ETP4HPC standard presentation
Building a globally competitive European world-class HPC technology value chain
What you should know by the end of this talk:

- Motivation and Context – HPC Ecosystem & Horizon 2020 (H2020)
- ETP4HPC
- Strategic Research Agenda (SRA)
- Other Activities
Motivation and context
HPC ecosystem & H2020
What we do
High-Performance Computing (HPC)
An essential tool for Science, Society and Industry
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An essential tool for Science, Society and Industry

Supercomputers: essential tools for powering numerical simulation, data analytics and big data processing, machine learning and AI

HPC
From leading edge to pervasive computing

A strategic driver to push advanced computing beyond its limits from core technologies to usage
HPC: An enabler for all scientific fields

An essential tool for Science, Society and Industry

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

Europe consumes 29% of global HPC resources

However, supplies less than 5% of them

Source: impact assessment accompanying the proposal and the 2016 Commission document on the implementation of the European HPC strategy.
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
How does cPPP work?

- Centres of Excellence joined in 2015 (‘private’ side = ETP4HPC + CoEs)
- Partnership Boards twice a year
- Private side provides input to define H2020 HPC programmes which are funded and operated by the EC
- Collaboration with PRACE, BDVA/Big Data PPP HiPEAC, Eurolab4HPC…
cPPP Implementation

● Calls 2015+2016: 172 M€ allocated
  – 21 FETHPC Projects (94.6 M€ + 35 M€) + 2 CSAs (4 M€)
  – 9 CoEs (42.4 M€)

● Calls 2017 and 2018
  – 10 new FETHPC projects (Sage2, MAESTRO, EPEEC, EXA2PRO, RECIPE, ASPIDE, VECMA, VESTEC, ExaQUte, ESCAPE-2)
  – Renewal of the 2 CSAs (EXDCI and Eurolab4HPC)
  – New call for CoEs (72 M€) + 1 FocusCoE (2 M€)

● cPPP-related calls on Low-power microprocessor technologies in ICT: (80 M€)
European HPC Ecosystem

Approx. 21 FETHPC projects and 9 CoEs running

And more coming in 2018 - 2020
The current European HPC technology landscape

HPC ECOSYSTEM
EXDCI, EuroLab-4-HPC
COST Networking, NEUS

CENTRES OF EXCELLENCE:
- MaX
- NOMAD
- E-CAM
- EvoCoE
- ESIWACE
- CoeGSS
- BioExcel
- CompBioMed
- POP

DEEP/DEEPER
- SAGE
- NEXTGenIO
- ExaNeSt
- ECOSCALE
- ExaNoDe
- Mont-Blanc 3
- EXTRA

MONT-BLANC
- NLAfET
- NLAfET
- ExaHyPE

Memory & Storage
Interconnect
Compute
Data Intensive
Real-Time

Programming Tools
Mathematics
Algorithms

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24/08/2018
Excellence in HPC applications (Centres of Excellence)

- **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
PRACE and Infrastructures

- Mission: enabling high impact scientific discovery and engineering research and development across all disciplines to enhance European competitiveness for the benefit of society.
- Realisation: Through offering world class computing and data management resources and services through a peer review process.
- Manage: Access to 7 world-class HPC systems with a total capability of more than 50 pflop/s.
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

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 Organisation

ETP4HPC’s Members

External contributors

Working Groups

Full Members

Steering Board
15 members

Office
ETP4HPC
Established in 2011
Officially a Dutch Association since December 2012

91 members
(as of July 2018)

- 56 full
- 35 associated
- 51 private
- 34 SMEs
- 17 larger companies
- 37 research organisations
Strategic Research Agenda (SRA)
Our Multi-Annual HPC Technology Roadmap

www.etp4hpc.eu/sra
The role of the SRA: research priorities

European Commission

Contributes to

HPC Work Programme Definition

European HPC Ecosystem

Creates

ETP4HPC Work Groups & other HPC experts

Interlock

ETP4HPC SRA core team

Defines

Calls

EC selects

Funded project consortia
SRA in Horizon 2020 Timeline

WP14/15 Call Deadline and Projects
WP16 Call
WP17 Call
WP18-20 Calls

*Call Deadline to Project Start = 10-12 months

SRA 1
SRA 2
SRA 3

CSA 14/15
CSA 16/17
CSA 18-20

SRA Published 2013, 2015 & 2017

Call Open
Call Open
SRA Contents – more than…

● Not only hardware…
  – Software stack, programming environments, tools, algorithms
  – Delivery modes

● Not only technology…
  – Link with applications, co-design; services; training; innovation and SME support…

● Not only compute intensive…
  – Data intensive as well
  – Balanced architectures

● Not only extreme scale…
  – Affordability, ease of use
  – Pervasiveness at all scales
  – New uses
Multi-Dimensional SRA HPC Model

APPLICATION REQUIREMENT

HPC SYSTEM ARCHITECTURE
SYSTEM SOFTWARE AND MANAGEMENT
PROGRAMMING ENVIRONMENT Including: Support for extreme parallelism
MATHEMATICS & ALGORITHMS FOR EXTREME SCALE HPC SYSTEMS

HPC STACK ELEMENTS
HPC USAGE EXPANSION
EXTREME SCALE REQUIREMENTS
NEW HPC DEPLOYMENTS

HPC USAGE MODELS Including: Big data, Data Analytics, AI, HPC in clouds

SME FOCUS
EDUCATION AND TRAINING

IMPROVE SYSTEM AND ENVIRONMENT CHARACTERISTICS Including: Energy efficiency, System resilience
BALANCE COMPUTE SUBSYSTEM, I/O AND STORAGE PERFORMANCE

Input related to Centres of Excellence (CoEs) in Computing Applications

Extreme-scale Demonstrators (EsD) concept in WP18-20
How do we write an SRA?

- 8 topical ETP4HPC Working Groups reflecting the Dimensions: 150 to 200 experts
- Workshops and Conference Calls
- Recognised external sources
- SWOT Analysis to identify general strategy
- Collaboration with PRACE, BDVA, HiPEAC & Eurolab4HPC, Industrial End-Users, ISVs and external experts
Extreme-Scale Demonstrators

**EXTREME-SCALE DEMONSTRATORS**

**TECHNOLOGY PROVIDERS**
- Ensure the integration of technologies
- Perform testing & quality/ performance assurance
- Perform maintenance & service

**APPLICATION OWNERS**
- Define application requirements
- Port & optimise applications

**HP C CENTERS**
- Participate in the co-design process
- Manage system deployment
- Operate, validate & characterise the system

1. Integrate results of R&D projects into fully integrated system prototypes
2. Establish proof-points for the readiness, usability & scalability of the technologies

TRL 7-8
- 6% of the HPC system performance at the time
Other ETP4HPC Activities

What else do we do?
Other Working Groups & Activities

- IP&E & Education and training reports
- SME Working Group
- HPC Software WG
- Energy Efficiency WG
- EXDCI – one of the two partners
- ISC: booth, workshops and other events
Our annual BoF at SuperComputing (SC)

Promoting European HPC Technology and Application projects and supporting their international collaboration
EXDCI Coordination and Support Action

European eXtreme Computing and Data Initiative
- Managed by PRACE and ETP4HPC (PRACE = coordinator; started in Sept 2015)

The EU HPC Ecosystem Booster!

Supporting:
- roadmaps: technical (SRA), scientific cases
- cross cutting topics: technical topics, training, SMEs
- international cooperation
- impact assessment
- HPC Summit Week
THANKS!

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