European HPC/BDA strategy
A vision from inside IPCEI
Proposed roadmap

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Disclaimer: this talk is a personal vision shared by the CEA and IPCEI Sherpas and naturally doesn’t commit, neither the Commission, neither the Member State of the IPCEI.
The Top Down view of the European Union (1)

Boost European Economy by improving competitiveness, growth and jobs

A single digital market
offering to all Europeans an equal and easy access to European Data
on which the applications of the future digital economy will be built

BUT this opportunity for a better European future is clearly occupied by non Europeans

Europe is clearly facing a market failure
due to fragmentation and lack of coordination

To face this situation Europe needs an appropriate answer:
The Top Down view of the European Union (2)

Boost European Economy by improving competitiveness, growth and jobs

Important Project of Common European Interest
A Luxembourg, France, Italy, Spain initiative
open to all European States sharing the same vision
With the support of the Commission

The European Cloud
Open to all European users
Ensuring privacy and confidentiality of data
Guaranteeing security, protection from outside world

To face this situation Europe needs an appropriate answer:

- A strategy
- A new governance and funding tool

The European cloud
The IPCEI
The bottom-up answer of the IPCEI (1)
Implementing an industrial solution through mastering technology

Integrated in a secured network of Computing and Data Centers

HPC 2020 BDA

Leading to competitive production machines on the world market

IPCEI
An industrial project of integration of the best European technologies

Extreme Scale Demonstrators

H2020

Developing technology bricks under a Strategic Research Agenda
A partnership between the Commission, the scientific community and industrials
The bottom-up answer of the IPCEI (2)
Implementing an industrial solution through mastering technology

Facing another market failure: European market represents 30% of world market
European industry provides less than 5% of it!

Other Regions
- Massively support R&D
- Have closed public market

⇒ ASYMMETRY
The bottom-up answer of the IPCEI (3) Implementing an industrial solution through mastering technology

The European CLOUD 2022
EU in the Top 3 leaders in HPC
With European exascale HPC machines
Leading to competitive production machines on the world market
An industrial project of integration of the best European technologies

The IPCEI answer to both market failures

- Demonstrating the EU industrial capacity to deliver innovative & competitive solutions
- Giving to all European, on an equal basis, access to computing and data and guaranteeing confidentiality, privacy and security
- Helping industrials, specially SMEs, to develop the applications of the digital economy
The value is in the data
And in the capacity of processing it

The capacity of processing should give a **competitive advantage to** EU industry

New innovative applications able to extract knowledge

The EU Data patrimony should be accessible to the EU community and **protected**

Data for Digital Economy and Society

High End Compute and Data Technologies

Compute and Data Infrastructure

Co-Design

An industrial program with one goal:

**Re-establishing a fair share of the market** in two fields where Europe is facing a market failure:

- Usage of European Data patrimony because of fragmentation and lack of coordination
- Usage of European technologies because of the asymmetry of the market
IPCEI proposed implementation of EU strategy: An industrial approach

- Accelerating and developing the Digital Economy: “Value is in the data”
  Pilar 3 “Test Beds”: Innovative solutions showing the competitive economic advantage given to EU industry and SME by combining Data and HPC.

- Proposing EU Industry and SMEs a fair access to Data and HPC with security/privacy
  Pilar 2 “Infrastructure” for Industry and e-gov

- Furnishing competitively to the market EU HPC/BDA solutions to these challenges:
  Pilar 1: “Technology”: developing and integrating EU technology answering to the specification issued by the Commission
Specifications from the Commission used for Pilar 1

EU in the TOP3 of “digital Power” in 2022

- “2 exascale computers with at least one based on EU technology in 2022”, capacity demonstrated by 2 pre-exascale “Demonstrators” in 2020 / 2021
  - The EU TIER0s: “world class machines” , “in the TOP3?”
    - They should be of world top level technology on energy, reliability, security
  - These machines will be bought by States hosting the EU TIER0 with participation of the Commission (EUROHPC) through “open process (PPI)
    - They should be competitive on the market
  - Envisaged cost 100/150M€ (Demonstrators)- 250M€ (exascale)
    - competitive production machines with high reliability
    - “vendors” should have the financial assets to warranty them
  - The visibility (success) of this Commission
    - The demonstrators should be delivered on time

- These machines (One of ?) will be “based on a “European processor””
  - To satisfy first criteria it should be at world top level in energy but more in reliability (meantime to failure in years...)
  - Timing
IPCEI proposed macroscopic Roadmap for technology pillar

Track 1: HPC oriented (accelerators?)

Track 2: BDA oriented (I/Os, storage...)

Common basic R&D Architecture/Integration...

Processor design

Availability on the market

Exaflop/s production European computer
Competitive on the market

2011 ... 2016  2017  2018  2019  2020  ...  2022
EU processor design

**WHY?**
- Better final price for the machine (Processor to day >20% growing)
- Better time to market for EU applications (Codesign)
- No legal problem for EU exports (ITAR)
- Better and guaranteed security...

**Problem:** NO HPC designer in EU for decades – restarting from ZERO

**Opportunity:**
- New business model give place to innovative solutions (ARM...)
- The end of Moore Law places the usual vertical model in front of a wall

**How?:** Starting a new company
- Gathering expertise from where it exist in Europe
- Gathering funds from Industrials of the technology and end users interested
- Finally asking support from the Commission
Summary

There is a Political objective and a strategy
- Expressed in the April 2016 declaration
- Approved unanimously by a Competitiveness Council
- In the final process of approval by the Union Parliament

The necessary expertise does exist in Europe
- Gathered under the banner of ETP4HPC, working on a permanent updated Strategic Research Agenda
- Supported by the Commission through a 700M€ cPPP

The EU industrial capacity with the necessary financial assets to share the R&D costs is here
- With a clear technical program, including costs, milestones and KPIs
- An EU consortium ready to commit to the Commission objectives

All lights are green... After 20 years of struggle we have a global opportunity

What are the hurdles?

INSTRUMENTS – GOVERNANCE
deploy suited tools, and efficiently, from R&D to machines procurements

CONSISTENT INDUSTRIAL VISION
beyond words and even financial R&D support, HPC industry needs CONTRACTS

The success is in OUR HANDS of deciders/procurers
Contribute to HPC/BD R&D that goes into products and in fine BUY EUROPEAN