / Focus Areas



## Excellent Science / FET / RI / HPC





# A new generation of components & systems

*Reinforce Europe's stronghold in electronics, microsystems and embedded systems*

*Capture opportunities in new growth ICT markets (smart environments, cars, homes, factories, cities)*

- *Cyber-Physical Systems (CPS)*
  - **JTI on Electronic Components and Systems**
  - **New paradigms and concepts for future generations of CPS**
- *Smart Miniaturised Electronic Systems*
  - **Miniaturised electronic and bio-electronic systems**
  - **Organic and large area electronics technologies**
- *Thin, Organic and Large Area Electronics (TOLAE)*
  - **Design, research, development, manufacturing and use of Smart Miniaturised Electronic Systems and of TOLAE**

*Develop, validate and pilot customised embedded computing systems and low-power server systems*

- ***Customised and low-power computing***
  - **Customised low-power heterogeneous computing systems**
  - **next generation servers and micro-server systems based on ultra-low power architectures**



# Future Internet

*Address the limitations of the current Internet and prepare for novel usage scenarios*  
*Establish the new 5G PPP*

- *Future networks*

- **Smart networks and novel architectures to support content delivery and access, and to facilitate network configuration and control**

- *PPP on advanced network and service infrastructure focusing on 5G*

- *Cloud computing*

- **Advanced cloud infrastructures and services**
- **Innovation measures to support the public and private sector take-up in the context of the European Cloud Partnership**

- *Innovative tools and methods for software development*

- **Complex software-intensive systems, innovative services and collaborative software development**

- *Experimental platforms*

- **Experimental facilities supporting experimentally-driven research**

- *Collective Awareness platforms*

- **Integrate social media, crowdsourcing mechanisms and Internet of Things to gather information from users and sensors and share knowledge for more informed and sustainability-aware decisions**

- *Web Entrepreneurship (WE)*

- **Support to WE by creating an environment favourable to their growth in Europe**



# Content technologies and information management

*Strengthen Europe's position as provider of products and services based on digital content*

*Tools to model, analyse, and visualise vast amounts of data in order to extract more value*

- *Big Data technologies*

- **Technologies for extracting value from data; innovation around data services and products with a focus on data services that are cross-sector, cross-lingual and/or cross-border.**

- *Machine translation*

- **Machine translation that give European citizens access to content in all European languages by 2025**

- *Tools for creative content, media and knowledge industries*

- **Technologies and tools to support cultural and creative industries in the creative process**
- **Digital gaming technologies and components for serious games and learning**
- **Novel platforms for hybrid audio-visual services**
- **Specific support to Creative SMEs including pilots and start-up incubators will be included.**

- *Multimodal and Natural Computer Interaction*

- **Advancing "human-information interaction" based upon multimodal verbal and non-verbal communication**

*Reinforce European scientific and industrial leadership in industrial and service robotics*

- ***Roadmap-based research in robotics***
  - **Implementation of Strategic Research Agenda of the Public-Private Partnership in Robotics**
  - **Support to an EU-wide benchmarking initiative to enable performance evaluation and certification of new robotics products and systems**



# Micro- and nano-electronic and Photonics

*Strengthen the competitiveness and market leadership of the related industries in the two ICT KETs*

## • ***Micro and nano-electronics***

- **Support to the micro and nanoelectronics part of the JTI on electronic components and systems**
- **Generic Technology Development on micro- and nanoelectronics focused on advanced research**

## • ***Photonics***

- **Support to a photonics public private partnership (PPP) addressing the whole research and innovation value chain**



# Factories of the Future (PPP FoF)

*Builds on Europe's strengths in engineering and manufacturing technologies*

*Supports the pan-European effort for re-industrialisation through higher innovation in the manufacturing sector*

*For ICT the focus is on:*

- **Process optimisation of manufacturing assets**
- **ICT-enabled modelling, simulation, analytics and forecasting technologies**
- **Innovation for Manufacturing SMEs**

- **Internet of things:** *platforms for connected devices, objects, smart environments, services and people*
- **Digital SSH:** *exploring the interaction between technology and society*
- **Cybersecurity:** *security by design, end to end security (complementing SC7)*
- **International Collaboration:** *Policy support to developed countries, adaptation to developing countries*
- **Horizontal Support to Innovation**
  - Access to finance
  - Support actions to encourage ICT entrepreneurship
  - Standardisation and patenting
  - Definition of inducement prizes
  - Networks of ICT procurers to prepare joint PCPs/PPIs.





# Open Disruptive Innovation Scheme

*Agile space to combine new technologies, devices, applications, interfaces, business models for new product and services concepts*

*Open, fast and light*

*Small-scale bottom-up initiatives*

*Continuously open calls with cut-off dates/year*

*SME instrument only*

*5% of LEIT budget*

# Societal challenges

- Concerns of citizens and **society/EU policy objectives** (climate, environment, energy, transport etc) cannot be achieved without innovation
- Breakthrough solutions come from **multi-disciplinary collaborations**, including social sciences & humanities
- Promising solutions need to be **tested, demonstrated and scaled up**

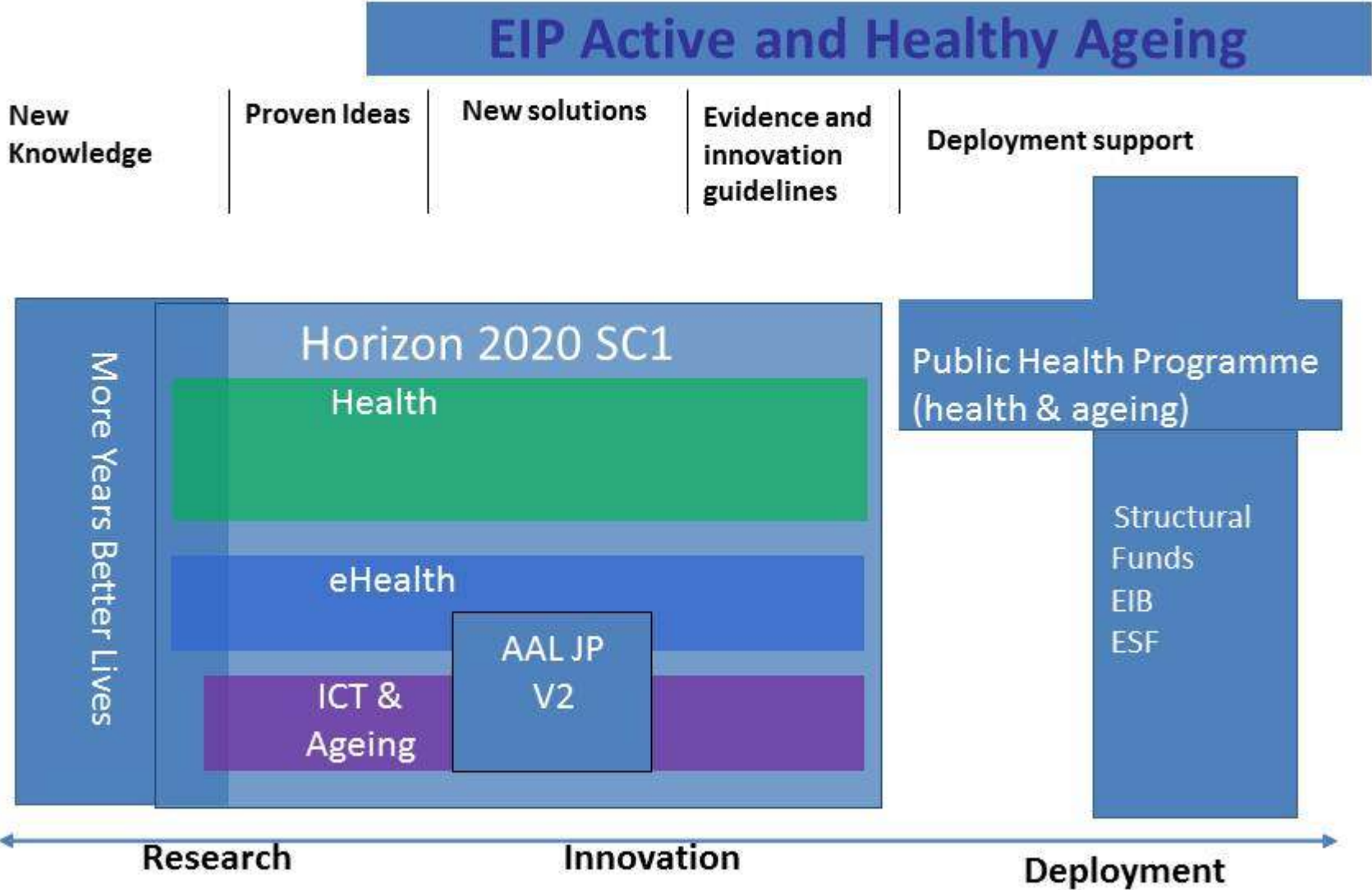
Health, demographic change and wellbeing	8 033
Food security, sustainable agriculture, marine and maritime research & the bioeconomy	4152
Secure, clean and efficient energy*	5 782
Smart, green and integrated transport	6 802
Climate action, resource efficiency and raw materials	3 160
Inclusive, innovative and secure societies	3819

- **Health, demographic change & wellbeing;**  
e-health, self management of health, improved diagnostics, improved surveillance, health data collection, active ageing, assisted living;
- **Secure, clean and efficient energy;**  
Smart cities; Energy efficient buildings; smart electricity grids; smart metering;
- **Smart, green and integrated transport;**  
Smart transport equipment, infrastructures and services; innovative transport management systems; safety aspects

# ICT in Societal Challenges (II)

- **Food security, sustainable agriculture, marine and maritime research & the bioeconomy**
- **Climate action, resource efficiency and raw materials**
  - ICT for increased resource efficiency; earth observation and monitoring
- **Inclusive, innovative and reflective societies**
  - Digital inclusion; social innovation platforms; e-government services; e-skills and e-learning; e-culture
- **Secure societies**
  - Cyber security; ensuring privacy and protection of human rights on-line

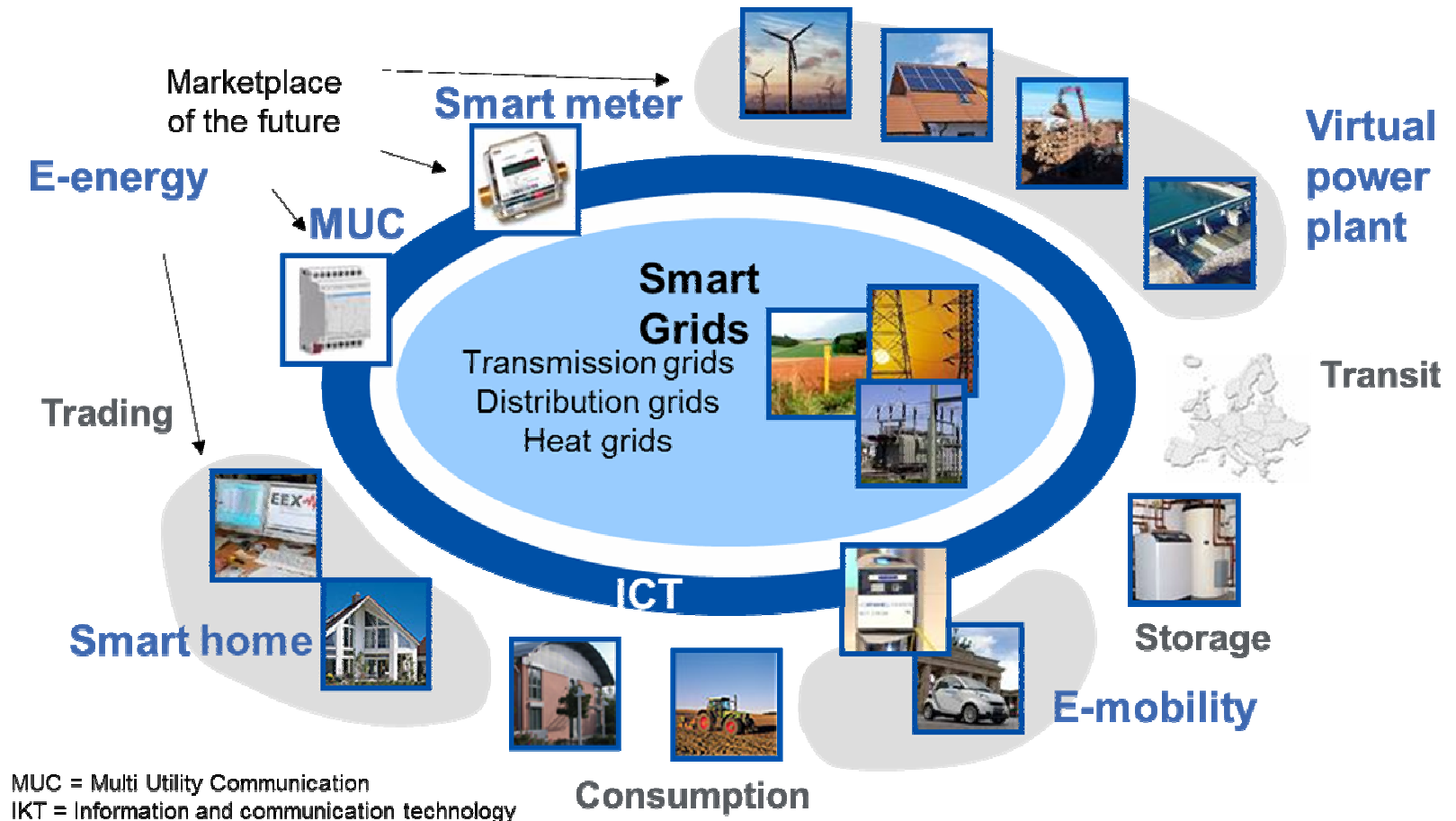
# Broader context: e.g. Health and Ageing



# ICT for Interoperability



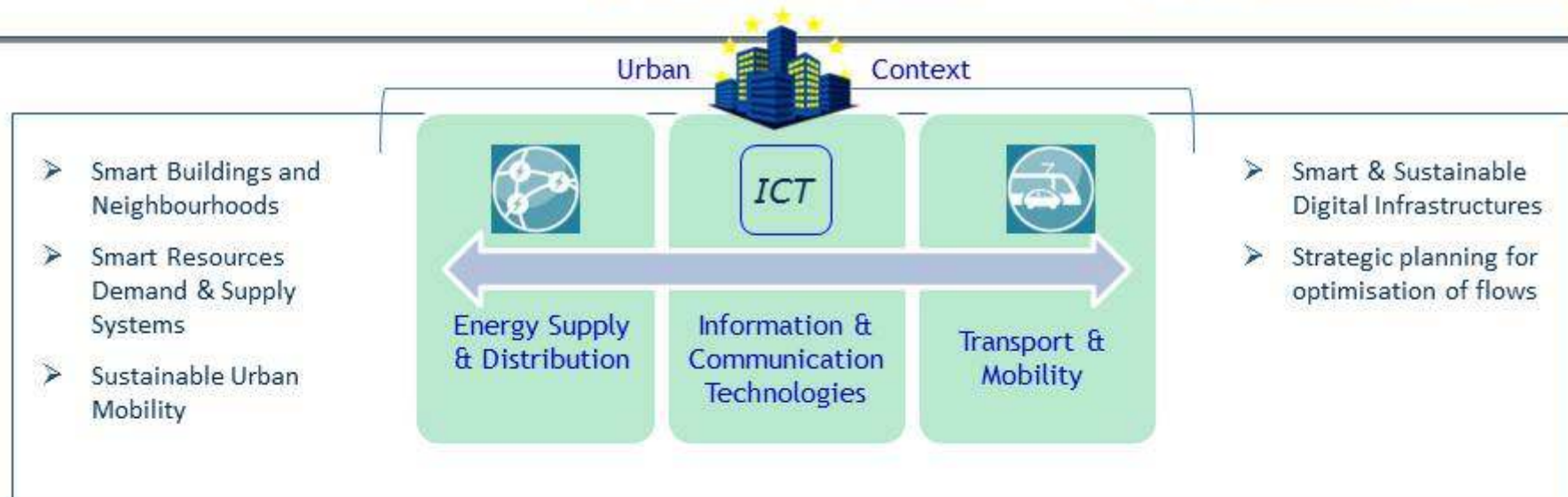
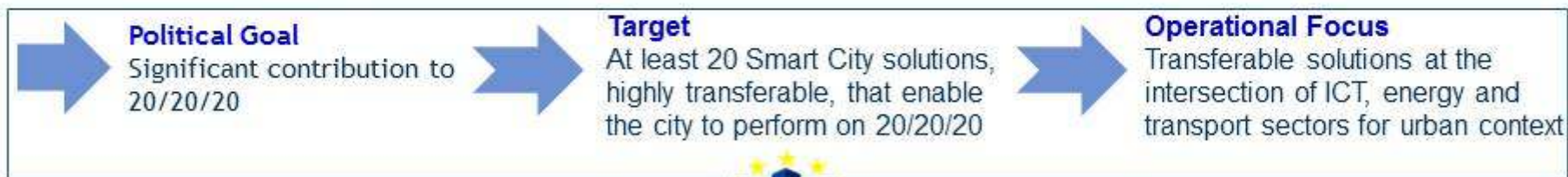
European Commission



MUC = Multi Utility Communication  
 IKT = Information and communication technology

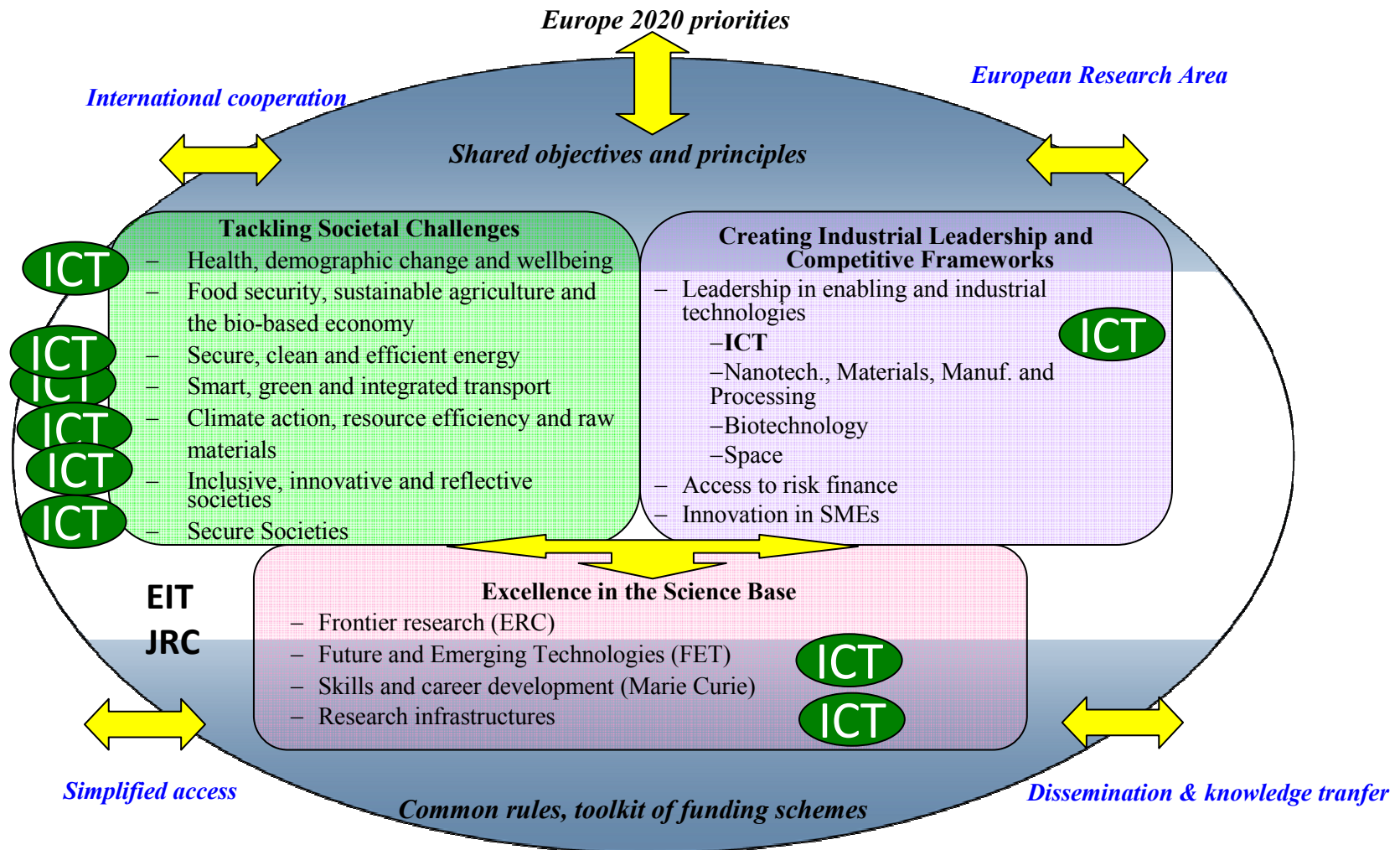
Source: RWE 2012

## Smart Cities and Communities European Innovation Partnership



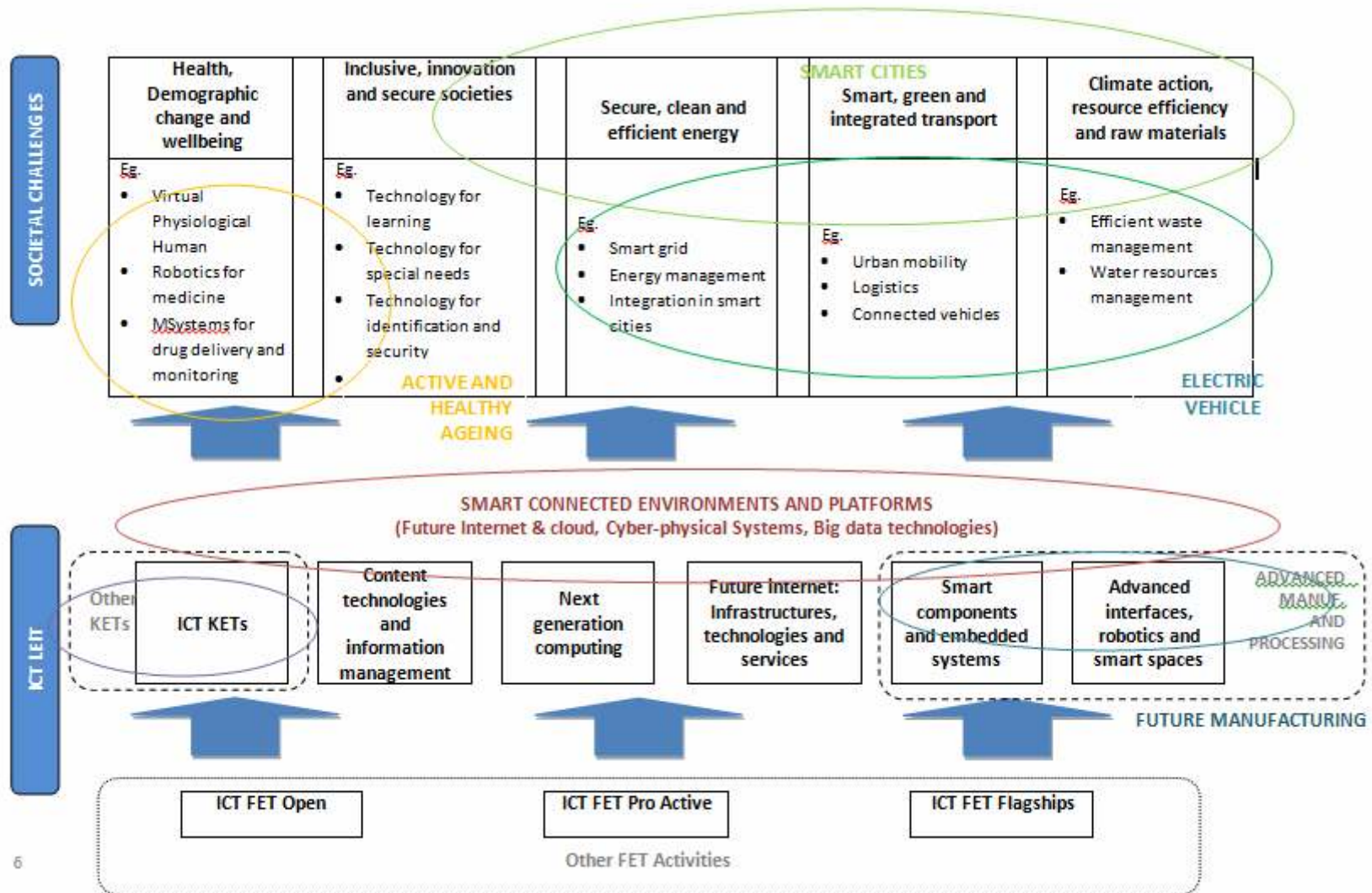


# ICT in H2020





# ICT in H2020





# International Cooperation under Horizon 2020

- *International cooperation will be a cross-cutting issue in H2020*
- *The approach will be similar to the current practice and may include a general opening of the programme, targeted openings, horizontal actions on international cooperation and coordinated calls*
- *Collaborative actions with specific third countries or their groups will be implemented on the basis of common interest and mutual benefit*
- *Reciprocal access to third country programmes will be encouraged*
- *Changes will be made to the ICPC list, or its concept as such, potentially excluding certain middle income countries (e.g. BRICs) from that list. This will be specified at the WP level*

## Next steps

- April/June 2013: Drafting of Work Programmes
- Summer: Multiannual Financial Framework Decision (2014-2020)
- Autumn: Horizon 2020 Decision
- Autumn: Consultation of Member States
- **November 6-8: ICT 2013 in Vilnius**
- 10 December 2013: Commission Decision on Work Programmes
- 11 December 2013: Publication of first calls, National Launch events
- Spring 2014: closing of first call



# ICT 2013: Create, Connect, Grow

## 6–8 November 2013, Vilnius



### Aim of the event:

ICT in Horizon 2020 – the EU's Framework Programme for Research and Innovation for 2014–2020.

### Structure of the event :

- conference,
- exhibition,
- networking.

### Registration:

Open from the end of April 2013

<http://ec.europa.eu/ictevent>

# Thank you for your attention!

*Find out more:*

*[www.ec.europa.eu/research/horizon2020](http://www.ec.europa.eu/research/horizon2020)*