



4th ENES HPC Workshop, Toulouse

European Data Infrastructure and HPC

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Problem Definition

- **Europe risks lagging behind world-class HPC infrastructure to process data!**
- **The exponential growth of data will drive societal challenges, scientific advances and productivity gains across the economy**
- **Lack of interoperability of infrastructures due to fragmented deployment**
- **Non optimal cost-efficiency in investments due to lack of coordination and critical mass**
- **Sub-optimal approaches to sustainability and preparation of the HPC capacity needed in the future**



Objectives

Endow Europe with a trusted and world class Data Infrastructure combining:

- **HPC infrastructure with exascale capacity to process data**
- **Storage capacity to access & preserve large and complex data and software**
- **High-speed connectivity to link and access data and software**

Support advanced research offering data infrastructure services to the European research communities and organisation through a service model (Open Science Cloud) for the management, analysis and re-use of research data

Widening access and building trust by opening the infrastructure to industry and public sector. Users from industry (SMEs) and the public sector will benefit from infrastructure for innovation and modernisation of products and services.

Staff Working Document High Performance Computing (HPC)



- HPC is at the core of major **scientific & industrial innovation** in the digital age and **critical for policy making, national sovereignty and economic competitiveness**
 - HPC is key for the innovation environment in the European Cloud Initiative
- Impressive progress in the last years towards overall goal: **Europe as a global leader in HPC use & supply by 2020**
 - However, the EU is losing its position in the top supercomputing league
- **Significant additional investments** are needed for Europe to stay in the HPC race and match the developments of Europe's main competitors
- **A full HPC ecosystem is needed**, complementing technology supply with the coordinated acquisition at EU level of world-class systems
- **National and European HPC policies and investments** must be further coordinated
- The **convergence of HPC, Big Data and Cloud must be exploited** for wide spreading and easing HPC use –in particular in industry/SMEs



Type of actions

High Performance Computing

- European native knowledge base to build key basic components and associated software (low power chip)
- Prototype EU HPC pre-exascale systems followed by fully operational HPC exascale machines
- Connect/upgrade HPC Tier 0 nodes and link them with the data infrastructure
- Support HPC centres of excellence for software and platforms adaptation to exascale

Data and software

- Rationalise and upgrade data centres and link them to HPC software centres of excellence
- Install the EU Data/CoE exascale storage node
- Operate a pan-European long term preservation infrastructure (Tier-0/Tier-1 and T2/long-tail nodes seamlessly connected)
- Support core services across domains (discoverability, long term preservation, access control)

Networking

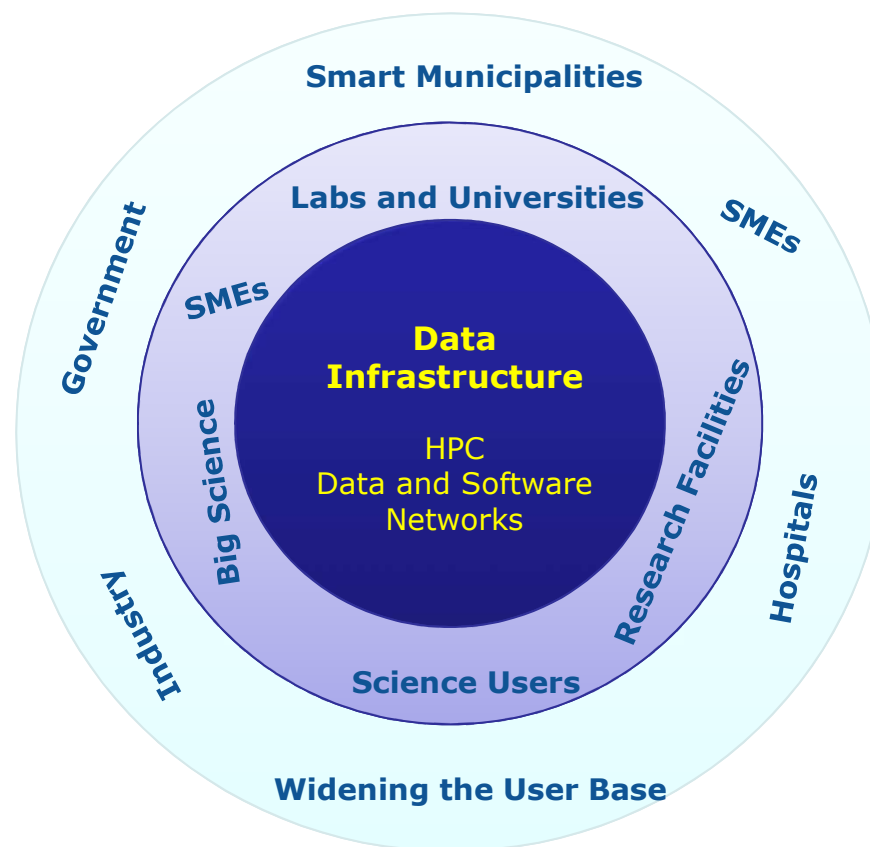
- Upgrade network capacity from backbone to the campus and researcher desk to respond to the exascale challenge
- Rooted European platform for innovative big data-driven services in different application areas
- Balance better and extend geographic coverage

Widening Access and Building Trust

Data Infrastructure service delivery **empowered to serve all European users:**

scientists but also for other users from **industry** (including SMEs) and the **public sector**.

Data infrastructure will allow **unlocking the value of Big Data** and digital by default.





Expectations from Member States - IPCEI

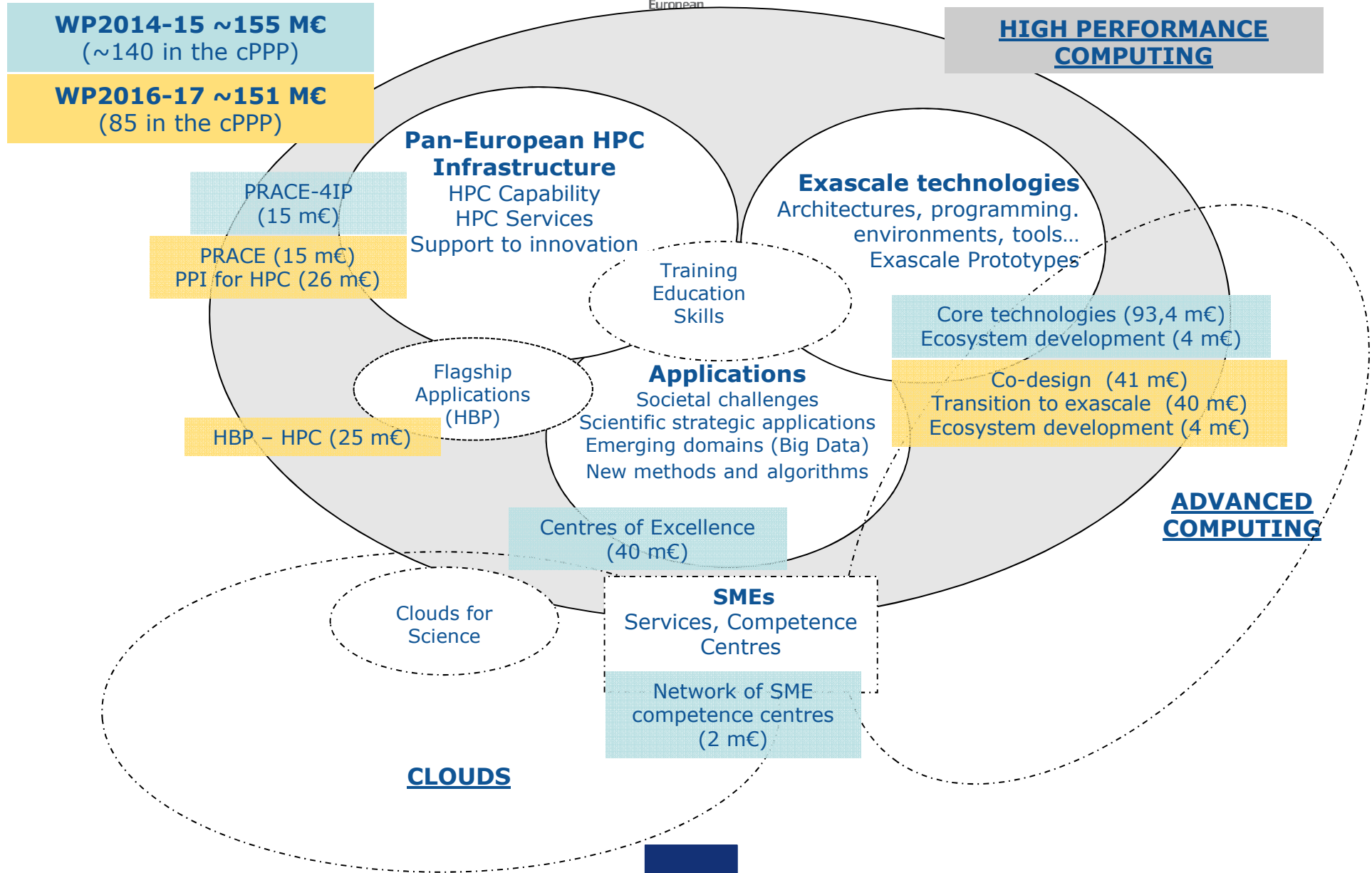
- Some Member States started activities to set-up an “**Important Project of Common European Interest**” (**IPCEI**) on HPC and Big Data Enabled Applications.
- Potential HPC and Big Data IPCEI examples: Secure Financial services, Smart Space, Smart Mobility, Smart Energy, Smart Building, Smart Water, Smart City, Smart Agriculture or Manufacturing 4.0.
- Benefits:
 - **Promising initiative from Member States to reduce fragmentation and to align strategies and investments.**
 - **Mechanism to deliver the DSM objectives in particular those of the European Cloud Initiative.**



HPC Overall strategy



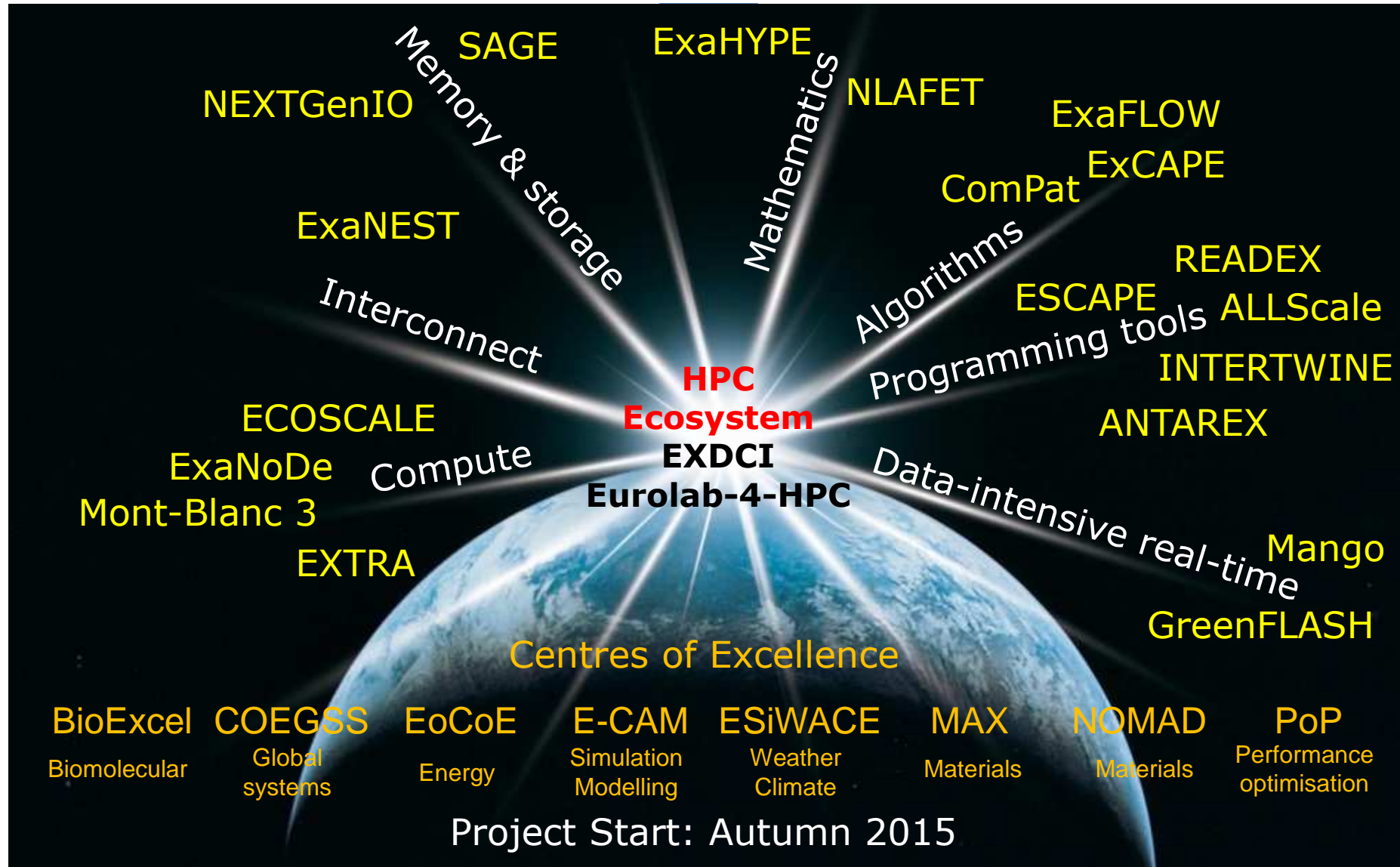
Horizon 2020 Calls 2014-2017



The new European HPC research landscape



European Commission



World-wide HPC revenue (IDC) 15.5B\$ by 2019

WW High-Performance Systems Revenue by Verticals/Application Areas

	2015	2019	CAGR 14-19
Bio-Sciences	1,097,523	1,378,060	4.0%
CAE	1,307,487	1,726,271	8.1%
Chemical Engineering	185,023	220,766	6.8%
DCC & Distribution	705,349	871,773	6.6%
Economics/Financial	618,333	850,892	19.9%
EDA / IT / ISV	812,235	1,100,507	11.2%
Geosciences	843,387	1,149,844	10.4%
Mechanical Design	61,460	64,136	4.2%
Defense	1,147,661	1,559,968	10.0%
Government Lab	1,995,262	3,018,993	8.2%
University/Academic	2,056,107	2,759,222	8.6%
Weather	496,854	626,445	6.4%
Other	95,495	142,916	8.2%
Total Revenue	11,434,185	15,469,792	8.6%



European Commission President
Jean-Claude Juncker

"Notre ambition c'est que d'ici 2020, l'Europe se classe dans le top 3 mondial du calcul à haute performance."

"Our ambition is that by 2020, Europe is in the world top 3 of high performance computing."

27 October 2015





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Thank You!

