High-Performance Computing in Europe: Looking ahead

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Future and Emerging Technologies

DG CONNECT

European Commission
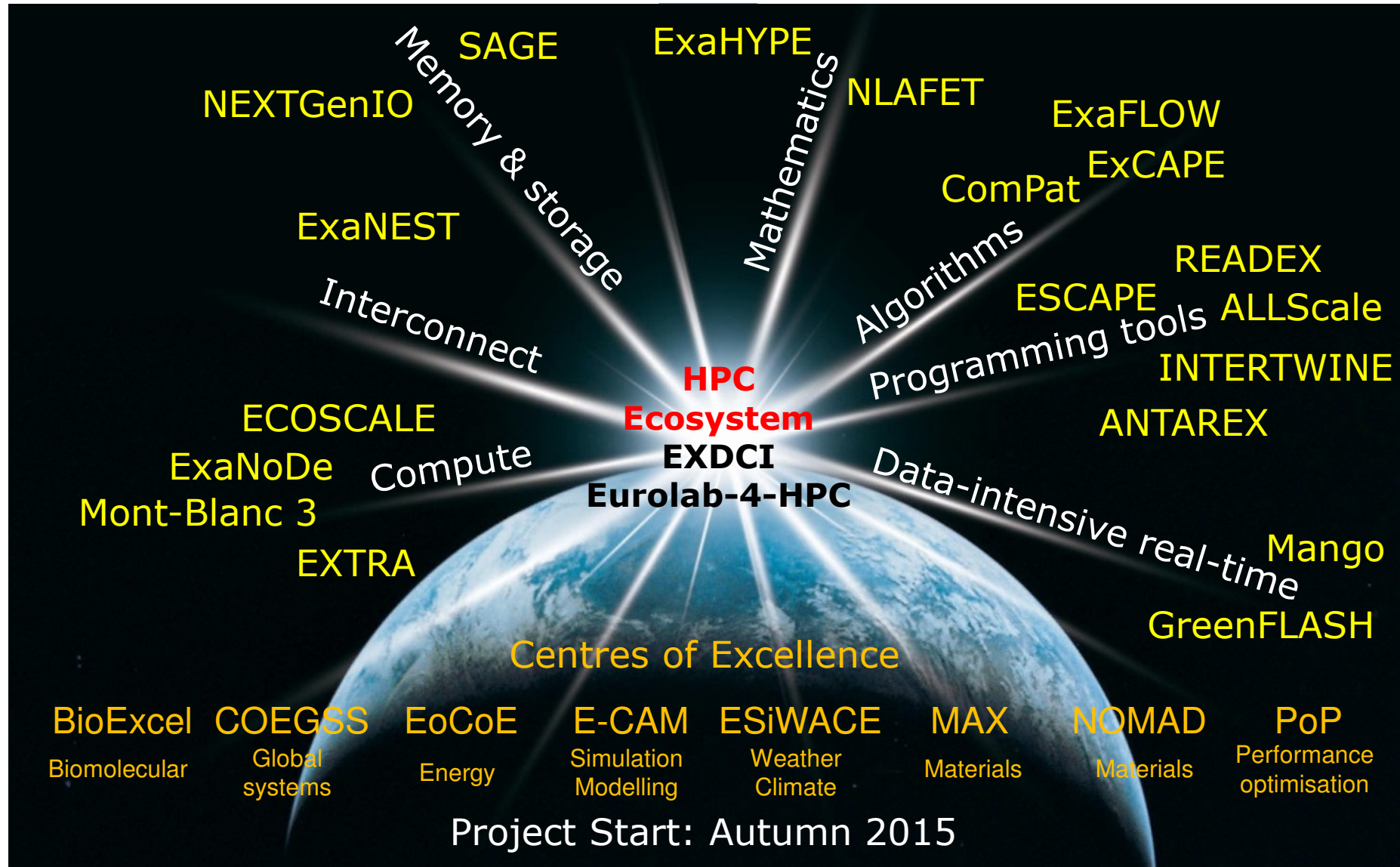
2014-2015 Calls of the HPC cPPP

- €140m funding committed

- Projects start: Autumn 2015

- Complete HPC R&D project portfolio covering all elements of HPC stack

- Multi-partner consortia involved in all projects

- Specific actions to further develop the European HPC ecosystem

- Centres of Excellence for key HPC applications

The new European HPC research landscape

PRACE ETP 4 HPC — THE EUROPEAN TECHNOLOGY PLATFORM FOR HIGH PERFORMANCE COMPUTING

European Commission

SAGE ExaHYPE Memory & storage Mathematics NLAFET ExaFLOW ExCAPE

NEXTGenIO ComPat

ExaNEST Algorithms READEX ESCAPE ALLScale

Interconnect Programming tools INTERTWINE

HPC Ecosystem ANTAREX

ECOSCALE EXDCI Eurolab-4-HPC

ExaNoDe Compute Data-intensive real-time

Mont-Blanc 3 Mango

EXTRA GreenFLASH

Centres of Excellence

BioExcel COEGSS EoCoE E-CAM ESiWACE MAX NOMAD PoP

Biomolecular Global systems Energy Simulation Modelling Weather Climate Materials Materials Performance optimisation

Project Start: Autumn 2015

Future HPC Calls 2016-2017

HPC-related calls Horizon 2020

- ***WP2016-2017***

  - **Support to the Pan-European HPC infrastructure (eInfrastructure)**

    - *Implementation of PRACE (PRACE-4IP) – 15 m€*
    - *Procurement of innovative solutions in HPC (PPI) – 26 m€*
    - *HPC e-infrastructure for the Human Brain Project – 25 m€*

  - **Support to exascale technologies development *(FET)***

    - *Co-design of HPC systems and applications – 41 m€*
    - *Transition to exascale computing – 40 m€*
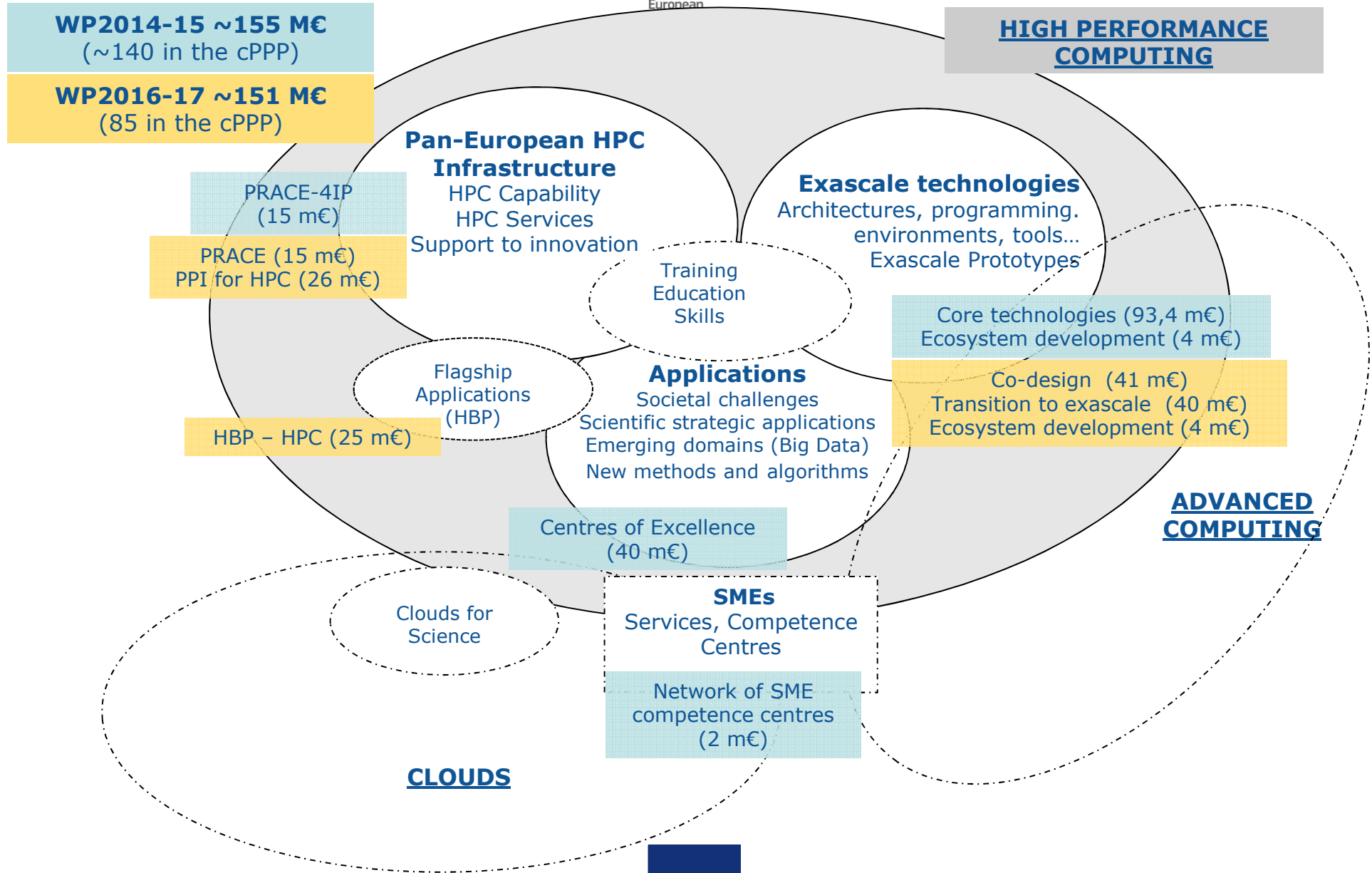   - *Exascale Ecosystem Development – 4 m€*

Headline research challenges   FETHPC 2016/2017 Calls

- ***Co-design of HPC systems and applications***: *bigger projects with 10-20m indicative funding per project* *[2016]*

- ***Transition to exascale computing*** *: smaller focused projects with 2-4m indicative funding per project* *[2017]*
    - **High productivity programming environments for exascale**
    - **Exascale system software and management**
    - **Exascale I/O and storage in the presence of multiple tiers of data storage:**
    - **Supercomputing for Extreme Data and emerging HPC use modes**
    - **Mathematics and algorithms for extreme scale HPC systems and applications working with extreme data**

- *Exascale* ***Ecosystem Development*** *: Coordination and Support Actions with 1-2m indicative funding per project* *[2017]*
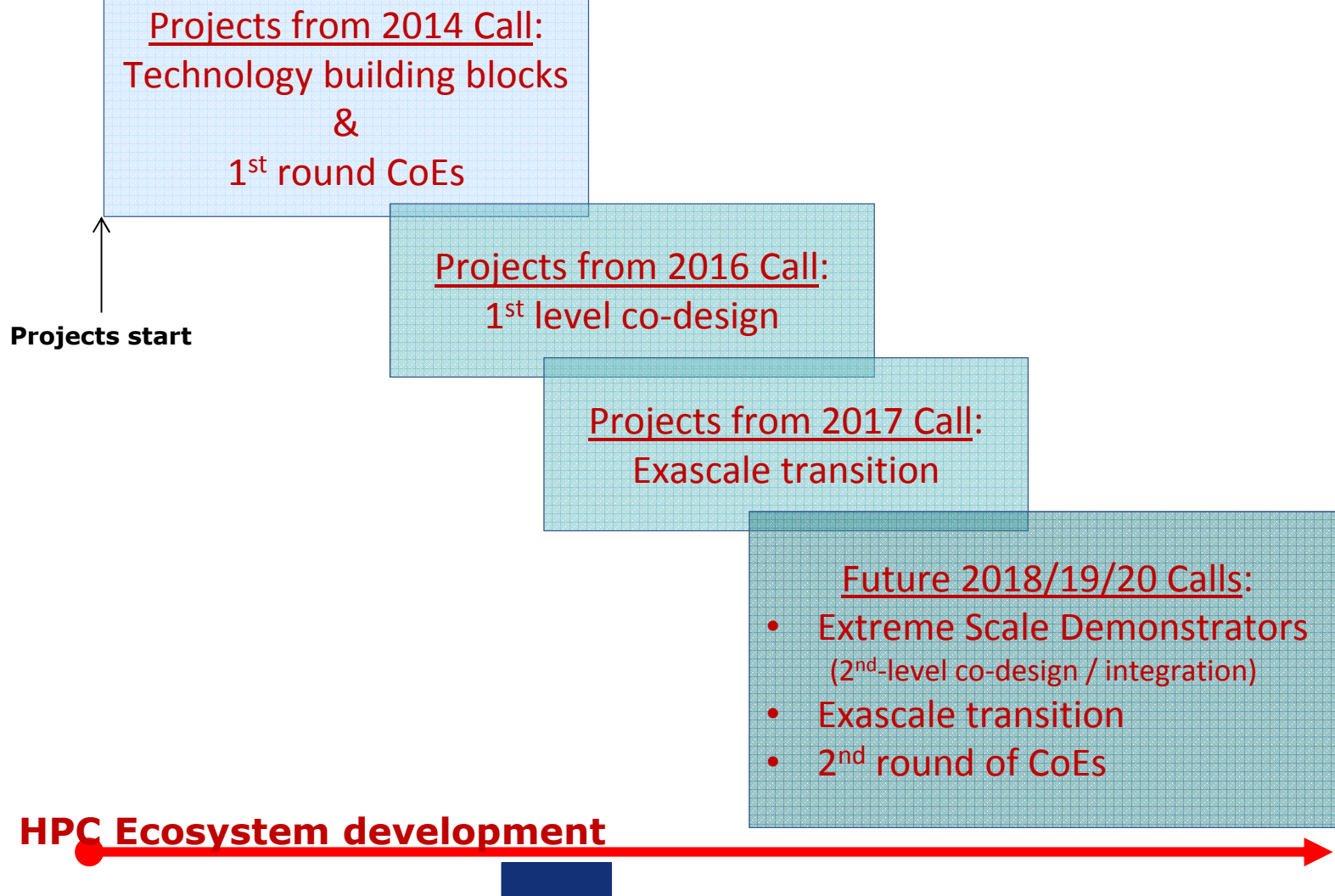
HPC Overall strategy

Horizon 2020 Calls 2014-2017

European

WP2014-15 ~155 M€
(~140 in the cPPP)

WP2016-17 ~151 M€
(85 in the cPPP)

HIGH PERFORMANCE COMPUTING

PRACE-4IP
(15 m€)

PRACE (15 m€)
PPI for HPC (26 m€)

Pan-European HPC Infrastructure
HPC Capability
HPC Services
Support to innovation

Exascale technologies
Architectures, programming.
environments, tools…
Exascale Prototypes

Training
Education
Skills

Core technologies (93,4 m€)
Ecosystem development (4 m€)

Flagship
Applications
(HBP)

Applications
Societal challenges
Scientific strategic applications
Emerging domains (Big Data)
New methods and algorithms

Co-design (41 m€)
Transition to exascale (40 m€)
Ecosystem development (4 m€)

HBP – HPC (25 m€)

ADVANCED COMPUTING

Centres of Excellence
(40 m€)

Clouds for
Science

SMEs
Services, Competence
Centres

Network of SME
competence centres
(2 m€)

CLOUDS

2013   2014   2015   2016   2017   2018   2019   2020   2021   2022   2023

Projects start

Projects from 2014 Call:
Technology building blocks
&
1st round CoEs

Projects from 2016 Call:
1st level co-design

Projects from 2017 Call:
Exascale transition

Future 2018/19/20 Calls:
- Extreme Scale Demonstrators
  (2nd-level co-design / integration)
- Exascale transition
- 2nd round of CoEs

HPC Ecosystem development

European Cloud Initiative

European Commission

- **Ambition**: maximise the growth potential of our European Digital Economy and give Europe a lead in the data-driven economy.
- The initiative comprises:
  - the **European Open Science Cloud**, a trusted, open environment for the scientific community for storing, sharing and re-using scientific data and results;
  - an underpinning **European Data Infrastructure** combining world-class supercomputing capability, high-speed connectivity, leading-edge data storage and interfaces for cloud-based service delivery.
  - widening the use of the European Cloud infrastructures not only for scientists but also for other users from industry (including SMEs) and the public sector.
- HPC is at the heart of this ambitious initiative that would place the EU among the world's top supercomputing powers.

Thank you for your attention!

Single point of access to all information about the EC HPC strategy, work programmes and HPC related news:
ec.europa.eu/horizon2020-hpc

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