A picture of the European HPC ecosystem

EXDCI WP7 - Impact monitoring methods and tools

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EXDCI Final Conference

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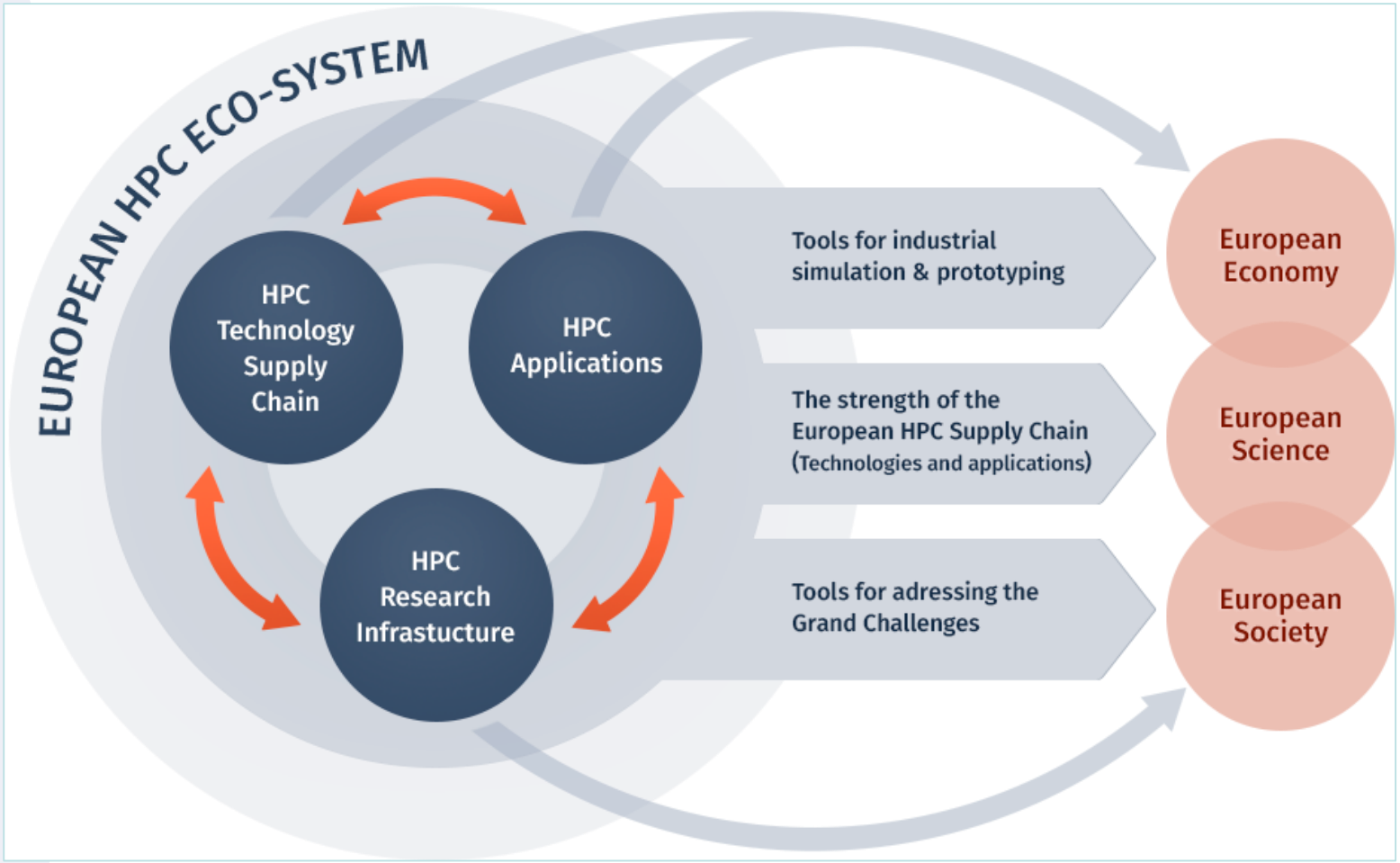
Outline

- 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

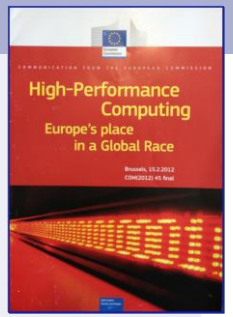


EU global strategy: important dates

- 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



EuroHPC
http://EuroHPC.eu

EUROPEAN HPC ECO-SYSTEM

ETP 4 HPC

HPC Technology Supply Chain

HPC cPPP

HPC Applications

FETHPC

HPC Research Infrastucture

PRACE

Tools for industrial simulation & prototyping

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

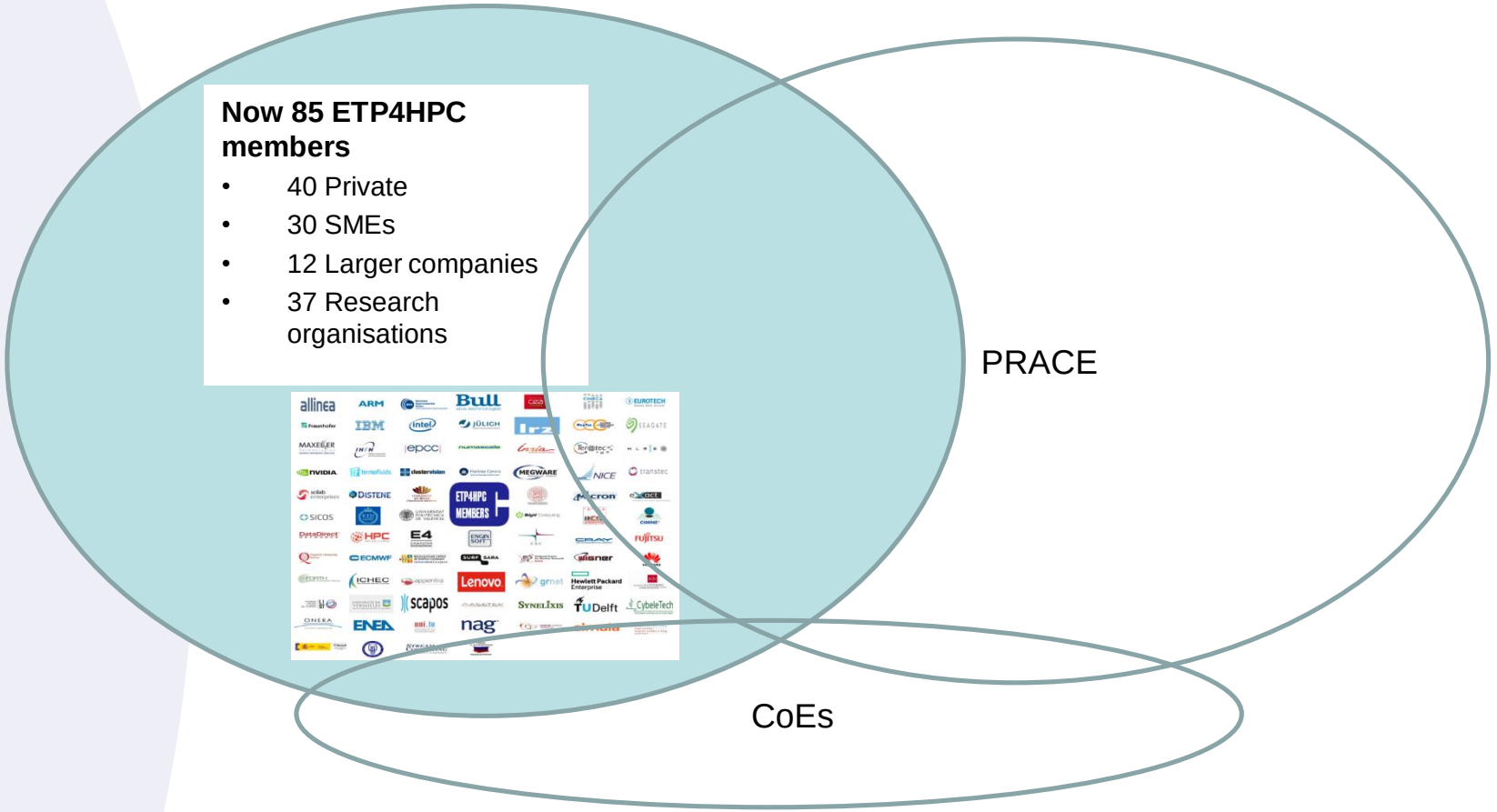
Tools for adressing the Grand Challenges

European Economy

European Science

European Society

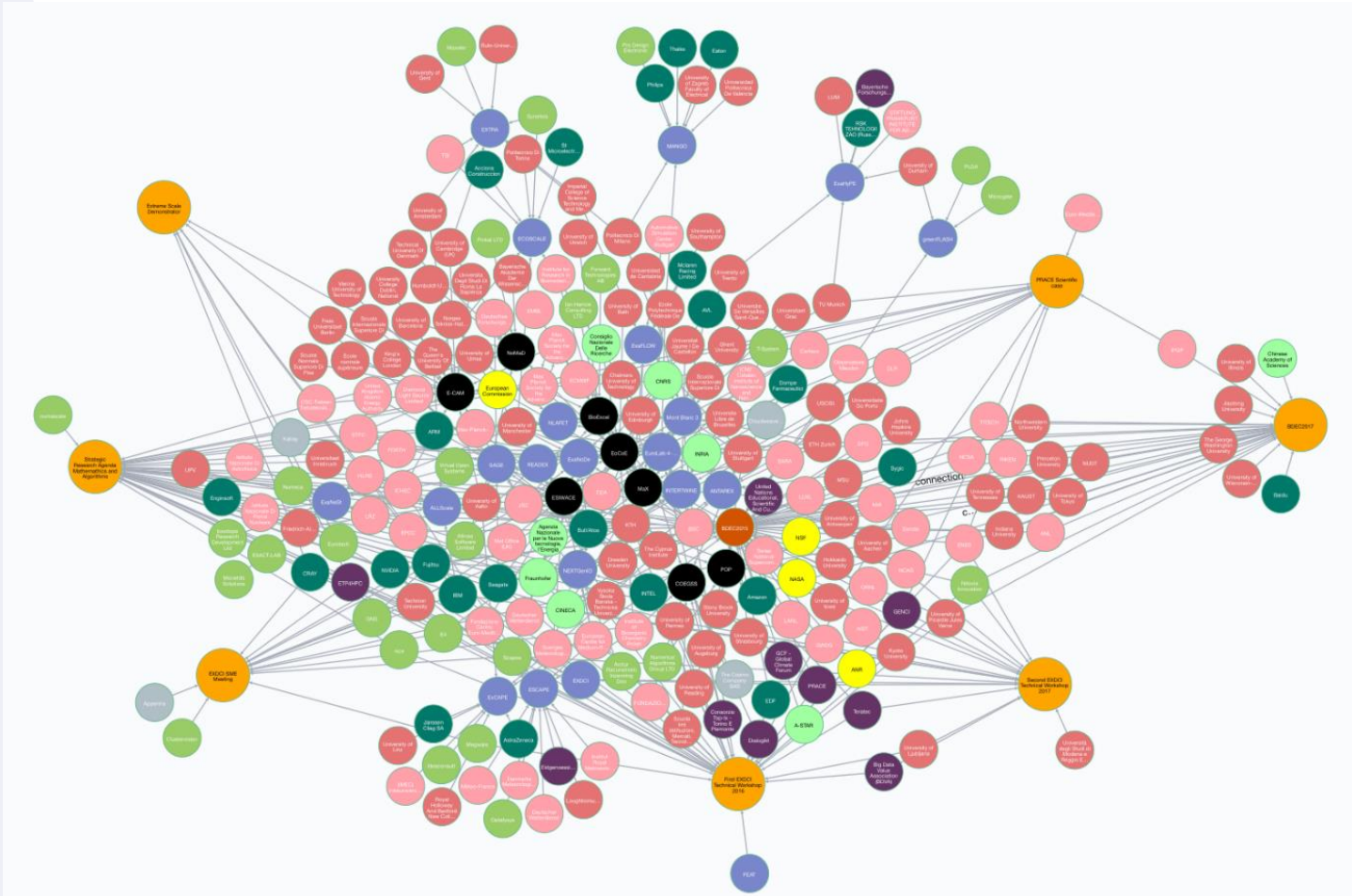
exdci European Extreme Data & Computing Initiative



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

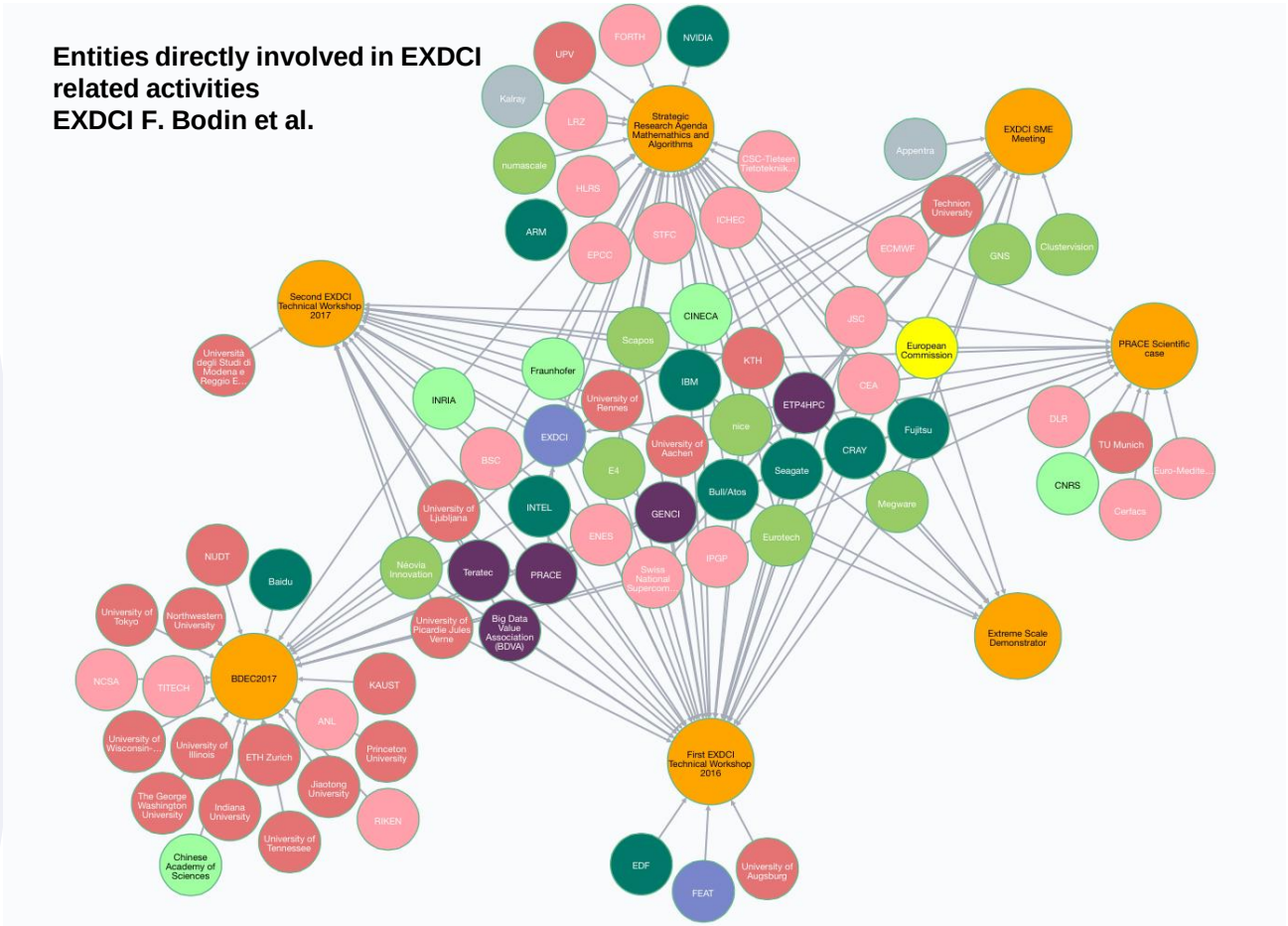
A map of the ecosystem

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…)

SRA and EsD Workshops

EXDCI Workshop, HPC Summit, May 9, 2016, Prague: The summit week started with the EXDCI workshop, during which, Dr Michael Malms presented ETP4HPC's update on its Strategic Research Agenda (SRA2).Other presentations during this workshop where made by the Centres of Excellence and by the FETHPC Projects.

ETP4HPC Extreme-Scale Demonstrators Workshop, May 12, 2016, Prague: ETP4HPC held its Extreme-scale Demonstrator Workshop during the European HPC Summit Week. This workshop was organised to provide a key input for the preparation of the EsD Calls for Proposals, which ETP4HPC will put forward in Work Programme 2018/20. The workshop was attended by representatives of FETHPC and other European HPC Technology projects, Centres of Excellence in Computing Applications and PRACE (workshop presentations).

ETP4HPC EsD Integrators Workshop, BSC, September 22, 2016, Barcelona: ETP4HPC facilitated a workshop on Extreme-scale Demonstrators (EsDs) during the EXDCI Technical Meeting. The objective of this workshop was to align the scope of the EsDs with the requirements of the European integrators and determine how they would like to get involved in potential EsD projects.

Connecting with BDVA and HiPEAC, BDEC

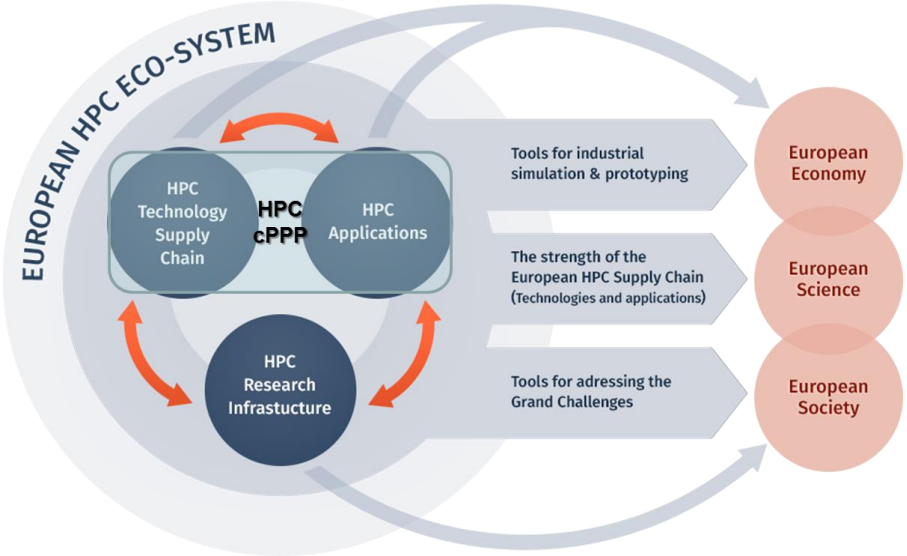
HiPEAC's Conference January 18 to 20, 2016, Prague: ETP4HPC's chairman, Jean-François Lavignon, was an invited speaker at HiPEAC's 11th Conference, which took place over three days and attracted over 600 delegates this year. He presented ETP4HPC's activities during the 9th edition of the MULTIPROG workshop, 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 Marcin Ostasz, in different sessions: panel on collaboration with other European initiatives such as IPCEI 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 eco-system, 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.

HPC cPPP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The Objectives and Principles of cPPP

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

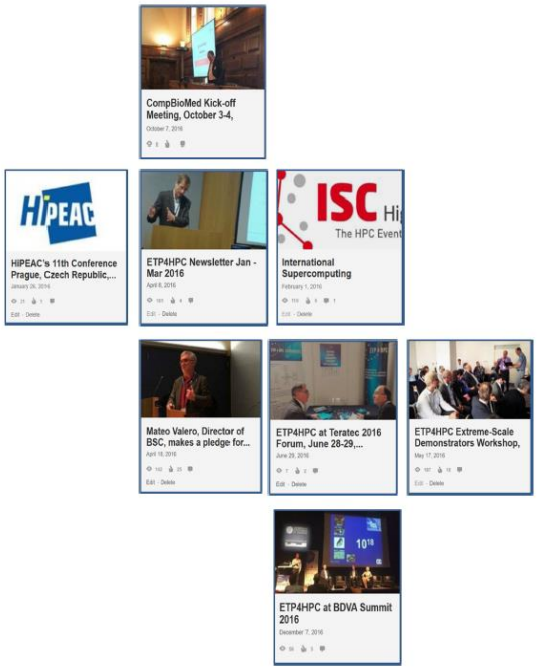
Excellence in HPC applications delivery and use

Training, education and skills development

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

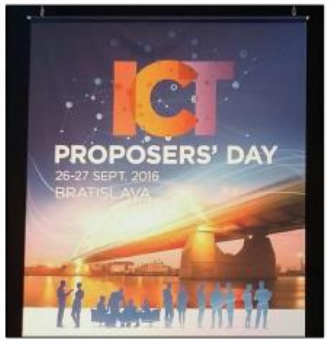
Governance of the cPPP

- Governance of the cPPP
  - 2 Partnerships Board / year
  - now encompassing reps. of all nine CoEs



Participation in EC events

[cPPP-ICT Proposers' Day](#) **2016, September 27, Bratislava:** Marcin Ostasz, ETP4HPC Office expert at BSC, took part in a panel discussion, during the 'Inside contractual Public Private Partnerships' (cPPPs) Idealist Workshop, with other cPPP representatives. The areas of discussion covered: 5G; Photonics; HPC; Cybersecurity; FoF; Big Data; and Robotics.



Dr Kalbe of EC HPC & Quantum Computing Unit met ETP4HPC on the occasion of his BSC visit, Sept 23, 2016, Barcelona: He joined the Steering Board meeting, where he provided an update on the EC-related developments, saying that HPC remains one of the top priorities of this new DG, with ETP4HPC remaining the body contributing to the EC's research work programme.

Round-table on Digitising European Industry, September 20, 2016, Brussels: The Chair of ETP4HPC, Jean-François Lavignon, attended - as an observer - the Round-table on Digitising European Industry with Commissioner Oettinger, and with also Commissioners Bienkowska and Moedas present. This Round-table kicked-off the governance and coordination framework for the "Digitising European Industry" (DEI) initiative.

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**

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

- 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)

Perspective	Goal
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

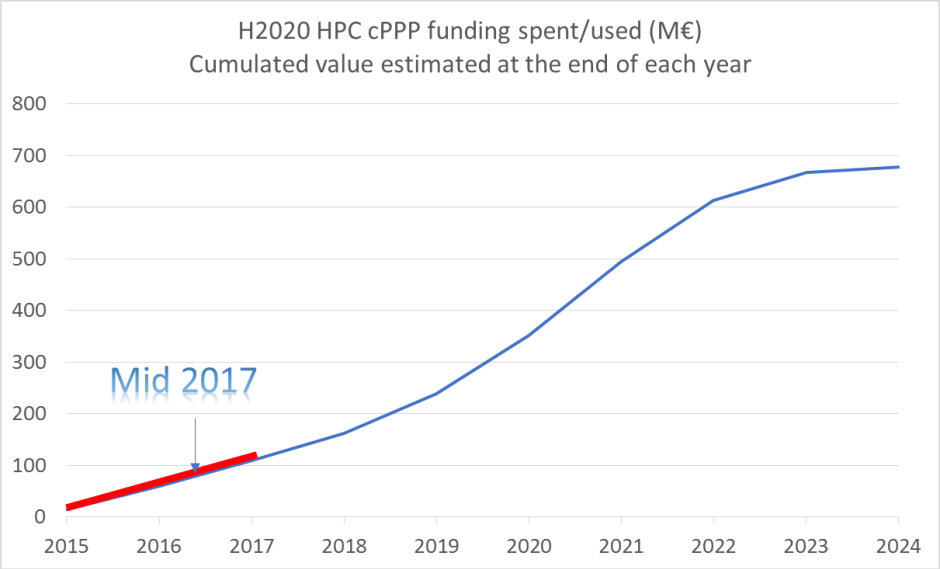
Perspectives and Goals of the BSC

Methodology and data sources

	KPI data sources							
	KPI	**Key Performance Indicator (KPI)**	EXDCI survey	ETPHPC Surveys and activity report	PRACE KPIs	EC H2020 stats	Analysts' study	Public sources Web etc.
Industrial Competitiveness and Socio-Economy Impact	**1**	Global market share of European HPC					***	*
	2	HPC additional investments		**			**	
	3	Jobs		**			**	
	4	Innovation Environment in HPC: start-ups…	**	**			**	*
Operational aspects of the programme	**5**	Research programme effectiveness and coverage: H2020 calls….				***		
	6	Performance of HPC technologies developed	*	*				**
	7	People, education, training and skills development			**			
	8	HPC use	*		**			
	9	HPC Software ecosystem	**		**			*
	10	Patent, inventions and contributions to standards in HPC by H2020 funded project	*	**			**	
Management aspects of the programme	**11**	Efficiency, openness and transparency of the PPP Consultation Process				***		
	12	Dissemination and Awareness	**	**	**			

	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).

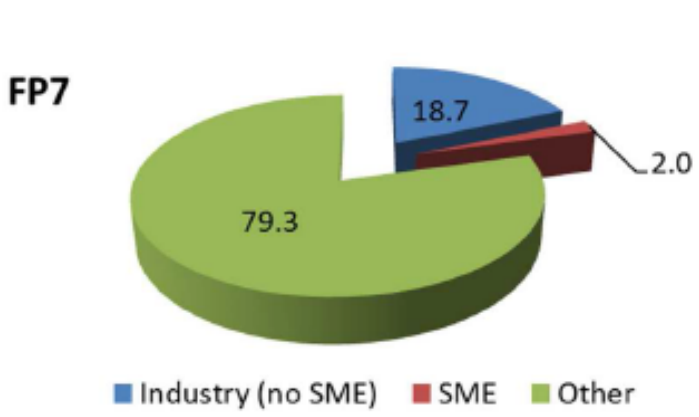
- Market share trends (joint study with Hyperion)
- *From a sample of 9 interviewed companies – incl. 4 EU SMEs - involved in 12 FETHPC (technology) projects, accounting for 26 M€ of H2020 funding - which is most of the cPPP funding going to industry via FETHPC first round of projects:*
  - *11 patents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

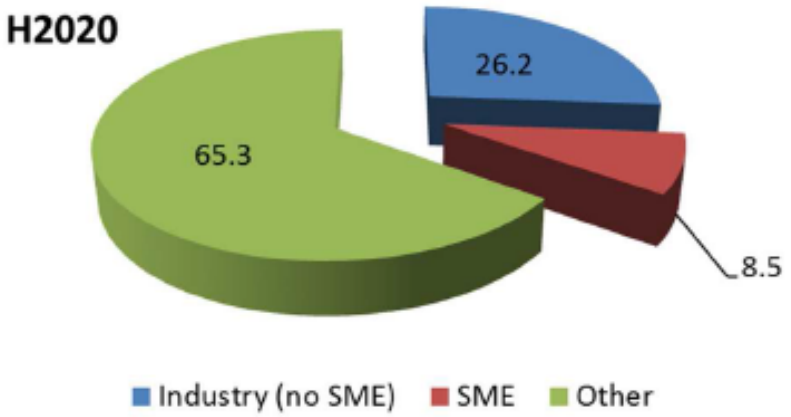
Operational aspects

# of H2020 calls implemented	3
Avg. time-to-grant	7 months
Total H2020 funding committed	€176.1 million
# of running projects	30
# of projects to start in 2017	2
Projects coordinated by ETP members	12
Participating organisations	321
Unique participations	186
non-ETP members participations	62%
Industry (non-SME) participations	22%
SME participations	11%

Industry participation

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