A picture of the European HPC ecosystem
EXDCI WP7 - Impact monitoring methods and tools

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Outline

- European HPC ecosystem
- HPC contractual Public Private Partnership
  - ‘Monitoring’ activity - Mid-term review
- EXDCI support to impact assessment
  - Methodology - A few highlights from 2017 findings
EUROPEAN HPC ECOSYSTEM
Value Chain Vision: common understanding
EU global strategy: important dates

- 2010 PRACE
- 2012 Communication on HPC
  A first version of a global policy and programme;
  creation of ETP4HPC
- 2014 Entry in force of HPC cPPP
- 2015 FETHPC and CoEs first projects (+ 2 CSA)
- 2016 New EC communications
  Updated / widened vision of HPC / Digital
  transformation of research and industry
- 2017 EuroHPC declaration and implementation
  preparation
EUROPEAN HPC ECO-SYSTEM

HPC Technology Supply Chain

HPC Applications

HPC Research Infrastructure

Tools for industrial simulation & prototyping

The strength of the European HPC Supply Chain (technologies and applications)

Tools for addressing the Grand Challenges

European Economy

European Science

European Society
Now 85 ETP4HPC members
- 40 Private
- 30 SMEs
- 12 Larger companies
- 37 Research organisations

EXDCI now connects a representative set of the different categories of stakeholders
A rich and open ecosystem with international collaborations and links (e.g. via BDEC)
A map of the ecosystem

as connected by EXDCI related activities (in orange, larger node)
EXDCI F. Bodin et al.
A map of the ecosystem

Entities directly involved in EXDCI related activities
EXDCI F. Bodin et al.
Stakeholders involvement

- ETP4HPC SRA, incl. EsD concept
  - involving ETP members, PRACE experts, CoEs, BDVA
  - cross-reflections/referencing with HiPEAC and Eurolab-4-HPC
- EXDCI
- HPC Summit Week
- SC BoF sessions
  - promoting EU exascale projects (2015, 2016, 2017 being planned...)
Connecting with BDVA and HiPEAC, BDEC

HiPEAC's Conference January 18 to 20, 2016, Prague: ETP4HPC's chairman, Jean-François Lavignon, was an invited speaker at HiPEAC's 11th Conference, which took place over three days and attracted over 600 delegates this year. He presented ETP4HPC’s activities during the 9th edition of the MULTIPROS workshop, which aims at bringing together researchers interested in programming tools, run-times and computer architecture.

BDVA Summit, Nov 29 - Dec 2, 2016, Valencia: ETP4HPC being represented by Mercén Osiesz, in different sessions; panel on collaboration with other European Initiatives such as IPCCI and ARTEMIS, giving a presentation on the importance of HPC, Parallel Session/Working Group titled ‘High Performance Data Analytics; Big Compute and Big Data Working Together for European Success’

HiPEAC Computing System Week, April 20-22, 2016, Porto: ETP4HPC presented the European HPC ecosystem, our Strategic Research Agenda, the main technological challenges of the European HPC technology Industry and the EXDCI project.

ETP4HPC participated in the Big Data and Extreme-Scale Computing (BDEC) 4th closed workshop in Frankfurt. BDEC brings together experts from the U.S., Japan and Europe on Big Data and exascale developments, focussing “Pathways to Convergence” between big data and exascale computing.
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 (annual progress report)

Excellence in HPC applications delivery and use

Training, education and skills development
Governance of the cPPP

- Governance of the cPPP
- 2 Partnerships Board / year
- now encompassing reps. of all nine CoEs
PORTFOLIO of H2020 Funded Projects relating to HPC cPPP – started in 2015

SRA & other inputs
- R&D recommendations

H2020 work programmes & calls
- EC funding

Consortia and projects
- EC processes for selection and monitoring

In 2017: EuroExa DEEP-EST

CENTRES OF EXCELLENCE:
- MaX | NoMaD | E-CAM | EoCoE |
- ESIWACE | COEGSS | BioExcel |
- ComBioMed | POP

HPC Ecosystem

SRA & other inputs

H2020 work programmes & calls

Consortia and projects

Brochure coming soon!
PPP Mid term review official process

May 16th 2017
- Submission of annual cPPP progress report
- Submission of input to the additional questions
  (actually delivered June 6)

End of May
- Publication of a Staff working document by the EC

June 12th
- Interview (F2F) with the Group of Experts

September 2017
- Final report of the Group of Experts

October 2017
- Public discussion of the findings of the Group of Experts at a major conference in Brussels
EXDCI SUPPORT TO IMPACT ASSESSMENT
EXDCI WP7 - Impact Monitoring – Methods and Tools

- Building on the **HPC cPPP and PRACE KPIs**
  - Indicators for Industrial Competitiveness and Socio-Economy Impact
  - Indicators for the operational aspects of the programme
  - Indicators for management aspects of the programme
  - Implementing data collection and processing
  - Delivering periodic score cards (incl. for cPPP mid-term review of 2017)

<table>
<thead>
<tr>
<th>Perspective</th>
<th>Goal</th>
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</table>
| Industrial Competitiveness and Socio-Economy Impact | • Increase market share  
• Create innovation environment in HPC (exploited patents and standards)  
• Increase employment  
• Support growth of SMEs |
| Operational aspects of the programme | • Effective research programme and coverage  
• Develop performance of HPC technologies  
• Provide education, training, skills development  
• Increase use of HPC  
• Develop a HPC software ecosystem  
• Generate patent, inventions and contributions to standards |
| Management aspects of the programme | • Dissemination and Awareness  
• Effective execution |

Perspectives and Goals of the BSC
# Methodology and data sources

<table>
<thead>
<tr>
<th>KPI</th>
<th>Key Performance Indicator (KPI)</th>
<th>EXDCI survey</th>
<th>ETPHPC Surveys and activity report</th>
<th>PRACE KPIs</th>
<th>EC H2020 stats</th>
<th>Analysts’ study</th>
<th>Public sources Web etc.</th>
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<tbody>
<tr>
<td>1</td>
<td>Global market share of European HPC</td>
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<td>2</td>
<td>HPC additional investments</td>
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<td>Jobs</td>
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<td>4</td>
<td>Innovation Environment in HPC: start-ups…</td>
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<td>Research programme effectiveness and coverage: H2020 calls….</td>
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<td>6</td>
<td>Performance of HPC technologies developed</td>
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<td>7</td>
<td>People, education, training and skills development</td>
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<td>8</td>
<td>HPC use</td>
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<td>9</td>
<td>HPC Software ecosystem</td>
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<td>10</td>
<td>Patent, inventions and contributions to standards in HPC by H2020 funded project</td>
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<td>11</td>
<td>Efficiency, openness and transparency of the PPP Consultation Process</td>
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<td>12</td>
<td>Dissemination and Awareness</td>
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- Not a data source
- * Complementary source
- ** Important source
- *** Main source
Socio Economic KPIs

33% of funding goes to industry (2/3 of which to large companies, 1/3 to SMEs).

- Market share trends (joint study with Hyperion)
- From a sample of 9 interviewed companies – incl. 4 EU SMEs - involved in 12 FETHPC (technology) projects, accounting for 26 M€ of H2020 funding - which is most of the cPPP funding going to industry via FETHPC first round of projects:
  - 11 patents were secured with the help of Work Programme 2014-15 funding
  - 61 jobs creations
  - a factor of 3-4 for extra investment to market
## Operational aspects

<table>
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<th>Metric</th>
<th>Value</th>
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<tr>
<td># of H2020 calls implemented</td>
<td>3</td>
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<td>Avg. time-to-grant</td>
<td>7 months</td>
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<tr>
<td>Total H2020 funding committed</td>
<td>€176.1 million</td>
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<td># of running projects</td>
<td>30</td>
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<tr>
<td># of projects to start in 2017</td>
<td>2</td>
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<tr>
<td>Projects coordinated by ETP members</td>
<td>12</td>
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<tr>
<td>Participating organisations</td>
<td>321</td>
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<tr>
<td>Unique participations</td>
<td>186</td>
</tr>
<tr>
<td>non-ETP members participations</td>
<td>62%</td>
</tr>
<tr>
<td>Industry (non-SME) participations</td>
<td>22%</td>
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<tr>
<td>SME participations</td>
<td>11%</td>
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In the case of Exascale technology projects, it is possible to measure quantitatively the progress which was made involving industry in this initiative and to assess the impact of the cPPP in raising the visibility of HPC at a European level. Five Exascale projects were funded through a dedicated call during the previous framework programme. In about 2 years, industry and SME participation in Exascale projects (both in terms of EC contribution and number of partners) has increased from about 19% and 2% to 26% and 8.5%, respectively. Therefore, overall industry participation has increased by more than 60% and SME participation has increased by a factor of 4.
CONCLUSION AND PERSPECTIVES
• EXDCI contributed to a more connected and better aligned EU HPC ecosystem
• EXDCI2