EUROPEAN HPC 2018

(Update from the Point of View of ETP4HPC)

Marcin Ostasz, ETP4HPC Office
Big Money Project Managed

Less Money Lack of control

GROWING CONTROL/FUNDING

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)
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
Breaking the limits

Big Data
HPC: An enabler for all scientific and industrial fields

- 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?

EU *consumes* 33% of global HPC resources

But *supplies* less than 5% of them
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

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

Excellence in HPC applications delivery and use

Training, education and skills development
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
90 Members
(as of May 2018)

- 56 Full
- 34 Associated
- 49 Private
- 32 SMEs
- 17 Larger companies
- 38 Research organisations

ETP4HPC
Established in 2011
Officially a Dutch Association since December 2012
STRATEGIC RESEARCH AGENDA (SRA)

Our Multi-Annual HPC Technology Roadmap

www.etp4hpc.eu/sra
SRA’s Role: Research Priorities

European Commission

Contributes to

HPC Work Programme Definition

 Defines

Calls

EC selects

Funded project consortia

European HPC Ecosystem

Interlock

ETP4HPC Work Groups & other HPC experts

ETP4HPC SRA core team

Strategic Research Agenda 2017
MULTI-DIMENSIONAL SRA HPC MODEL

APPLICATION REQUIREMENTS

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

HPC STACK ELEMENTS

- SME FOCUS
- EDUCATION AND TRAINING
- HPC USAGE EXPANSION
- EXTREME SCALE REQUIREMENTS
- NEW HPC DEPLOYMENTS

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

IMPROVE SYSTEM AND ENVIRONMENT CHARACTERISTICS
- Including: Energy efficiency, System resilience

BALANCE COMPUTE SUBSYSTEM, I/O AND STORAGE PERFORMANCE

EXTREME-SCALE DEMONSTRATORS

14 May 2018 eIRG Workshop – May 2018
INPUT SOURCES FOR THE SRA 3

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

HPC CENTERS
- Participate in the co-design process
- Manage system deployment (phase A)
- Operate, validate & characterise the system (phase B)

TECHNOLOGY PROVIDERS
- Ensure the integration of technologies
- System architects
- Perform testing & quality/performance assurance (phase A)
- Perform maintenance & service (phase B)

APPLICATION OWNERS
- Participate in the co-design process
- Define application requirements (phase A)
- Port & optimise applications (phase B)

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

BUDGET: €20-50M
DIVERSITY OF ARCHITECTURES

TIL T-9
SIZE = 5% OF THE HPC SYSTEM PERFORMANCE AT THE TIME

ETP 4 HPC
EUROPEAN TECHNOLOGY PLATFORM FOR HIGH PERFORMANCE COMPUTING

14 May 2018 e-IRG Workshop – May 2018
POST H2020 VISION: WHERE TO GO NEXT?

14 May 2018

HPC “in the loop”

BD Analytics @Edge

Storage & Curation @Cloud

BD Analytics @Cloud

IoT / CPS / Edge /…

eIRG Workshop – May 2018
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

Less Money Lack of control
HPC status in Europe today

- EU has no top ranked supercomputers and depends on non-EU technology
- Funding Gap wrt USA, JP, CN
- Insufficient coordination of national investments
- Weak EU supply chain
  Weak integration of EU technology in HPC machines
- HPC strategy implementation by EC is inefficient
- Demand is not met
What is the starting point?

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

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

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

HPC cPPP ➔ SRA, community building

Data intensive applications, new business cases
A new Instrument
The main Specifications

- Safeguard EU interests
- Pooling funds
- Joint public Procurement
- Open to Private Partners
- Open to new MS/AC Partners
- Research & Innovation

EuroHPC Instrument

Safeguard EU interests
Joint public Procurement
Open to Private Partners
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

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
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**

**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]

**Decision making & Advice**

**Implementation**

- **R&I activities**
- **JU funded**
- **HPC machines**
- **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
"Building a globally competitive European world-class HPC technology value chain"

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