High Performance Computing in Horizon 2020

- brief overview -

Dr Panagiotis Tsarchopoulos
Future and Emerging Technologies
DG CONNECT
European Commission

European Commission

HORIZON 2020

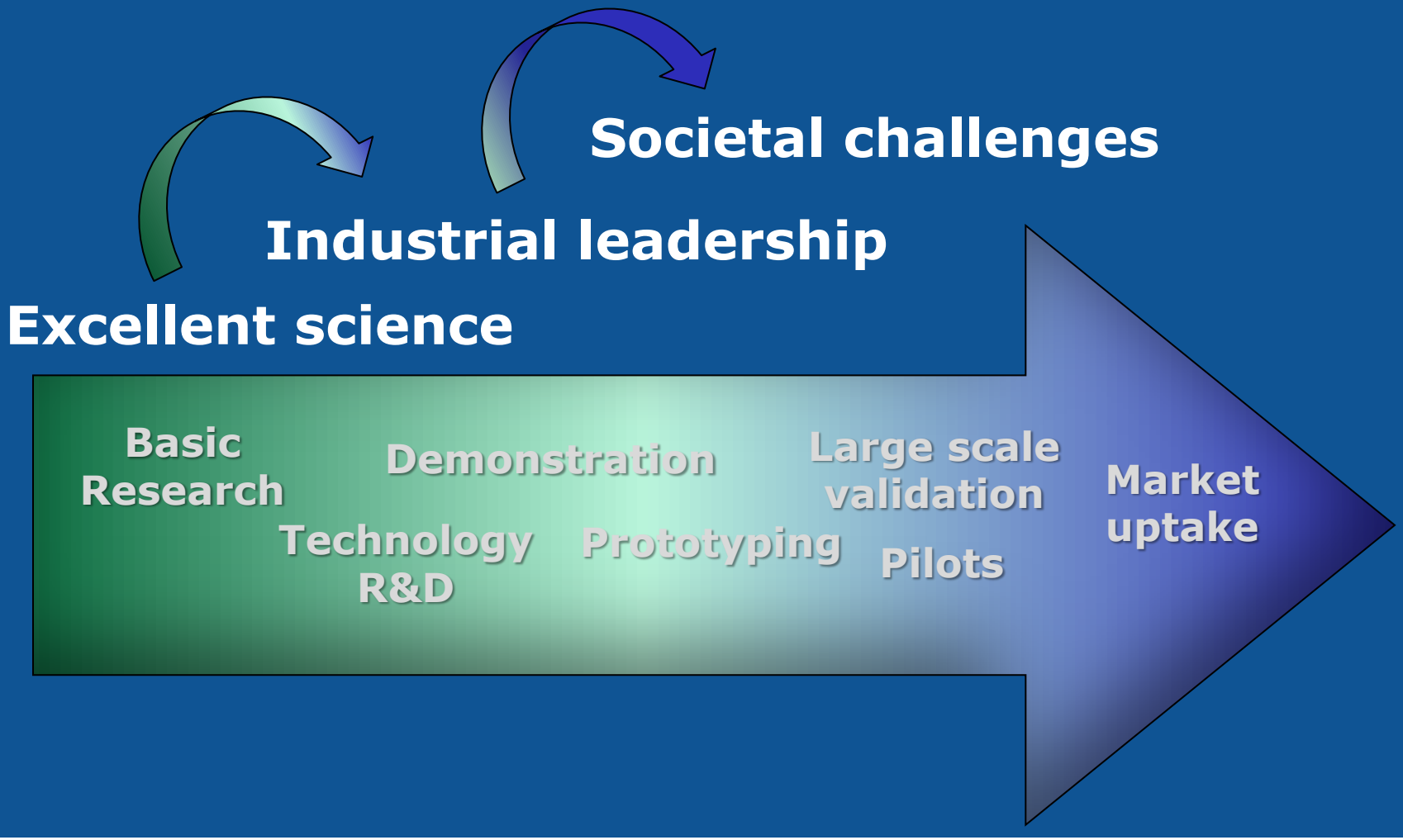
the EU framework programme for research and innovation

2014-2020

Three priorities

European Commission

Coverage of the full innovation chain



H2020 Budget: 77B€*

*in current prices (inflation rate est. 2%)

European Commission

Horizon 2020 and partnering

Public private partnerships:

*Through **Joint Technology Initiatives** or other formal structures (Art. 187)*

*Through **contractual agreements**, which provide inputs for work programmes*

Only when criteria met, e.g. clear commitments from private partners

Public public partnerships:

Through « ERA-Nets » for topping up individual calls/actions (replacing current ERA-Net, ERA-Net Plus, Inco-Net, Inno-net)

Through participation in joint programmes between Member States (Art. 185)

Supporting agendas of Joint Programming Initiatives when in line with Horizon 2020

Only when criteria met, e.g. financial commitments of participating countries

European Innovation Partnerships:

Not funding instruments, but for coordination with broader policies and programmes

Public-Private Partnerships

(Article 19 H2020 FP)

Joint Technology Initiatives *(under Article 187 FR)*

- *Innovative Medicines Initiative 2*
- *Clean Sky (Aeronautics) 2*
- *Fuel Cell and Hydrogen 2*
- *Bio-based Industries*
- *Electronic components and systems*

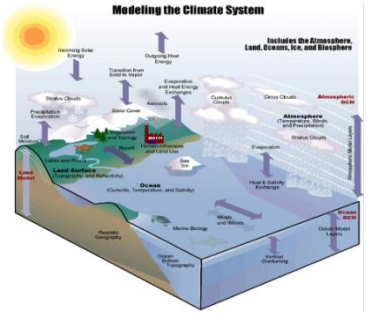
Contractual Public-Private Partnerships

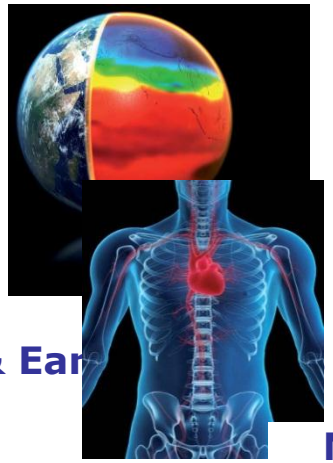
- *Factories of the Future*
- *Energy-efficient Buildings*
- *European Green Vehicles Initiative*
- *Sustainable Process Industry*
- *Photonics*
- *Robotics*
- *High Performance Computing*
- *Advanced 5G networks for the Future Internet*

The European HPC strategy

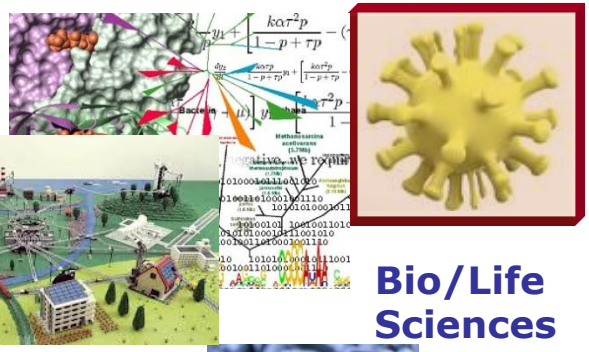
Importance of HPC

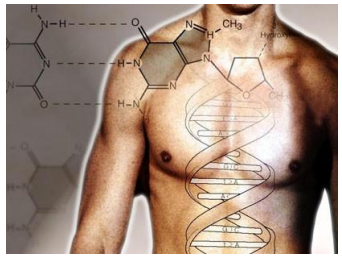
European Commission





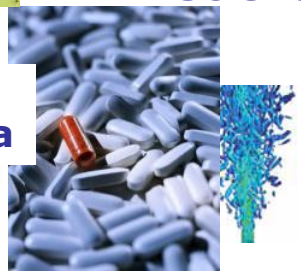
Weather, Climate & Ear

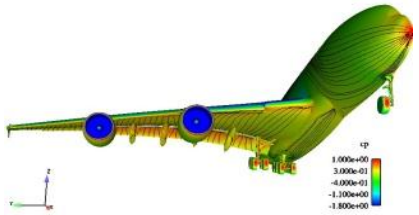


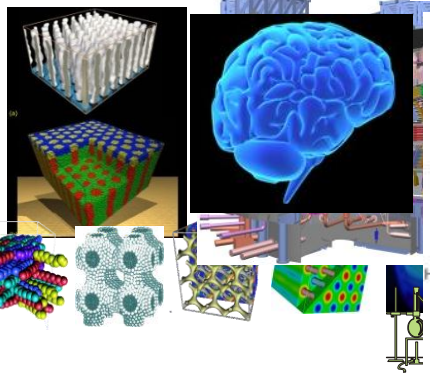


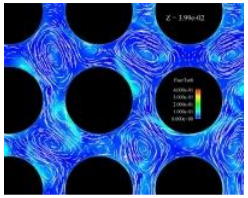
Bio/Life Sciences

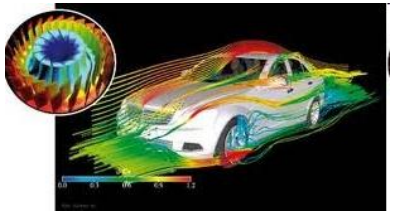
New applications e.g. Health, Big data



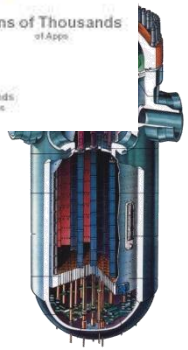








Fundamental sciences: Physics, Chemistry, Material Sciences, Astrophysics



Industrial & Engineering

The exascale generation!

- The "exaflop machine" is not a goal per se, it's the "exascale computing" challenges: energy consumption, programmability, reliability, software, algorithms, applications…
- Synergetic approach combining supply and demand

(a) Technology towards **exascale** HPC; R&D of HPC technology covering the whole spectrum from processors and system architectures to high-level software and tools to delivering prototype exascale systems and associated applications

(b) World-class **HPC infrastructure** for academia and industry, providing next generation machines to increase competitiveness in science, industry and SMEs

(c) Centres of Excellence in HPC **applications**; development, optimization and provisioning to fully exploit the performance of current and future exascale computing systems

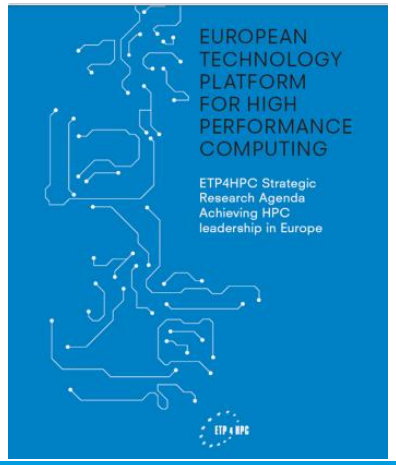
Key EU developments HPC

European Commission

Communication from the EC "High-Performance Computing: Europe's place in a global race" (2012)

Council Conclusions on High-Performance Computing (Competitiveness Council – 2013)

Establishment of the European Technology Platform on High-Performance Computing (ETP4HPC - 2012) and Strategic Research Agenda on HPC (2013)



Horizon 2020 programme adopted (end of 2013)

Public-Private Partnership with ETP4HPC (1st January 2014)

Partner of the HPC PPP: European Technology Platform for HPC and PPP

An industry-led forum founded by stakeholders of HPC technology

Open to any actor of the HPC ecosystem in Europe

Through the **Strategic Research Agenda**, the ETP4HPC has identified research areas and topics to reach a stronger European HPC ecosystem that can benefit Europe and the rest of the world.

Public-Private Partnership (PPP) with ETP4HPC (starting 1st January 2014) **- 700 m€ (2014-2020)**

www.etp4hpc.eu

PPP in HPC: General objectives

- To build a **European world-class HPC technology value chain that is globally competitive** - synergy between the three pillars of the HPC ecosystem (technology development, applications and computing infrastructure)
- To achieve a **critical mass** of convergent resources in order to increase the competitiveness of European HPC vendors and solutions
- To leverage the transformative power of HPC in order to **boost European competitiveness in science and business**
- To **expand the HPC user base**, especially SMEs, and to facilitate the participation of SMEs in the provision of competitive HPC technology solutions
- To develop a **EU leadership and world-wide excellence in key application domains for industry, science and society**
  - provision of innovative solutions for grand societal challenges
  - development of the future applications for the next exascale computing generation

An integrated HPC approach

- HPC strategy combining three elements:

(a) Computer Science: towards **exascale** HPC; *A special FET initiative focussing on the next generations of exascale computing as a key horizontal enabler for advanced modelling, simulation and big-data applications* [HPC in Future and Emerging Technologies (FET)]

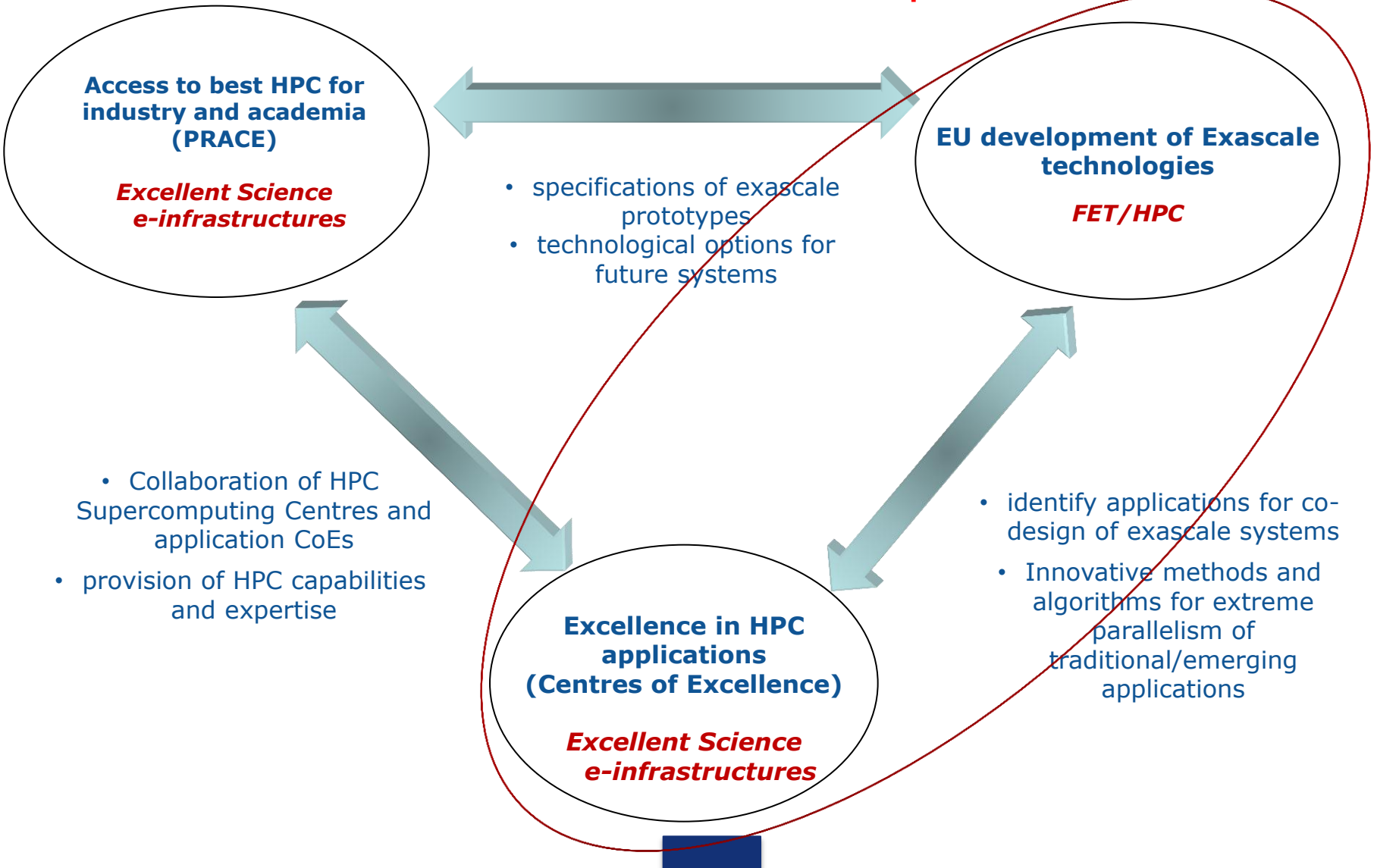
(b) providing **access** to the best supercomputing facilities and services for both industry and academia; *PRACE - world-class HPC infrastructure for the best research* [HPC in e-infrastructures]

(c) achieving excellence in HPC **applications**; *Centres of Excellence for scientific/industrial HPC applications in (new) domains that are most important for Europe* [HPC in e-infrastructures]

- complemented with training, education and skills development in HPC

Interrelation between the three elements

"Excellent Science" part of H2020



HPC related Calls 2014-2015

European Commission

	2014 EUR million	2015 EUR million	Call Deadline
FETHPC1-2014 HPC Core Technologies, Programming Environments and Algorithms for Extreme Parallelism and Extreme Data Applications	93,4		25/11/2014 at 17:00 Brussels time
FETHPC 2 - 2014: HPC Ecosystem Development	4		25/11/2014 at 17:00 Brussels time
EINFRA-4-2014 - Pan-European HPC infrastructure and services	15		02/09/2014 - 17:00 Brussels time
EINFRA-5-2015 - Centres of Excellence (CoE) for computing applications		40 (tbc)	2015 (date tbc)
EINFRA-6-2014 - Network of HPC Competence Centres for SMEs	2		02/09/2014 - 17:00 Brussels time

European Commission

Thank you for your attention!

All H2020 Calls and necessary documentation are published on the Participant Portal: http://ec.europa.eu/research/participants/portal

HPC Call texts available in the FET and e-infrastructures Workprogrammes

Next HPC info events:

- 25 March London
- 9 April Paris

Email: Panagiotis.Tsarchopoulos@ec.europa.eu