Regional Vision and Strategy
The European HPC Strategy

BDEC
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Why Europe needs a HPC strategy?

HPC helps addressing big scientific, industrial and societal **challenges** and fosters **innovation** and **business opportunities**

Some trends ….

- More computing cores in the chip at less energy requirements are profoundly changing the semiconductor industry and all end-user markets
- Cloud computing, Mobile devices and Apps, Social Technologies, Big Data Analytics today represent about 20% of global IT spending, growing 6 times faster than traditional IT (80% of the IT market by 2020)
- HPC is pushing the computing frontier (exascale) needed for new applications (e.g. Human Brain Project, Square Kilometre Array)
- Sustainable HPC : 100 times current computing power consuming 100 times less energy
- Europe consumes 30% of world HPC… but supplies 5%
- Europe decreasing its score in top 500 world supercomputers (~20% and only 2 in top 10)

HPC is a strategic resource for the EU's future

- **Computational Science is already the "third pillar" of science:**
  - **Scientific endeavours increasingly rely on data, simulation and models.**
  - **The most powerful supercomputers are needed to address scientific and societal grand challenges needing huge computing and data resources**
- **Industry relies more and more in HPC for innovation in products and services.** Several of the most profitable and vibrant industrial sectors in Europe are big HPC users
  - **e.g.: manufacturing - 6,500 B€ of GDP and 30 million jobs-, oil & gas - 440B€ of GDP and 170K jobs-, pharmaceutical industry - 800B€ of GDP and 40% of EU worldwide market shares for medicine - 1,000B€ of public spending (10% of the EU's GDP)**

Some examples

Smart Cities

•Cyber-physical embedded systems and real time simulation and control for drinking/waste water, electricity consumption and distribution (e.g. Dalkia/Veolia, EDF)

•Propagation of electromagnetic waves for reducing power in antennas (Geomod)

Health

•HPC for modelling instead of animal testing (e.g. L'Oreal, Rhenovia),

•Understanding the human (Virtual Phisiological Human, Human Brain Project Flagship)

Transport

•Virtual prototyping, reducing time-to-market (Airbus, Renault, Porsche, etc)

Big data analytics for finance (Paypal -online fraud detection-, Geco -real-time calculation of insurance quotes-, Amazon –predictive purchase-), health (personalised medical diagnosis), Global System Science

The European HPC strategy and its implementation through Horizon 2020

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)]

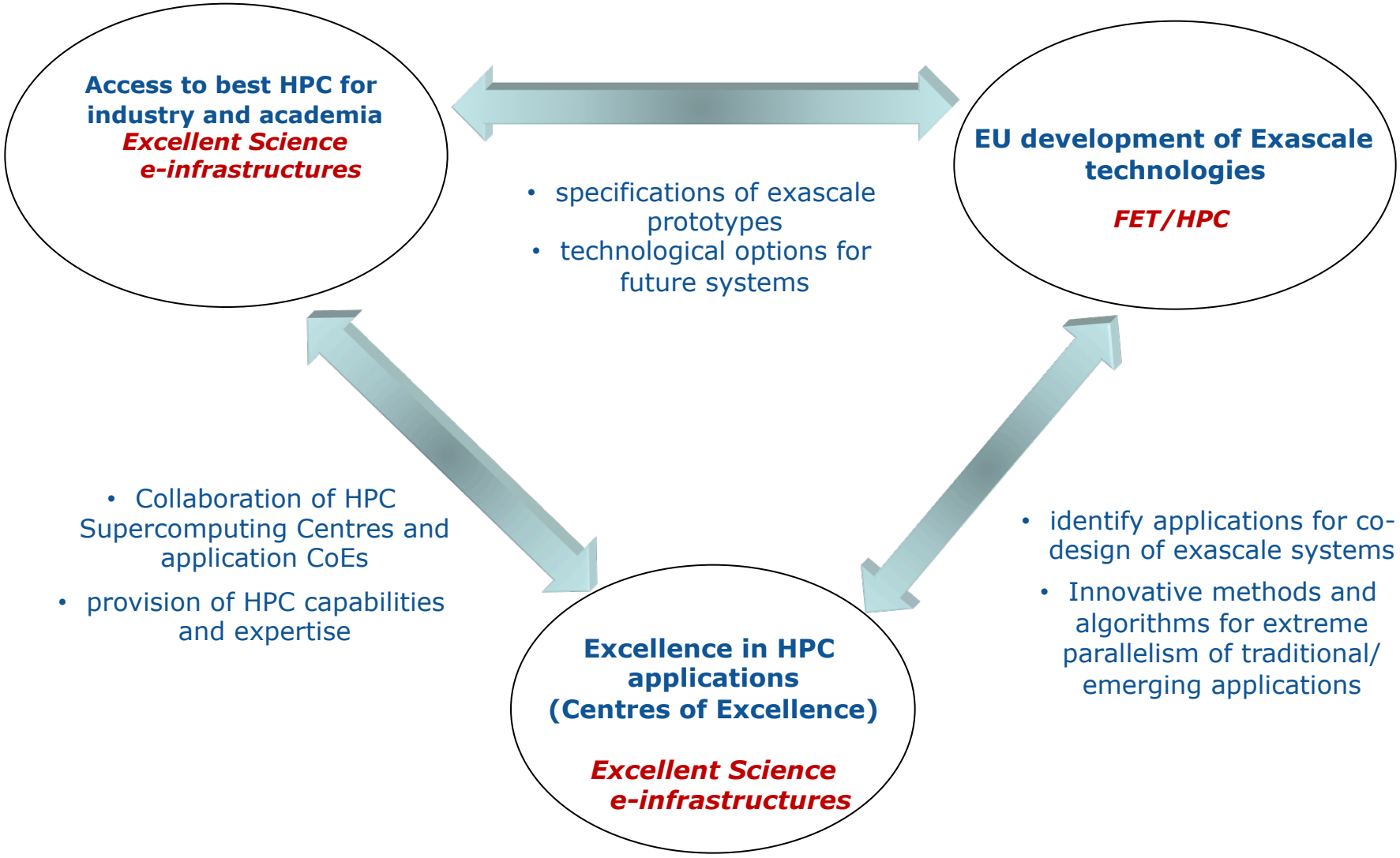
(b) providing **access** to the best supercomputing facilities and services for both industry and academia; *PRACE - world-class HPC infrastructure for the best research* [HPC in e-infrastructures]

(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

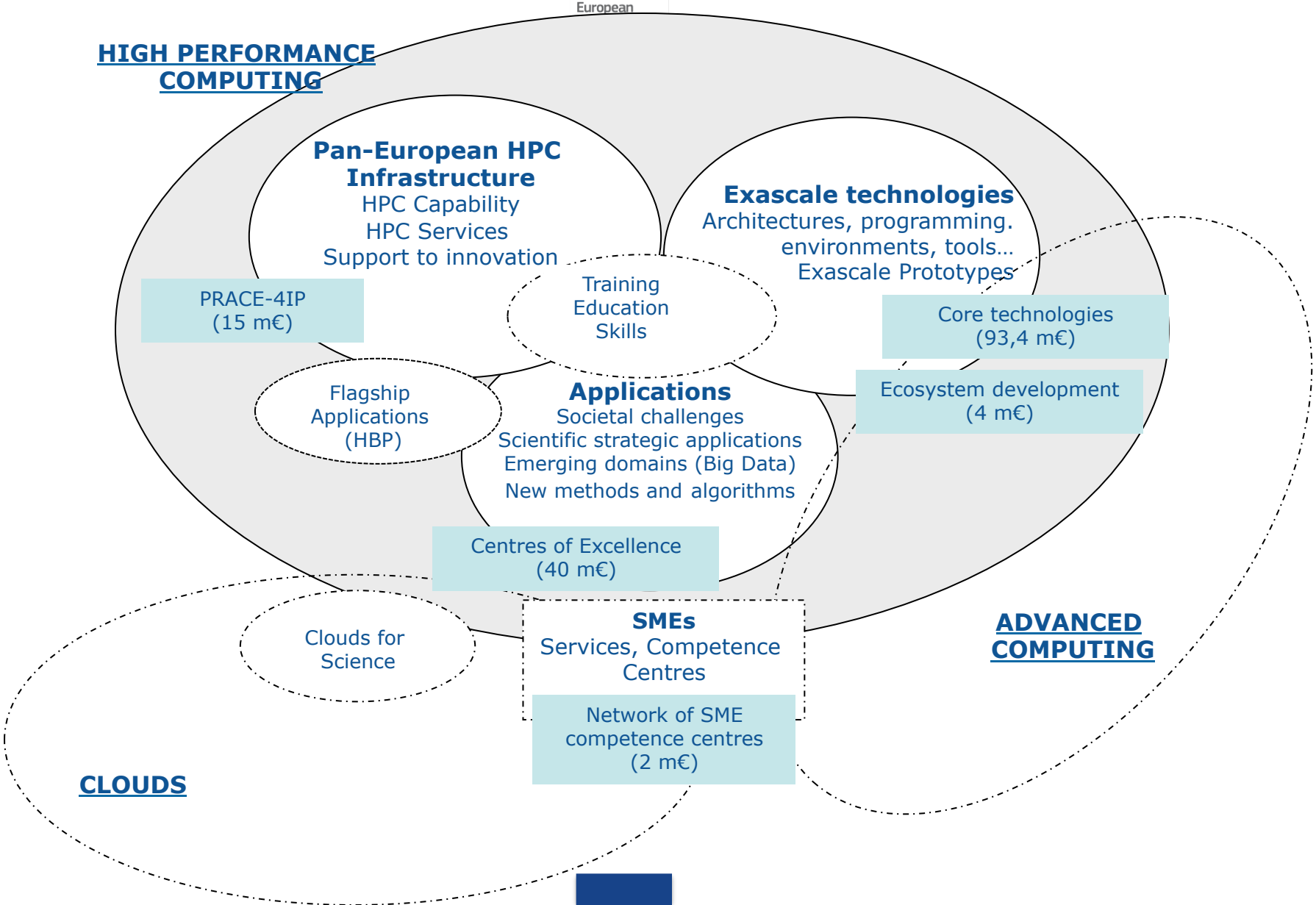
Interrelation between the strategy pillars

"Excellent Science" part of H2020



HPC Overall strategy

Horizon 2020
WP2014-15



Public Private Partnership (PPP) in HPC

PPPs in Horizon 2020

*Public-Private Partnerships (PPP) where all the partners concerned commit to **support the development and implementation of R&I activities of strategic importance to the Union**.*

The Union has established the following contractual PPPs:

- *Factories of the Future (FoF)*
- *Energy-efficient Buildings (EeB),*
- *European Green Vehicles Initiative (EGVI),*
- *Sustainable Process Industry (SPIRE),*
- *Future Internet - Advanced 5G network (5G) Robotics,*
- *Photonics*
- *HPC with ETP4HPC platform (January 2014)*
- *Big Data Value Chain, with Big Data Value Association (January 2015)*

PPP in HPC: General objectives

- To build a **European world-class HPC technology value chain that is globally competitive** - synergy between 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 to **boost European competitiveness in science and business**
- To **expand the HPC base**, especially SMEs (both as users and suppliers of competitive HPC technology solutions)
- To develop a **EU leadership and world-wide excellence in key application domains for industry, science and society**

Interrelation between the strategy pillars

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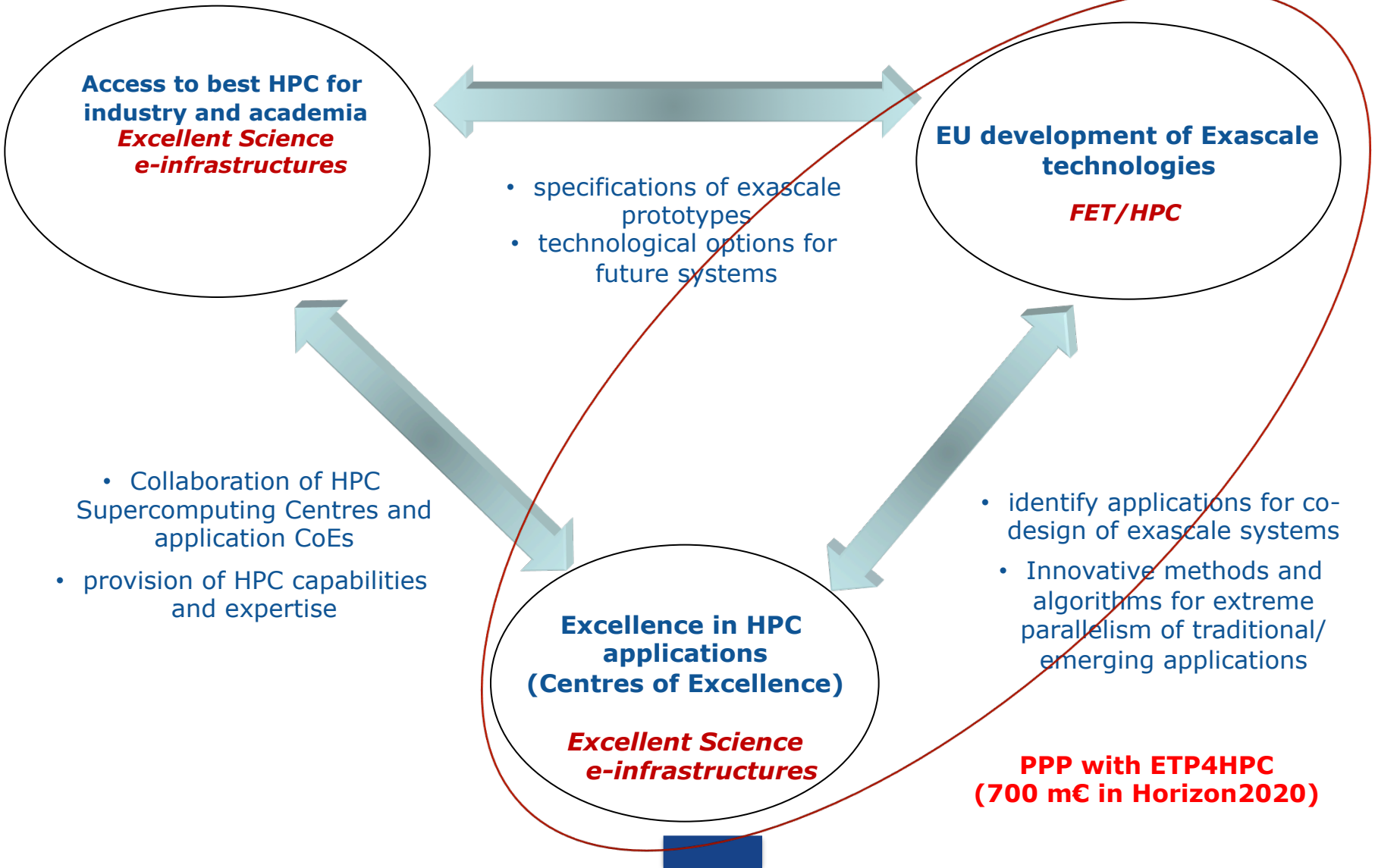

Next steps in Horizon 2020

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WP2016-2017 (work in progress)

- *Support to implementation of the Pan-European HPC infrastructure (PRACE 2.0?)*
- *Support to procurement of innovative solutions in HPC (PPI)*
- *Core technologies towards exascale (PPP in HPC)*
- *HPC platform of the Human Brain Project (HBP)*

Establishment of first Centres of Excellence (end 2015)

Study to follow the progress on the implementation of the European HPC strategy (mid-2015)

- *HPC market and HPC R&I landscape in the EU*
- *Impact and the return on HPC investments in innovation and economic progress and growth in the EU.*
- *Status of the implementation of the HPC Communication Action Plan*

Report to Parliament and Council on European HPC strategy (end 2015)

THANK YOU!