

# HPC, BIG DATA AND IoT

*....The aim of the activities under this heading is to enable the creation of a world-class High Performance Computing (HPC)/Big Data (BD) ecosystem based on European leadership in HPC, Cloud and Big Data technologies....\**



**Jim Kenneally**  
Principal Investigator  
Labs, Intel Corporation

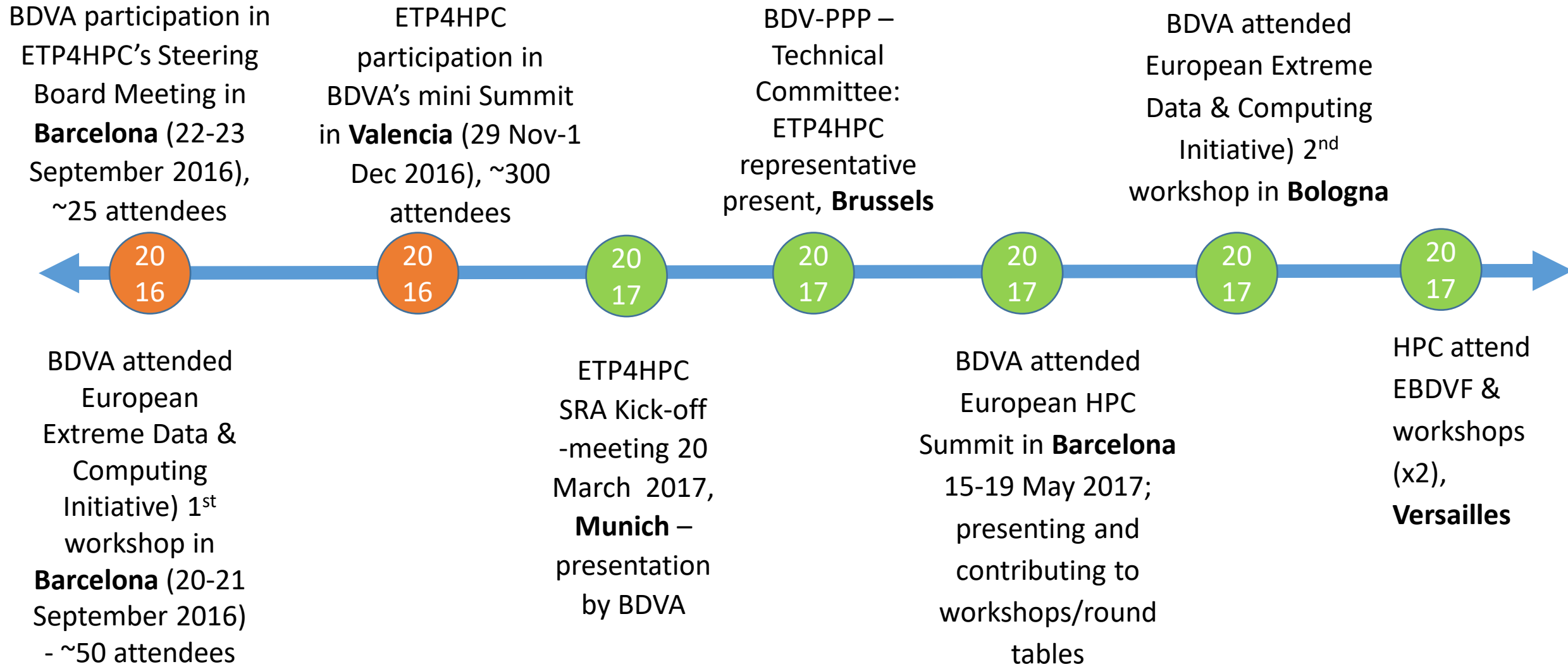


**Michael Malms**  
ETP4HPC Project Manager  
IBM Research

\* Horizon 2020 - Work Programme 2018-2020



# HPC-BD Collaboration - Timeline



# .....from the H2020 ICT 11 and ICT 12 call:

\* Horizon 2020 - Work Programme 2018-2020

“The Internet of Things and the convergence of HPC, Big Data and Cloud computing technologies”\*

“.....resulting in an increased prevalence of data value chains and related technologies (HPC/BD/Cloud/IoT).” \*

“.....a coordinated action with all related areas (e.g. analytics, software engineering, HPC, Cloud technologies, IoT) is necessary.”\*



**AIOTI**  
ALLIANCE FOR INTERNET OF THINGS INNOVATION



# HPC-BD Collaboration – Bologna Workshop, July '17

## Agenda

1. HPC - Big Data - a common glossary
2. Cross-Pollination of HPC and BD technologies
3. Extreme BD workloads
4. Collaboration between HPC CoEs and BD CoEs
  - Centres of Excellence for High Performance Computing
  - Centres of Excellence for Big Data
5. User engagement
6. Exploring options for possible collaborations

*Collaboration between Big Data and HPC Technology*

BDVA and ETP4HPC

[www.etp4hpc.eu](http://www.etp4hpc.eu) and [www.bdva.eu](http://www.bdva.eu)

Working Document

Jul 2017



ETP4HPC & BDVA group photo

Common understanding of technical challenges for joint future research priorities



# HPC-BD Collaboration – Versailles Workshop, Nov '17

EUROPEAN  
**BIGDATA  
VALUE** FORUM  
2017 NOV 21-23 VERSAILLES  
TRUSTED AI IN SMART INDUSTRY



13:00 Welcome and agenda review (J.Kenneally, M. Malms)

13:10 Introduction of AIOTI as organisation, technical agenda (T. Hahn)

13:25 Review of remaining use cases (moderator M. Malms)

14:25 ISO use case template walk-through (J.K. and N. Stojanovic)

15:00 Coffee - Break

15:45 HPC template walkthrough (D. Pleiter)

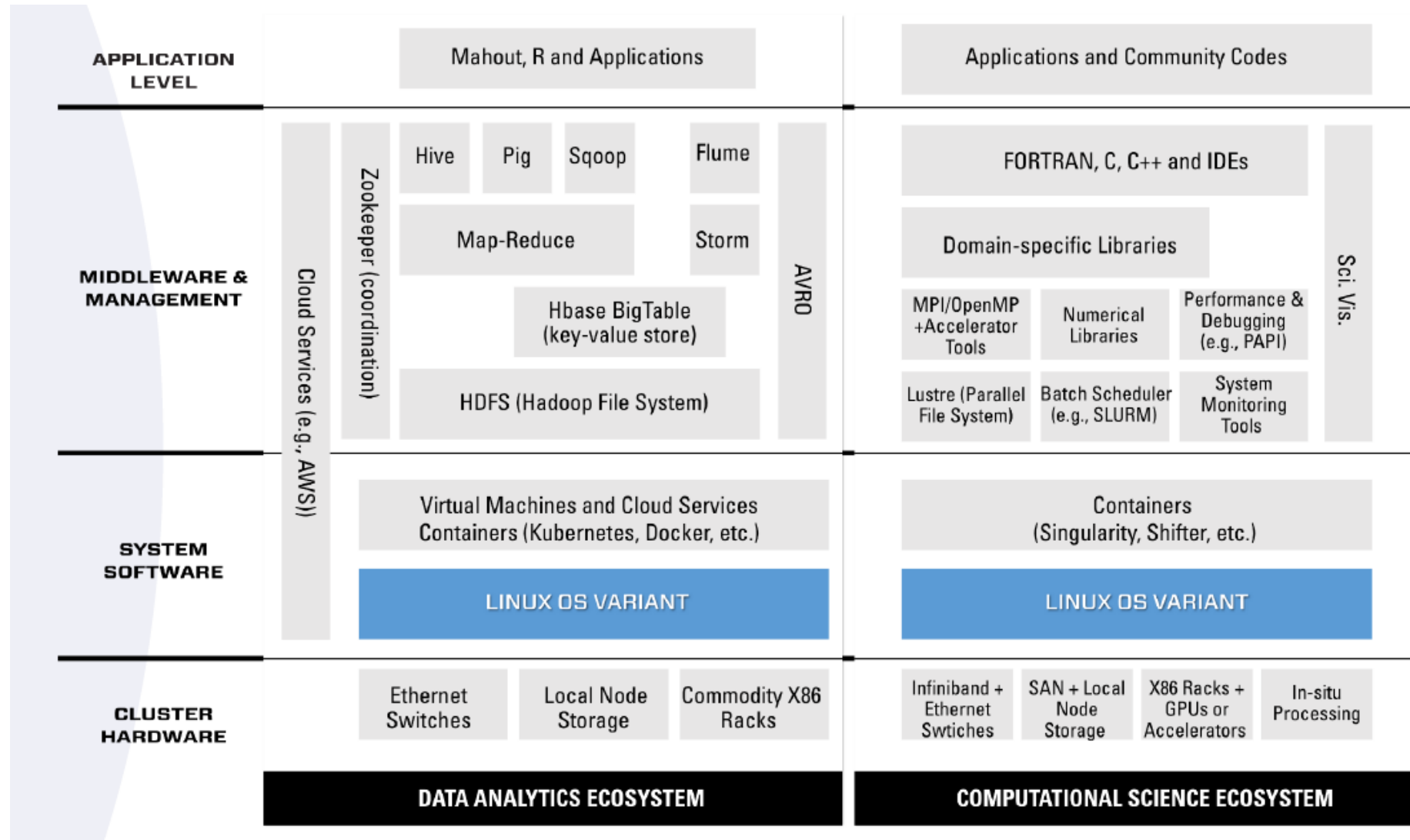
16:15 Research projects: critical implementation aspects (political, economical, social and technical challenges) (JK, M)

17:00 Joint look at ICT 11 and 12: how to interpret the call text? (JK, MM)

17:45 Next events and steps

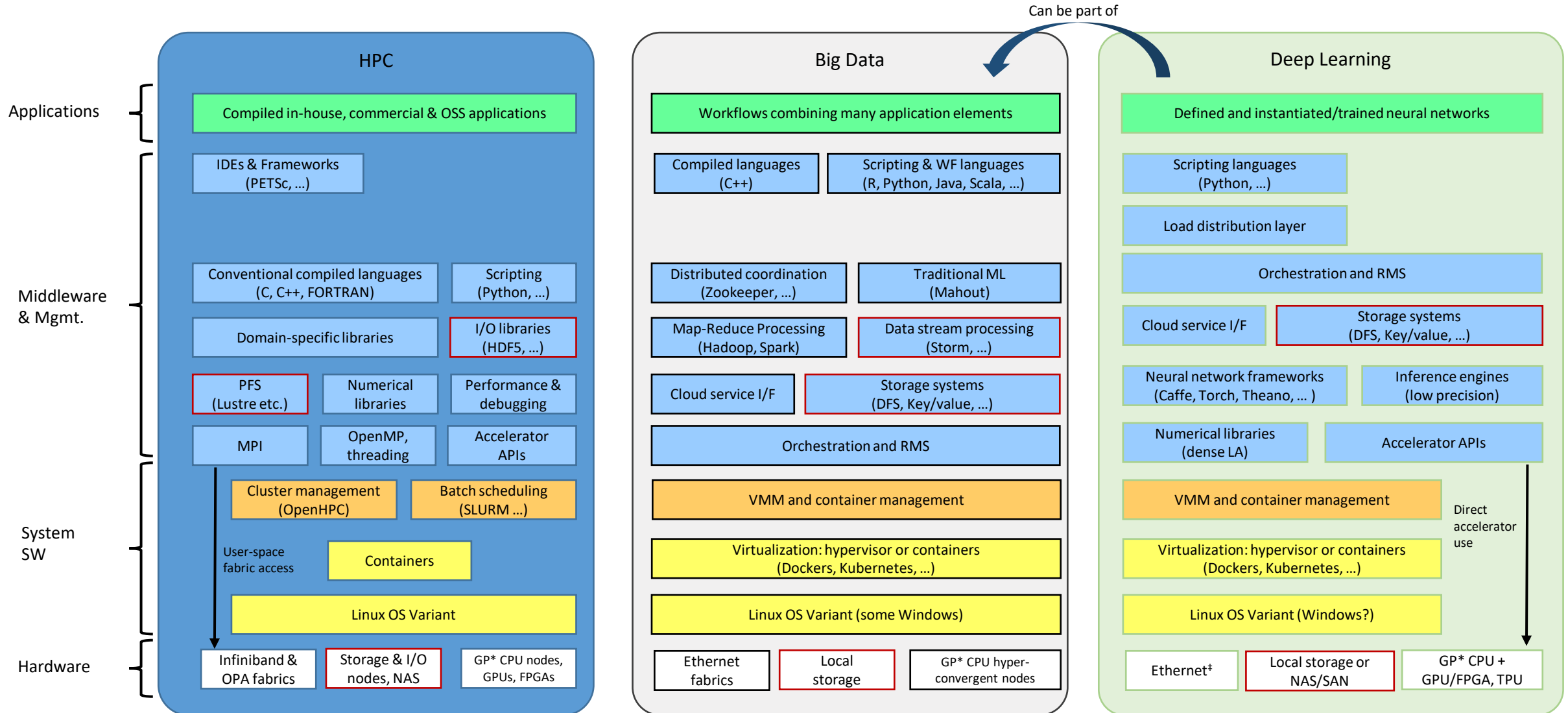
Structured description of use cases  
=> common understanding

# From BDEC report: HPC and Big Data stacks side by side



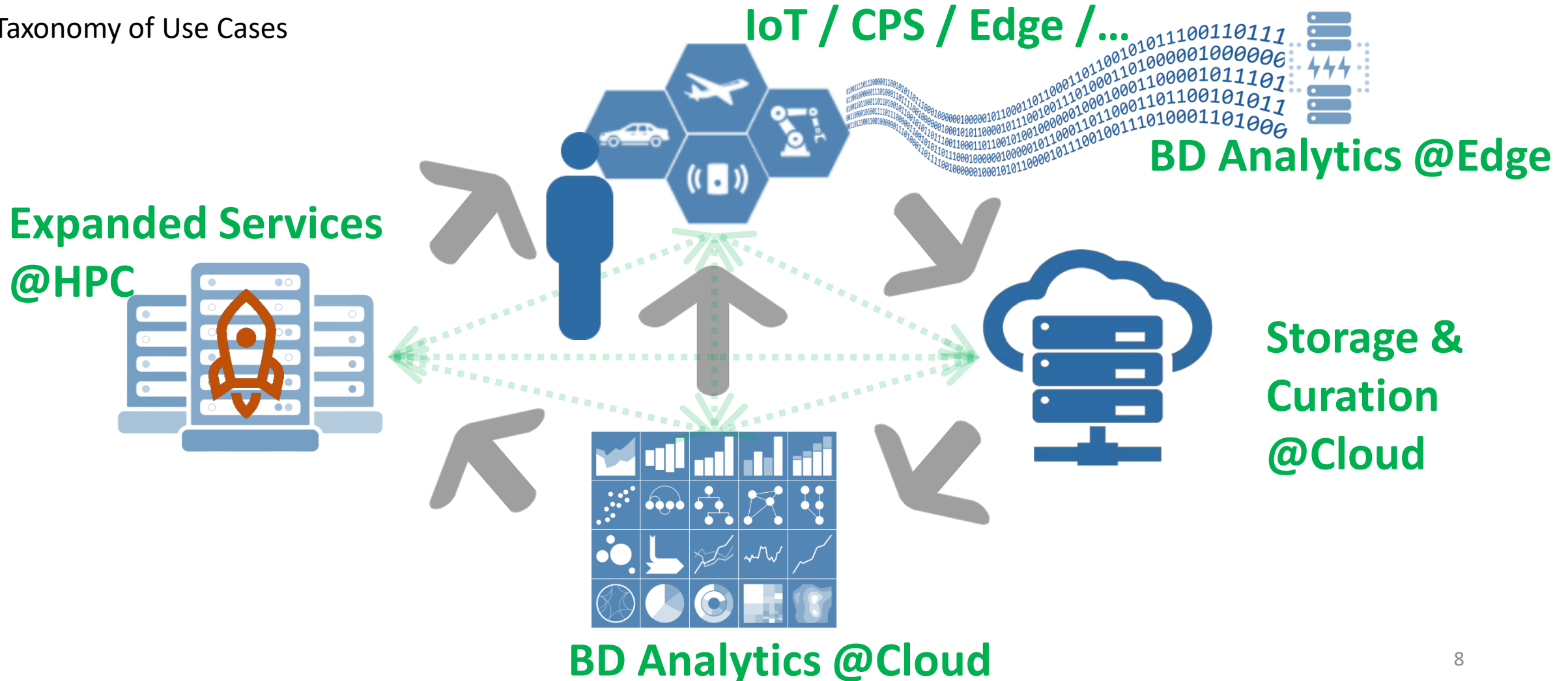
# ETP4HPCs extension to HPC, Big Data and Deep Learning

This is the structural foundation of the technical roadmap work ahead



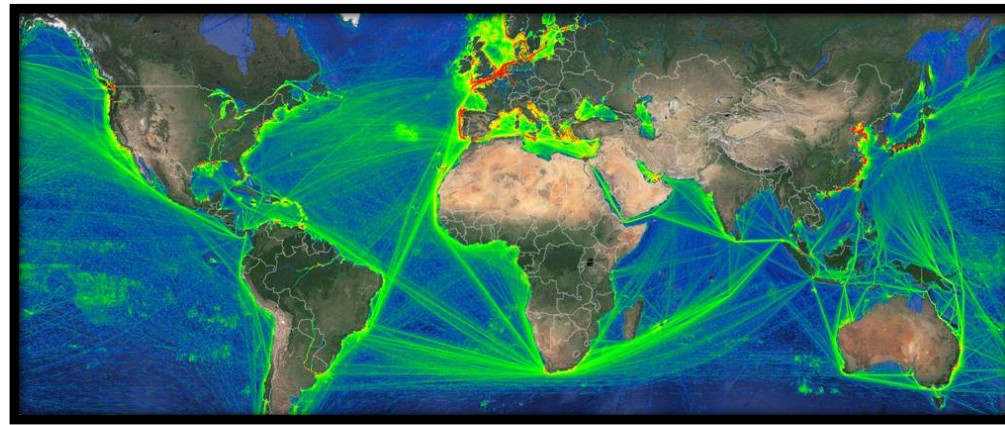
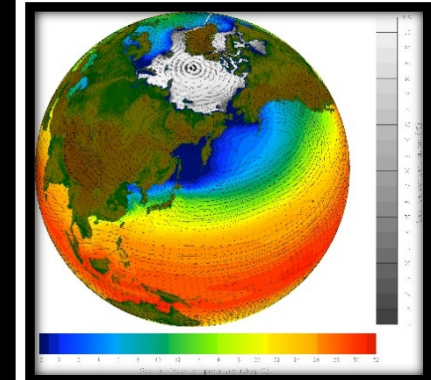
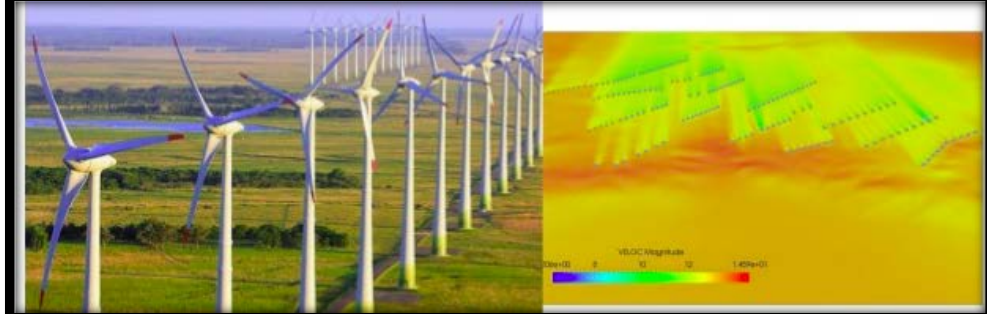
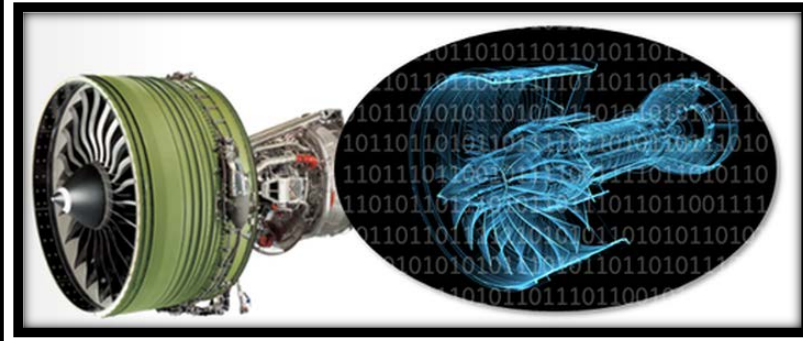
# Enabling new forms of transforming [*Data*] > [*Information*] > [*Action*] > [*Value*]

Taxonomy of Use Cases





# Spectrum of high-impact use cases



# BD-HPC-IOT high-impact use cases – summary pitch

**ICT-11-2018-2019:** HPC and Big Data enabled Large-scale Test-beds and Applications  
.....

**ICT-12-2018-2020:** Big Data technologies and extreme-scale analytics  
.....

**ICT-14-2019:** Co-designing Extreme Scale Demonstrators (EsD)  
.....

...???

- 1. Cases in Manufacturing Line / Factory Digital twin**, - [Anibal Reñones, Cartif, ]
- 2. Smart grid and customer pattern analysis** - [Anibal Reñones, Cartif, ]
- 3. Hybrid-Twin: Wind Turbine Farm of Composite Rotor Blade** – [Fouad El-Khadi, ESI Group],
- 4. Near Real Time Electricity Network Smarter Optimized Operation**, [Davide Dalle Carbonare, Engineering, ]
- 5. Real-time Simulation For Man-in-the-loop Aircraft Testing** [[Davide Dalle Carbonare, Engineering, ]
- 6. Combating Fake News with AI, Big Data and HPC solutions**, [Davide Dalle Carbonare, Engineering, ]
- 7. Nonintrusive Load Monitoring** – [Davide Dalle Carbonare, Engineering],
- 8. Automatic cartography of extensive territories** – [Tonny Velin, Answare]
- 9. Autonomous driving / Data Twin** – [Nenad Stojanovic, Nissantech]
- 10. Ship behaviour simulation/modelling**. [Konstantinos Chatzikokolakis, Marine Traffic]
- 11. Wind Power Sound Propagation** – [Panu Maijala, VTT,]
- 12. FEM-based optimisation & digital twin of electromechanical devices** [Janne Keränen, VTT]
- 13. Individualized healthcare diagnosis** - [DANIEL ALONSO ROMÁN, ITI ]
- 14. Weather and climate forecasts** – [Claudio Arlandini, CINECA]
- 15. Weather and Climate Modelling** – [Philipp Neumann , Deutsches Klimarechenzentrum, : Peter Bauer, European Centre for Medium-Range Weather Forecasts]
- 16. Data-Check: distinguish truth from lies**, [Antonis Ramfos, Athens Technology Center S.A.]

# Panel Discussion + Q&A



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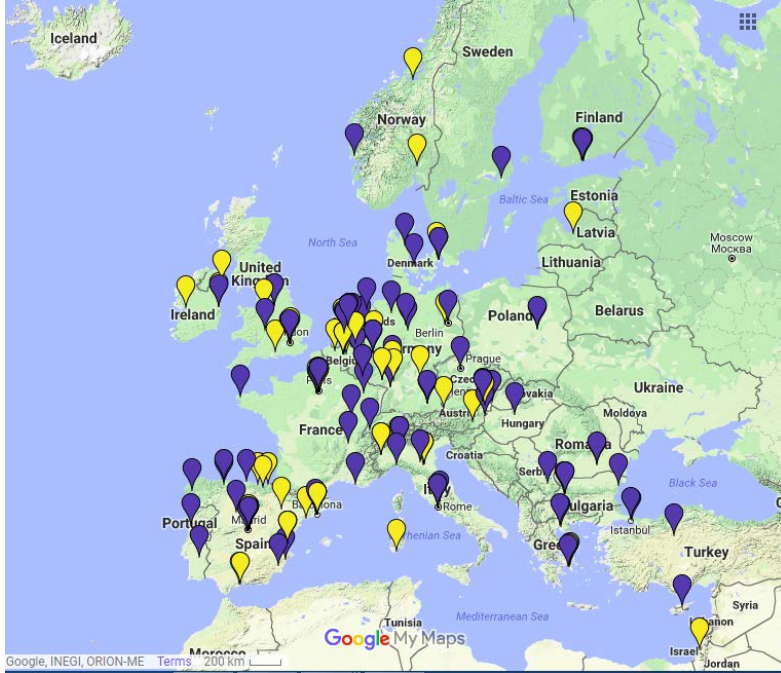


European Commission

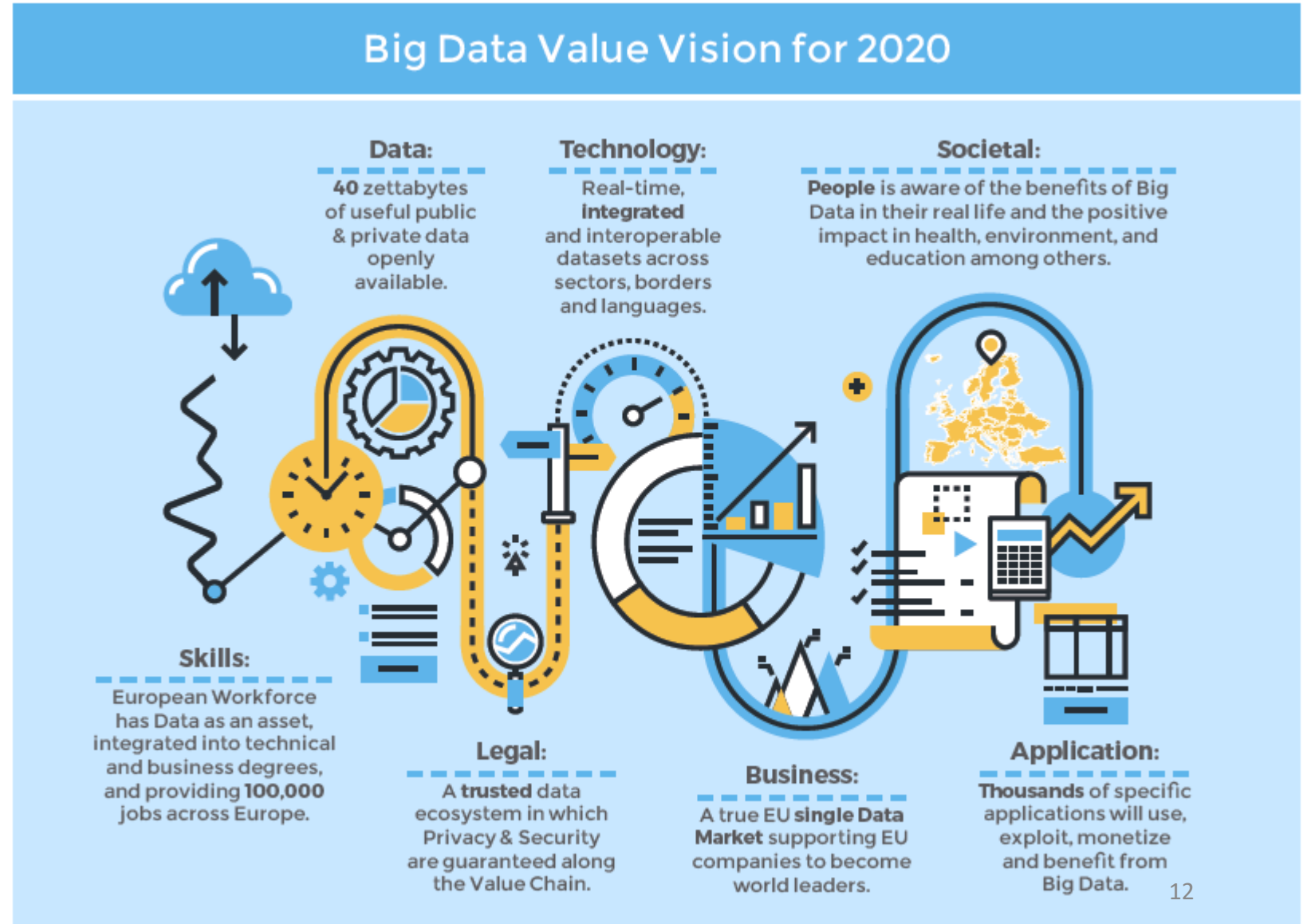




BDVA focuses its activities on updating the multi-annual roadmap and on providing regular advice to enable the European Commission to prepare, draft and adopt the periodic Work Programmes, as well as on delivering Data Innovation Recommendations, developing Big Data Value Ecosystem, guiding Standards, and, facilitating Know-how exchange.



BDVA (~200) members include large industries, SMEs, research organisations and data users and providers to support the development and deployment of the EU Big Data Value Public-Private Partnership with the European Commission.





# ETP4HPC Association

Industry-led think tank founded in 2012 – Private partner of the HPC cPPP with the EC  
“Building a globally competitive European world-class HPC technology value chain”

## 86 Members

44 Private / 29 SMEs

38 Research organisations



## Main remit:

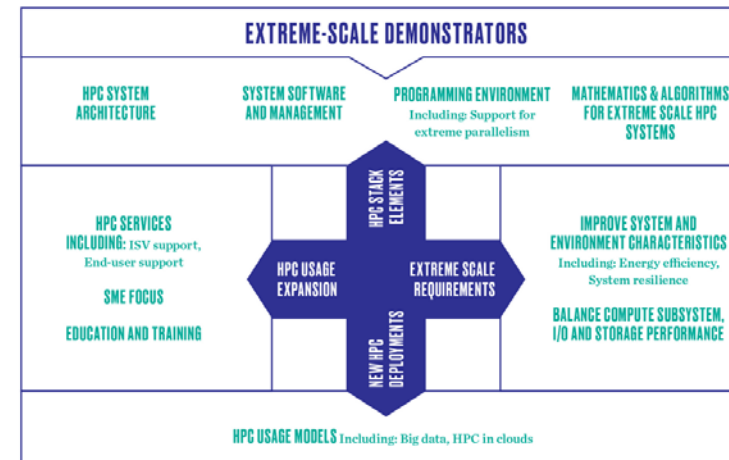
Provide input to define H2020 HPC R&D programmes funded and operated by the EC

Tool = “Strategic Research Agenda “ – SRA

<http://www.etp4hpc.eu/en/sra.html>

## Other activities

HPC global ecosystem development (actions with other stakeholders, mainly in the context of EXDCI, a H2020-funded support action)



<http://www.etp4hpc.eu/> [office@etp4hpc.eu](mailto:office@etp4hpc.eu)



**AIOTI**

ALLIANCE FOR INTERNET OF THINGS INNOVATION

The Alliance for Internet of Things Innovation (AIOTI) was initiated by the European Commission in 2015, with the aim to strengthen the dialogue and interaction among Internet of Things (IoT) players in Europe, and to contribute to the creation of a dynamic European IoT ecosystem to speed up the take up of IoT.

# HiPEAC

HiPEAC was a European Network of Excellence (now a CSA) on **H**igh **P**erformance and **E**MBEDDED **A**rchitecture and **C**ompilation

Created in 2004, **HiPEAC** gathers over 500 leading European academic and industrial computing system researchers from nearly 350 institutions in one virtual centre of excellence of 1800 researchers.



January 2017 version is available at:  
<http://hipeac.net/vision>



The workshops on **Big Data and Extreme-scale Computing (BDEC)** have been premised on the idea that we must begin to systematically map out and account for the ways in which the major issues associated with Big Data intersect with, impinge upon, and potentially change, the national (and international) plans that are now being laid for achieving exascale computing.



# HPC, Big Data & IoT: Panel Discussion + Q&A



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European Commission



# Thank You

To participate....

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