
EUROPEAN TECHNOLOGY PLATFORM FOR HIGH PERFORMANCE COMPUTING

# EUROPEAN HPC 2018

## (Update from the Point of View of ETP4HPC)

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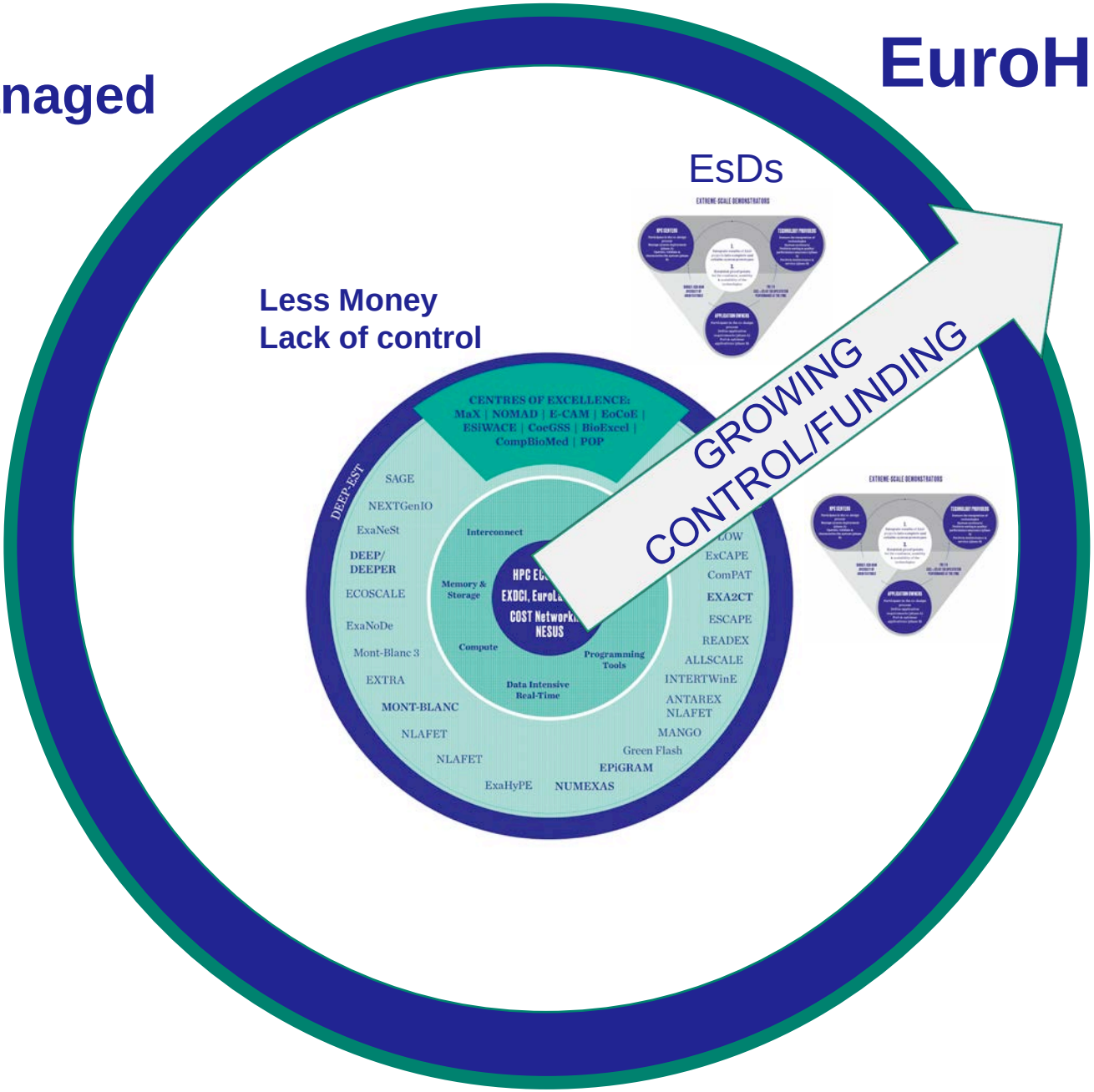
# Big Money
# Project Managed

# EuroHPC JU



# What you should know by the end of this talk:

- Motivation and Context – HPC Ecosystem & Horizon 2020 (H2020)
- ETP4HPC
- Strategic Research Agenda (SRA)
- EuroHPC Joint Undertaking (courtesy of EC)

HIGH PERFORMANCE COMPUTING FOR EUROPE

ETP 4 HPC

# MOTIVATION AND CONTEXT HPC ECOSYSTEM & H2020

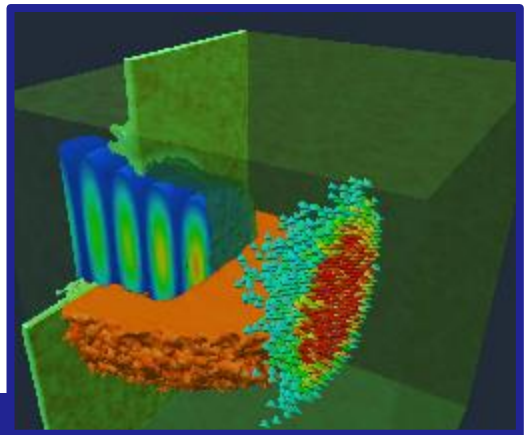
What we do

# High-Performance Computing (HPC)

## An essential tool for Science, Society and Industry

Supercomputers

A strategic driver



Simulations

Data analytics
Big data processing
Machine Learning and AI

Prototyping

Societal Challenges

New Technologies

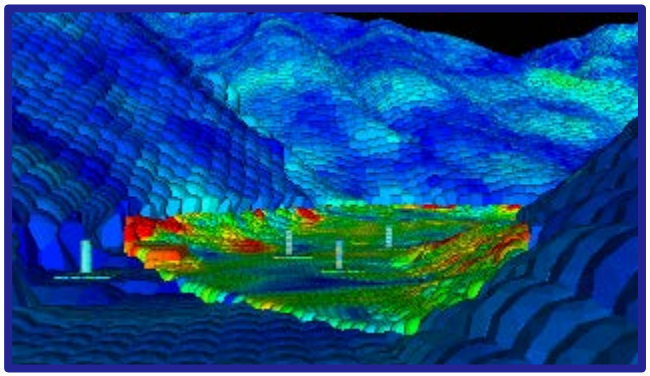
Big Data

Breaking the limits

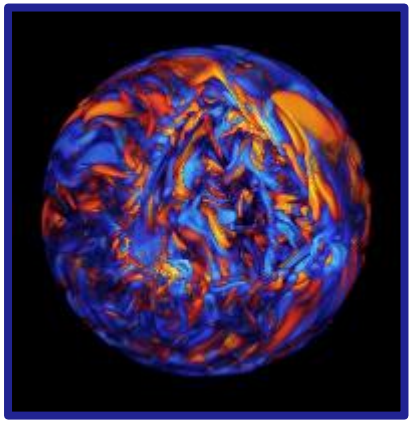
ETP 4 HPC — European Technology Platform for High Performance Computing

# HPC : An enabler for all scientific and industrial fields

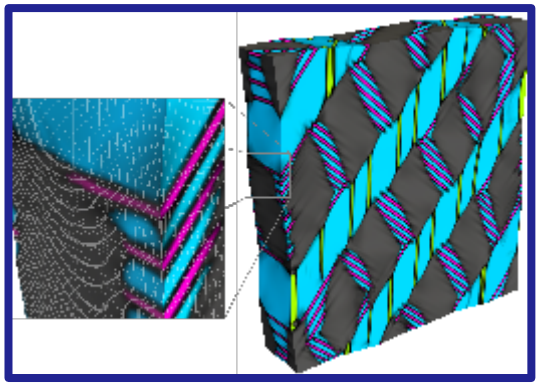
Life Sciences & Medicine



Earth Sciences



Astro, High Energy & Plasma Physics



Materials, Chemistry & Nanoscience

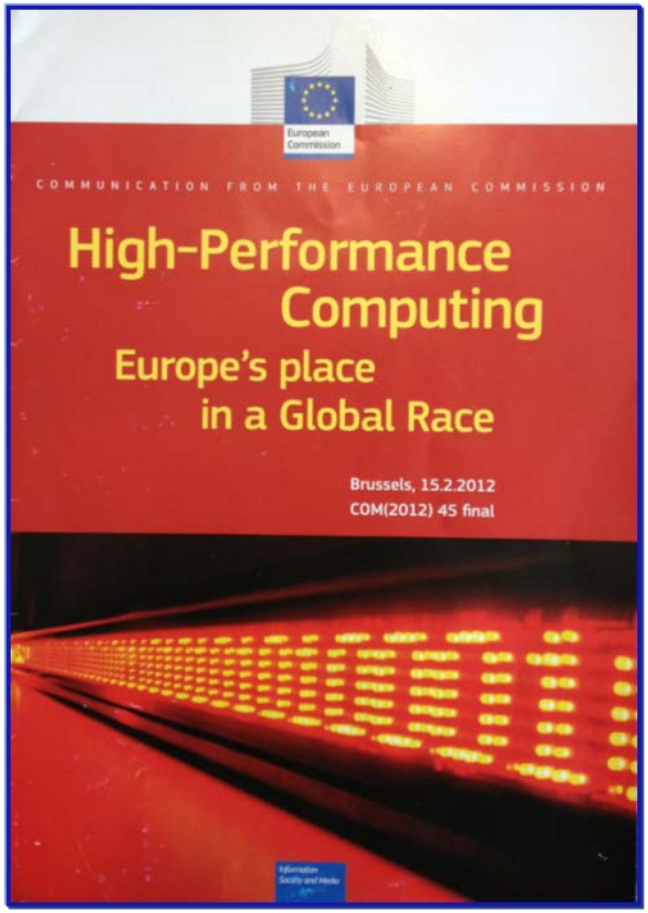
Engineering

- Advances leading to:
  - Improved Healthcare
  - Better Climate Forecasting
  - Superior Materials
  - Sustainable Energy
  - More Competitive Industry
  - …

# KEY DOCUMENT:
# 2012 EC COMMUNICATION

EU needs independent access to HPC technologies, systems and services

=> ETP4HPC created end of 2012 to contribute to this objective



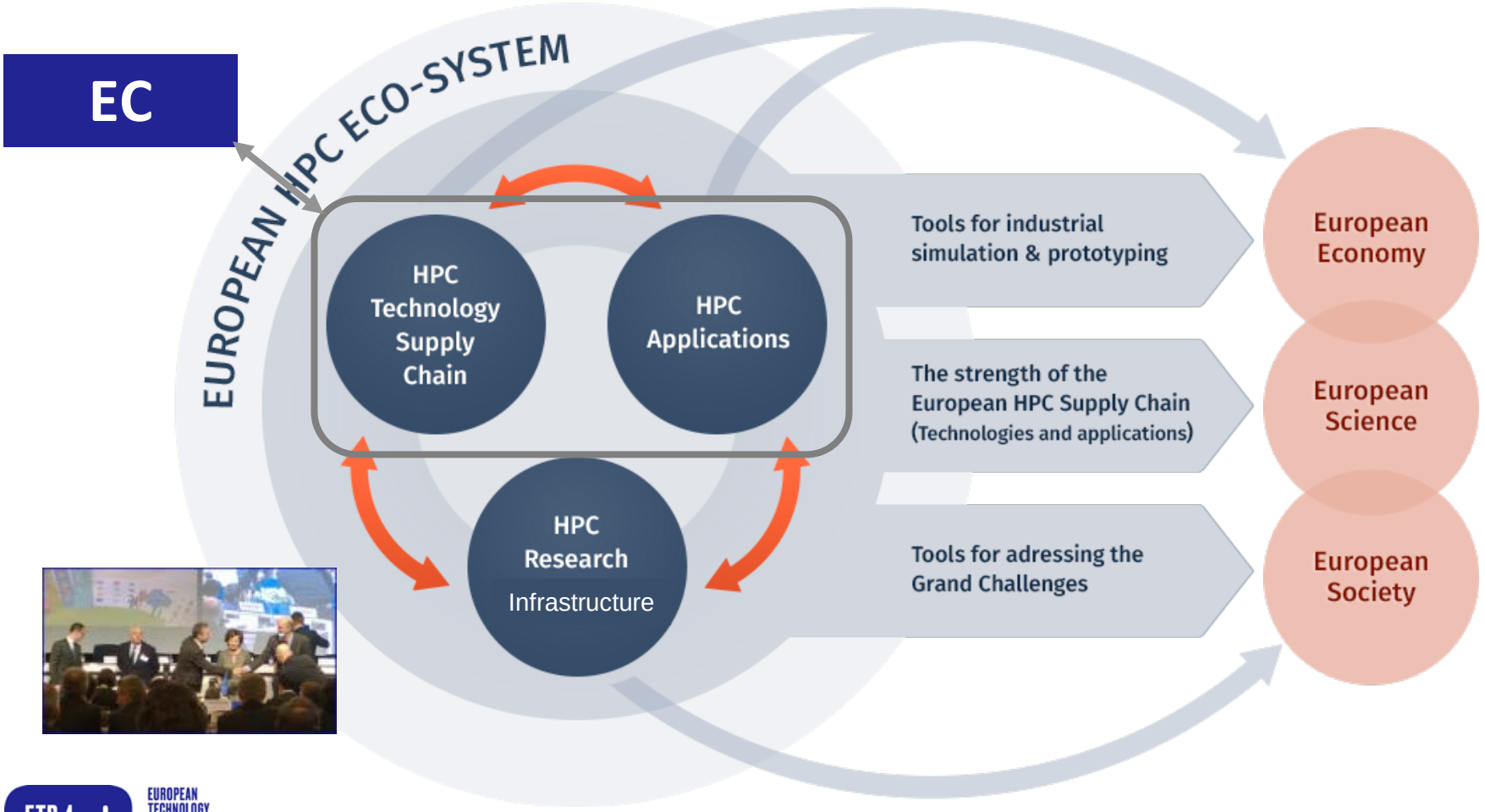
# WHY DO WE NEED TO ACT NOW?

EU **consumes** 33% of global HPC resources

But **supplies** less than 5% of them

# EUROPEAN HPC ECO-SYSTEM

**The contractual Public-Private Partnership covers two pillars of the European HPC eco-system: technology provision and application expertise**



# The Objectives and Principles of cPPP

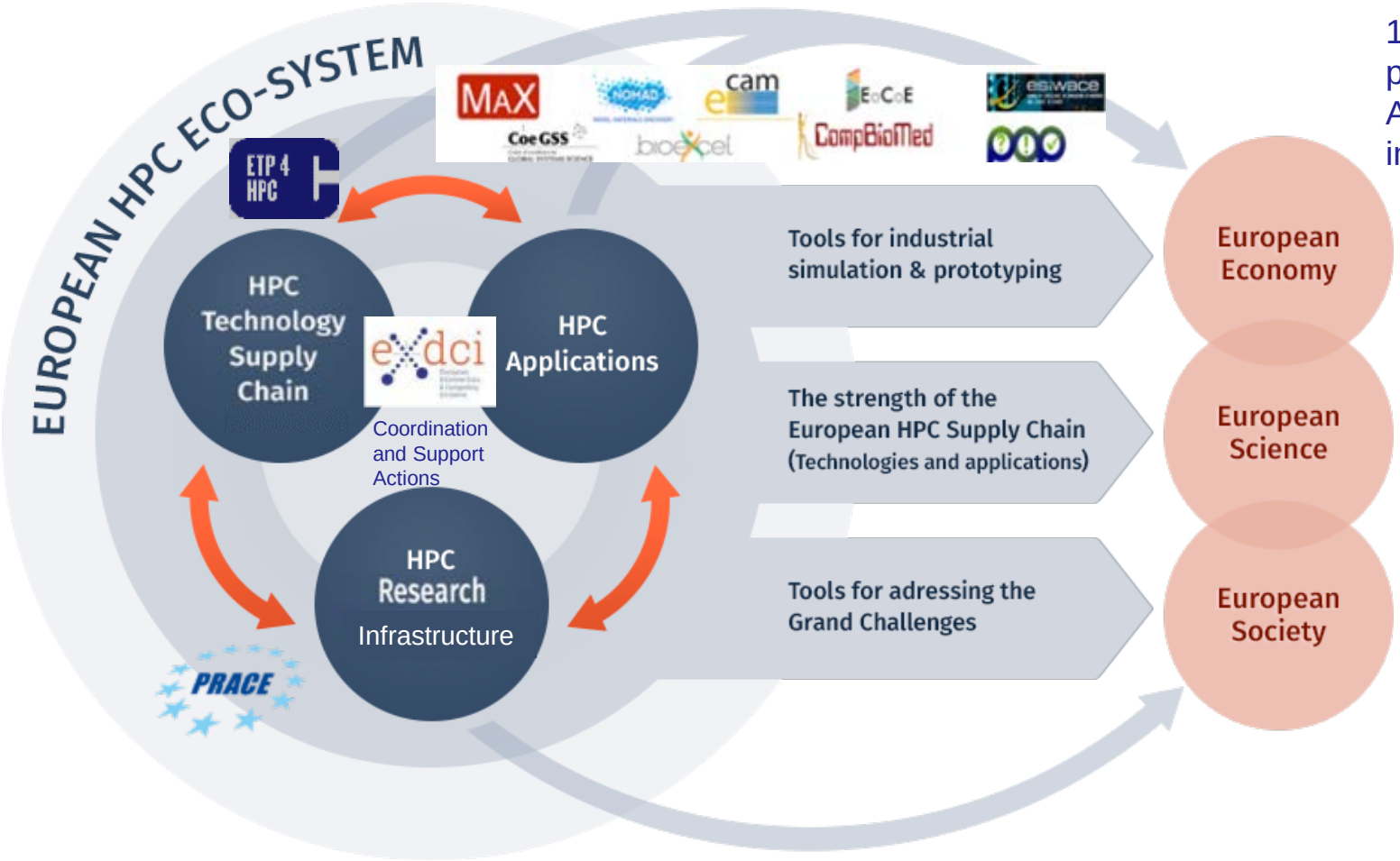
Development of the next generation of HPC technologies, applications and systems towards Exascale and pervasive use

Excellence in HPC applications delivery and use

Training, education and skills development

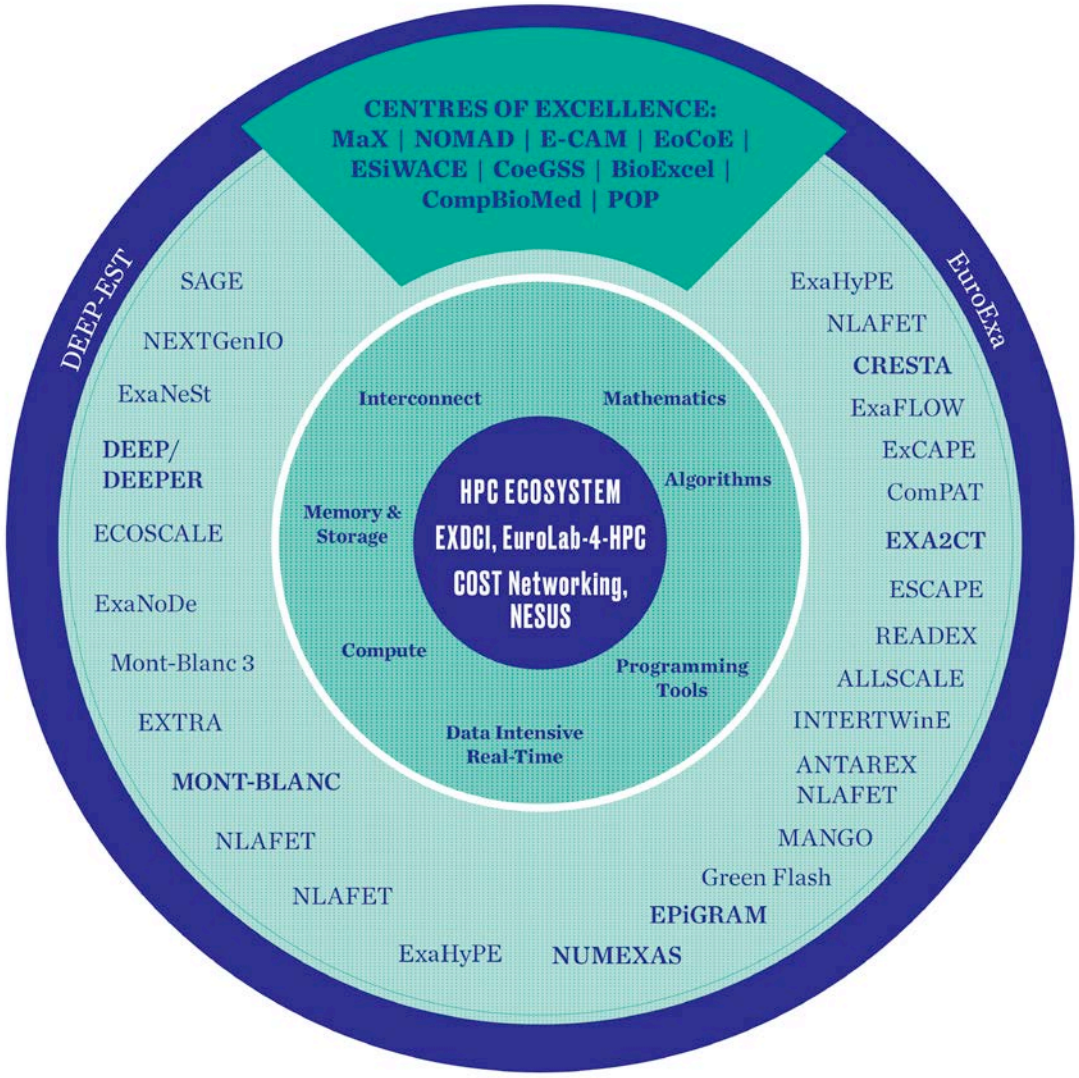
- Structured dialogue
- Commitment from private partners to match EC funding
- Joint progress and impact monitoring

# EUROPEAN HPC ECOSYSTEM




19 FETHPC projects running
And more coming in 2017-2020

# THE CURRENT EUROPEAN HPC PROJECT LANDSCAPE



# APRIL 2016: NEW EC COMMUNICATION(S)

« European Cloud Initiative – Building a competitive data and knowledge economy in Europe »

- Directions :
  - European Open Science Cloud
  - European Data Infrastructure
  - Widening access and building trust

**Looking forward …**

EC European Open Science Cloud and European Data Infrastructure announcements of April 2016 acknowledge and confirm the importance of HPC

- Scientific but also industrial and societal stakes
- Wider scope of Digital Single Market and Digitising European Industry

http://europa.eu/rapid/press-release_IP-16-1408_en.htm


# ETP4HPC

What we do

# Key Activities

- Foster growth of HPC technology Research and Development in Europe
- Advise EC through cPPP
- Define Strategic Research Agenda (SRA)
- Propose H2020 Work Program contents
- Monitor ecosystem development

# ETP4HPC

## Established in 2011

## Officially a Dutch Association since December 2012

**90 Members**
(as of May 2018)

- 56 Full
- 34 Associated

- 49 Private
- 32 SMEs

- 17 Larger companies
- 38 Research organisations


HIGH PERFORMANCE COMPUTING FOR EUROPE

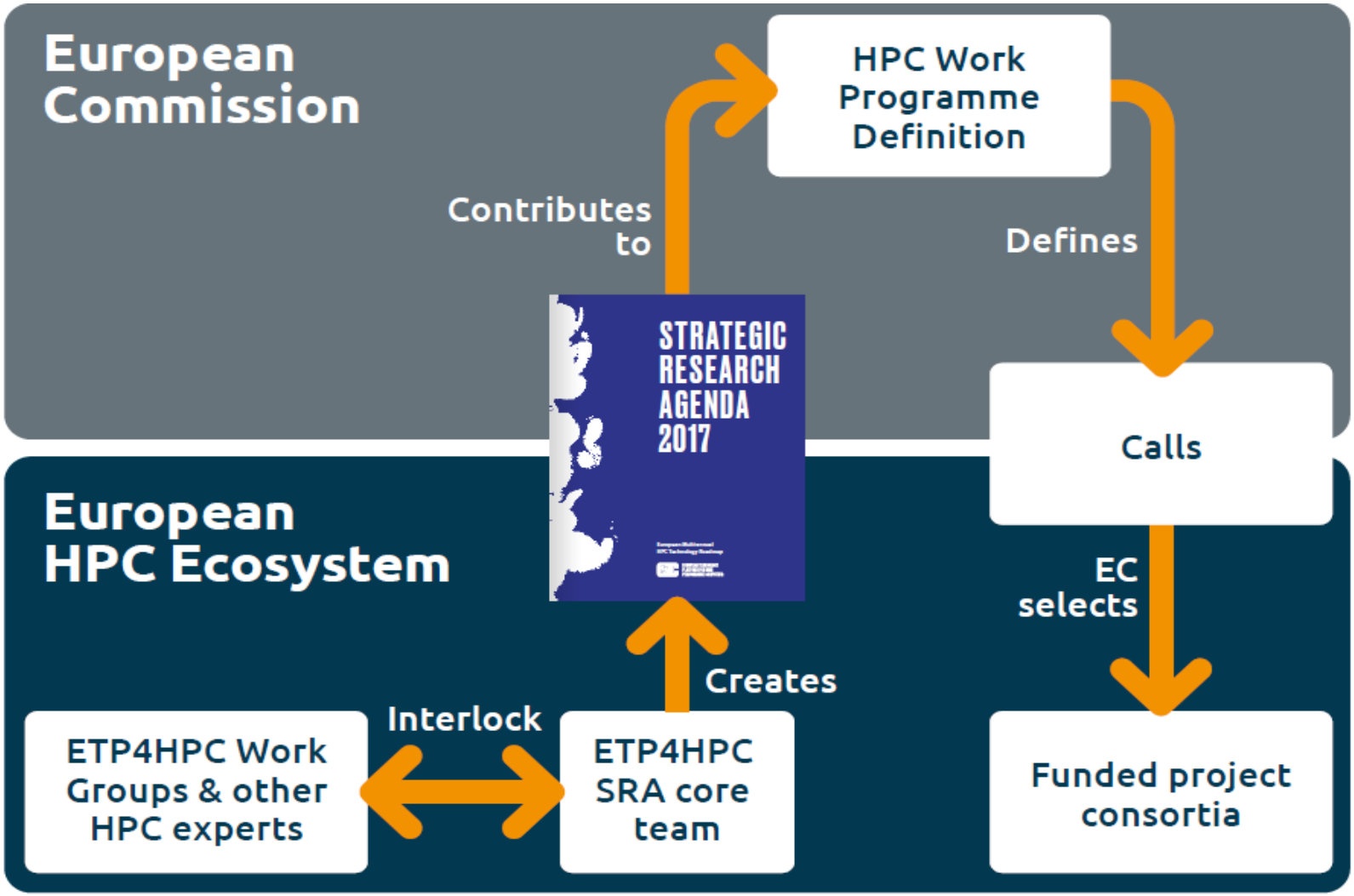
ETP 4 HPC

# STRATEGIC RESEARCH AGENDA (SRA)

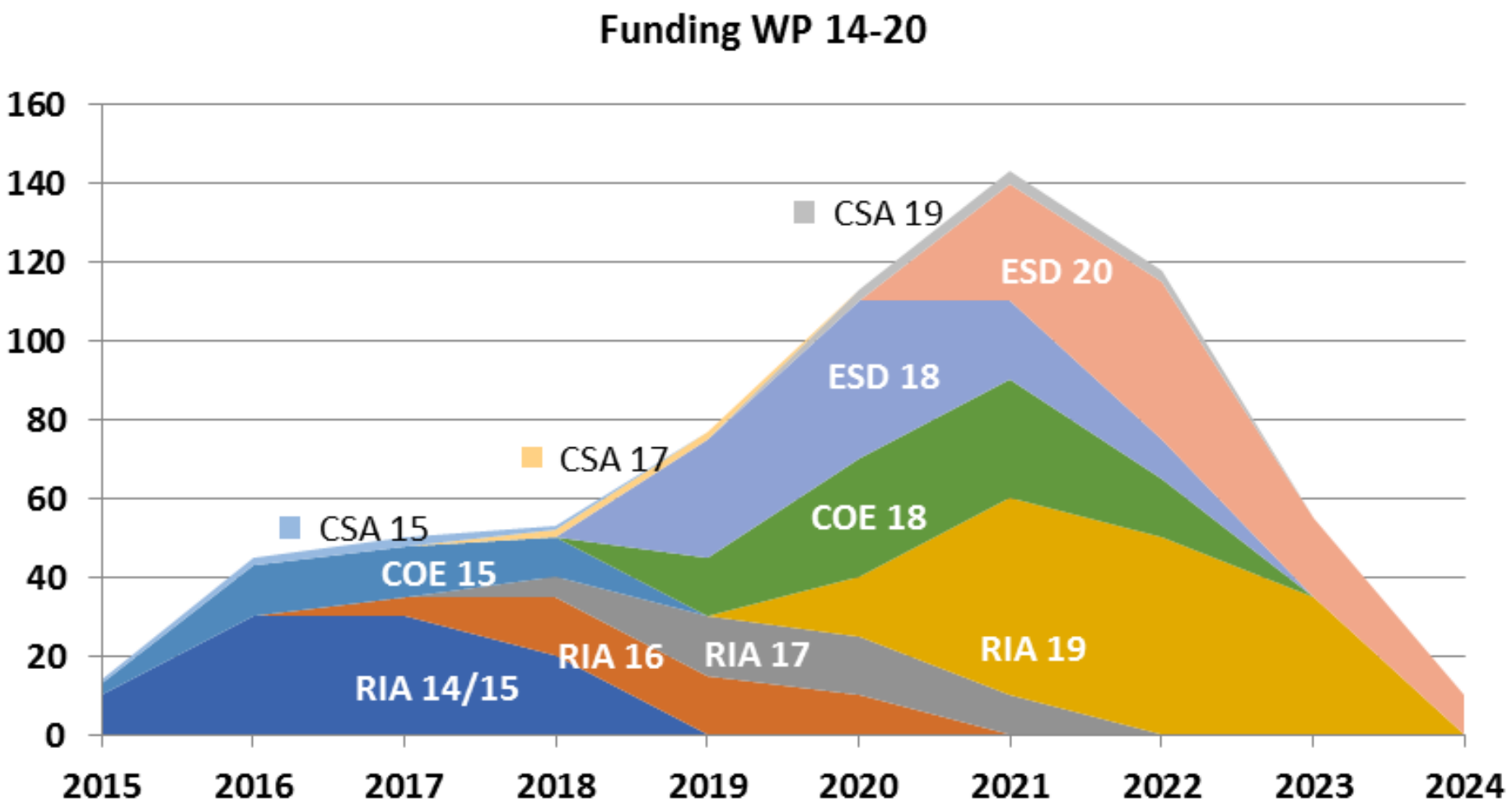
Our Multi-Annual HPC Technology Roadmap

**www.etp4hpc.eu/sra**

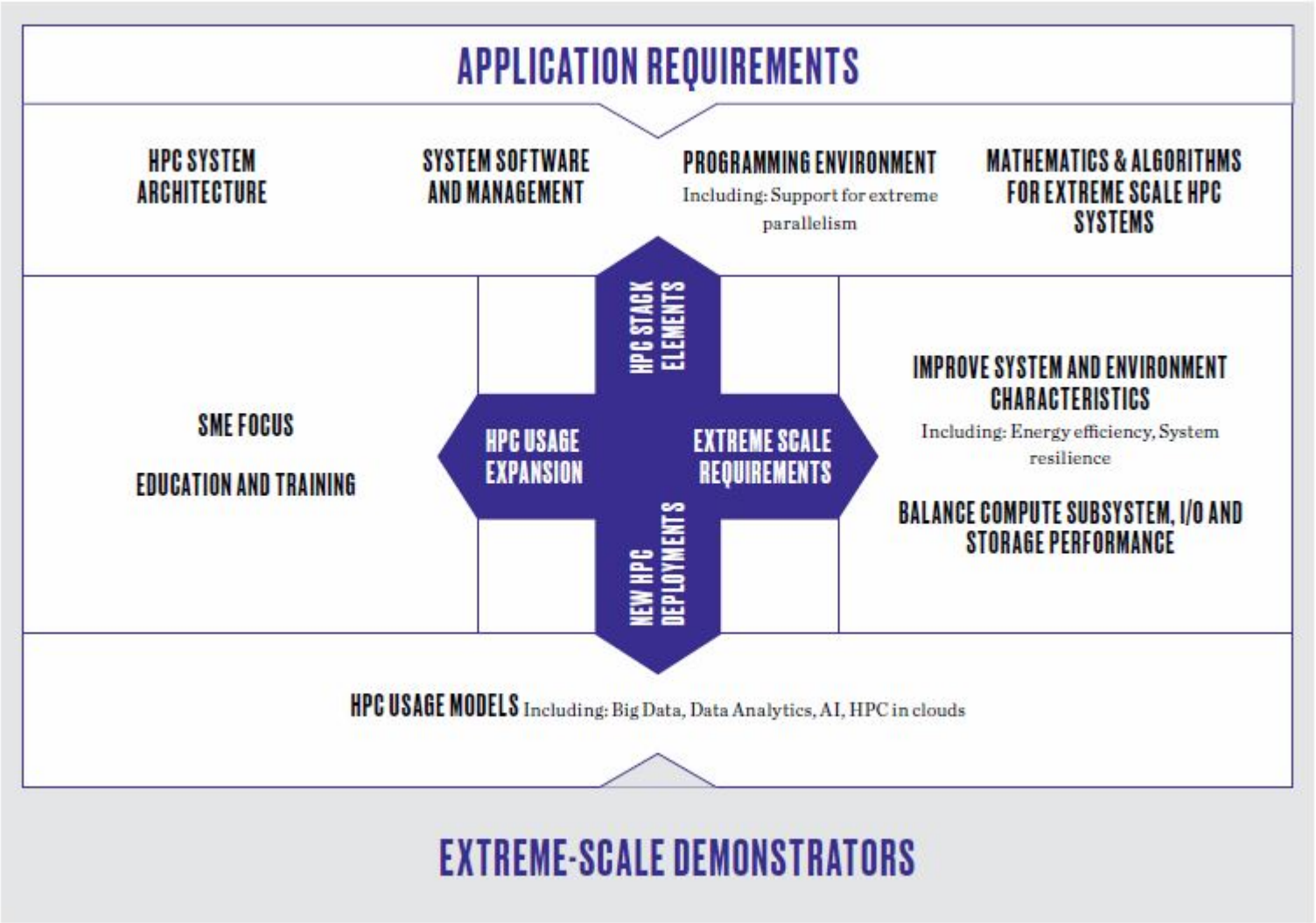
# SRA's Role: Research Priorities



# H2020 HPC Work Programme – Duration/Values (Euro Ms)



# MULTI-DIMENSIONAL SRA HPC MODEL



# INPUT SOURCES FOR THE SRA 3

- **Material sciences:** Materials design at the eXascale
- **Material sciences:** The Novel Materials Discovery Laboratory
- **Material sciences:** An e-infrastructure for software, training and consultancy in simulation and modelling
- **Energy:** Energy oriented Centre of Excellence for computer applications
- **Climate:** Excellence in Simulation of Weather and Climate in Europe
- **Global Systems Science:** Center of Excellence for Global Systems Science
- **Bioscience:** Centre of Excellence for Biomolecular Research
- **Biomedicine:** A Centre of Excellence in Computational Biomedicine
- **Performance:** Performance Optimisation and Productivity

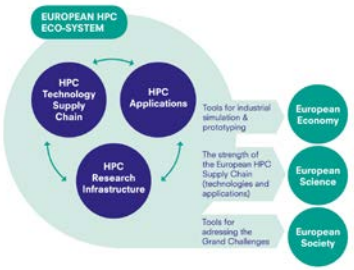
Application Requirements
Science: CoEs/PRACE Applications
Industry
Big Data (BDVA)
BDEC / HiPEAC

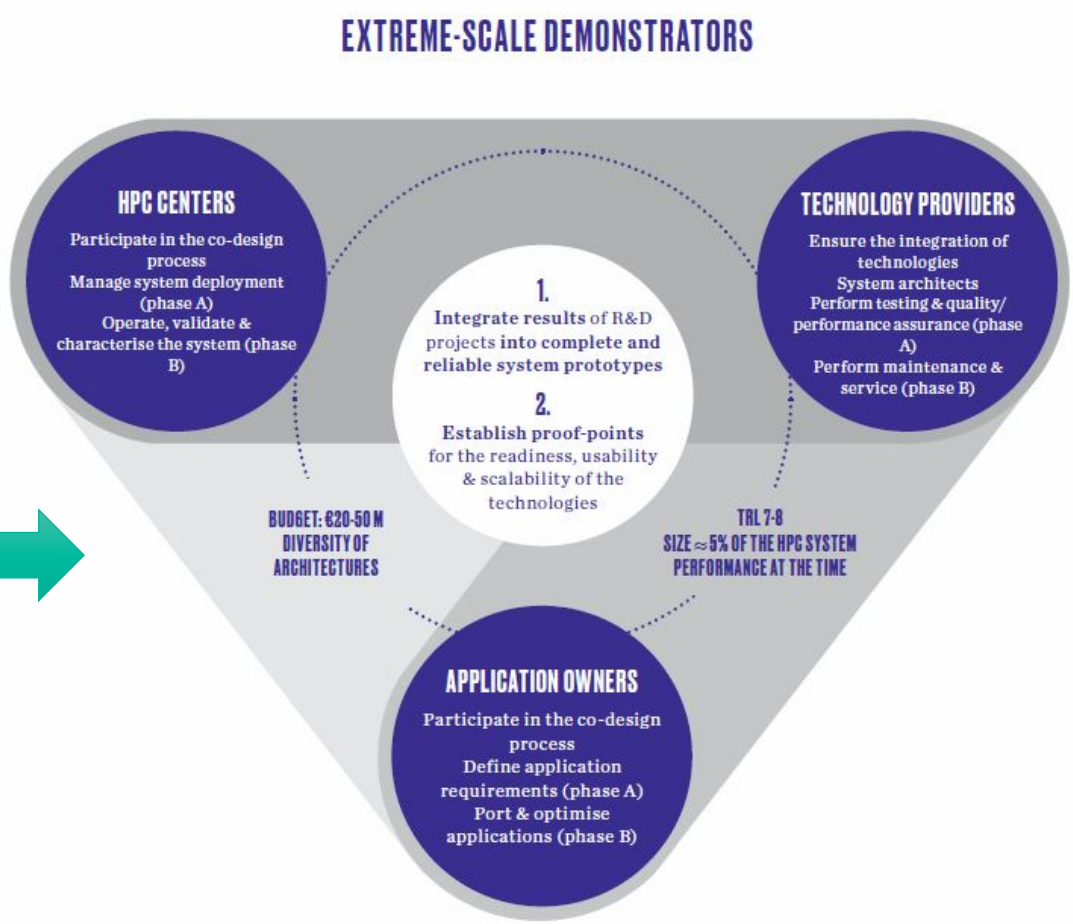

HiPEAC COMPILATION ARCHITECTURE

BDEC BIG DATA AND EXTREME-SCALE COMPUTING

BDV BIG DATA VALUE ASSOCIATION

# EXTREME-SCALE DEMONSTRATORS



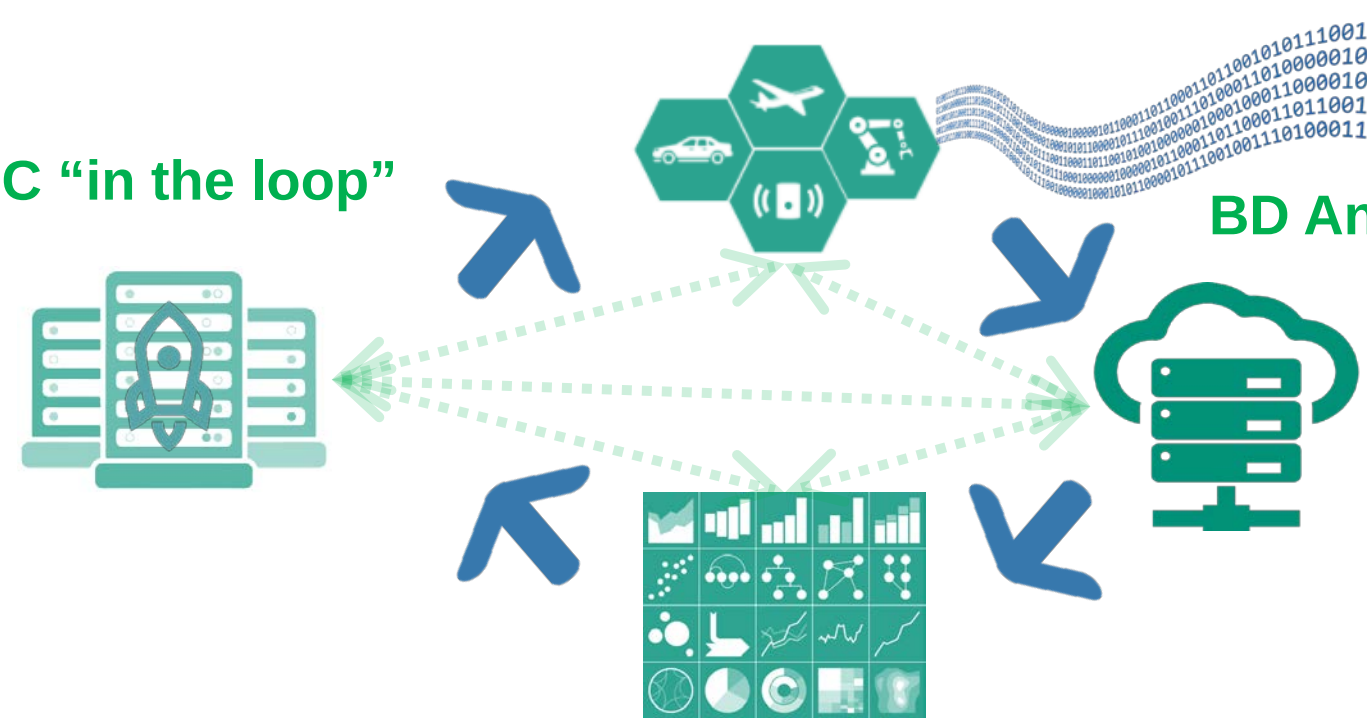
# POST H2020 VISION: WHERE TO GO NEXT?



IoT / CPS / Edge /…

HPC “in the loop”

BD Analytics @Edge



Storage & Curation @Cloud

BD Analytics @Cloud


# EuroHPC Joint Undertaking

**Courtesy of Gustav Kalbe**

**Head of Unit, High Performance Computing & Quantum Technologies**

**DG CONNECT, European Commission**

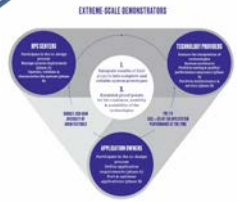
# Big Money
# Project Managed

## EuroHPC JU

EsDs

Less Money
Lack of control


GROWING CONTROL/FUNDING



# HPC status in Europe today

EU has no top ranked supercomputers and depends on non-EU technology

Demand is not met

Weak EU supply chain

Weak integration of EU technology in HPC machines

HPC strategy implementation by EC is inefficient

Insufficient coordination of national investments

Funding Gap wrt USA, JP, CN

# What is the starting point?

PRACE

Tier-0 ➔ access to HPC infrastructure, training, applications, support services

GÉANT

Provides the high-bandwidth connectivity between the users and the supercomputers

HORIZON 2020

R&D&I Programme ➔ fundamental science, technology development, infrastructure, applications, support services

ETP 4 HPC — EUROPEAN TECHNOLOGY PLATFORM FOR HIGH PERFORMANCE COMPUTING

HPC cPPP ➔ SRA, community building

BDV BIG DATA VALUE ASSOCIATION

Data intensive applications, new business cases

# A new Instrument
# The main Specifications

**EuroHPC Instrument**

**Pooling funds**

**Safeguard EU interests**

**Joint public Procurement**


**Open to Private Partners**

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**Open to new MS/AC Partners**

**Research & Innovation**

# Towards the world top HPC powers: EuroHPC Joint Undertaking

**Co-invest on a leading HPC and data infrastructure**
for our scientists, industry and the public sector and support the development of technologies and applications across a wide range of fields

- **Coordinate EC/MS activities**
- **Pool public and private resources at EU level**
- **Procure world-class infrastructure**
- **Close the chain from R&D to procurement**
- **Become lead Users**
- **Create a competitive supply industry**
- **Lead in Applications**

**A world-class European HPC, Big Data and Cloud Ecosystem**

# The EuroHPC JU
# A two-phase Approach

**Phase 1: 2019-2020 (Present EU Financial Framework)**

**[Pillar 1]** Pre-exascale machines and petascale machines

**[Pillar 2]** Applications; technologies for exascale

High Performance Computing (HPC)

**Phase 2: 2021-2028 (Next EU Financial Framework)?**

**[Pillar 1]** Exascale and post-exascale machines + first hybrid HPC / Quantum Computing infrastructures

**[Pillar 2]** Applications; technologies for post-exascale

# EuroHPC JU in a nutshell

High Performance Computing (HPC)

- Follows underlying model of JUs (legal base, reporting, establishment, staff issues, auditing, …)
- Tripartite partnership: EC + Participating States + Private Members
- Implements H2020 + Connecting Europe Facility
- Infrastructure Acquisition AND R&I activities
- Open to in-kind contributions by MS
- Governance adapted to the EuroHPC objectives
- Participating countries entrust JU with their financial contributions
- JU running costs shared → EC, Participating States, Private Members
- Seat = Luxembourg

# The EuroHPC JU
# Governance

**Intelligence gathering** → **Decision making & Advice** → **Implementation**

## Stakeholders
[academia, industry]

**(a) Users forum**
- Science Users
- Users of PRACE and HPC Centres of Excellence
- Industry Users

**(b) Technology forum**
- PRACE, GEANT
- Tier-0 supercomputing centres
- Industry (ETP4HPC, BDVA PPP, etc.)

## Governing Board
**Public Members**

The decision making Board

## Industrial and Scientific Advisory Board

**Research & Innovation Advisory Group**
[academia & industry advising on Pillar 2 activities]

**Infrastructure Advisory Group**
[academia & user industry advising on Pillar 1 activities]

**R&I activities**

JU funded

**HPC machines**

ETP4HPC

BDV BIG DATA VALUE ASSOCIATION

**Member State-funded activities**

**PRACE activities**

**IPCEI activities**

**…**

# Next Steps

## JU establishment

1. **JU Start Date: 1.1.2019**
2. **Council negotiations**
   - Agreement by end May'18
   - Adoption: Austrian Presidency (September?)
3. **Sherpa meetings**
   - 20 March, 20 April, 15 May, 19 June
4. **Working Groups**
   - "In-kind contributions" 19 March
   - "HPC & SMEs" 20 March
5. **Transitional phase**: Q3 2018 – Q4 2019 (?)

## EuroHPC Sherpa's Body

**Work with Sherpa's for defining the EuroHPC JU 2019-2020 activities, the calls for proposals and the MS budget contributions**

Images courtesy of BSC, CEA, Fraunhofer and JSC

"Building a globally competitive European world-class HPC technology value chain"

ETP4HPC

# THANK YOU FOR YOUR ATTENTION!

For more information:
www.etp4hpc.eu ■ contact: office@etp4hpc.eu

HPC strategy, work programmes and HPC related news:
ec.europa.eu/horizon2020-hpc