

RETI TRANSFRONTALIERE NEL
SETTORE ICT



hpc^{H5}

high performance
and cloud computing
cross-border competence
consortium

L'imperativo dell'HPC nella ricerca e nell'industria

Stefano Cozzini

eXact lab srl and CNR/IOM Democritos - Trieste

venerdì 25 maggio 2012, Gorizia

Agenda

- A short introduction to High Performance Computing:
- The quest of HPC
 - Research
 - Industry
- Conclusions

Why is High Performance Computing important ?

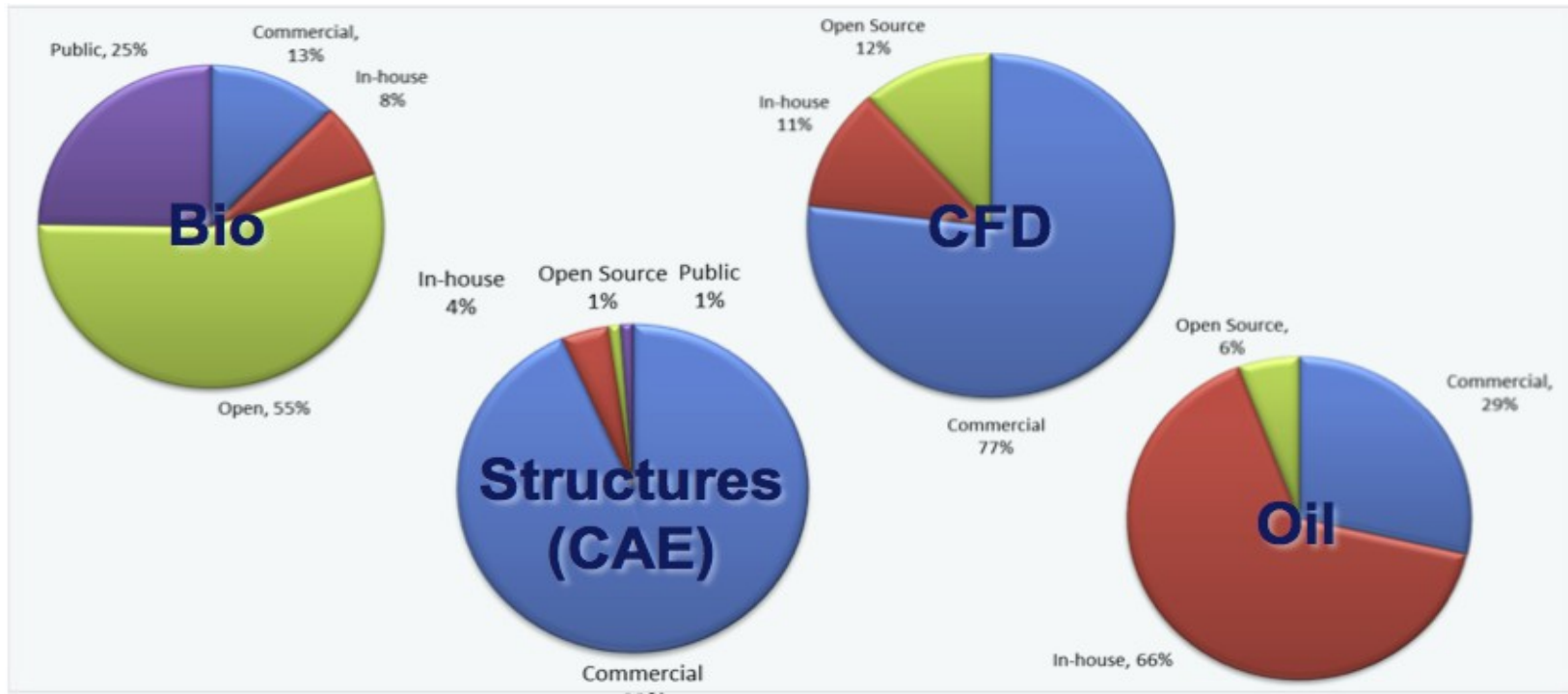
- “The next 10 to 20 years will see computational science firmly embedded in the fabric of science – the most profound development in the scientific method in over three centuries” (US Department of Energy).
- “A host of technologies are on the horizon that we cannot hope to understand, develop, or utilize without simulation” (US National Science Foundation)

Components of HPC ecosystem: HW

- Computing
 - Computing resources: Multicore cpus + GPGPUs
 - Order of hundreds of Teraflops (~tens of cores/gpus)
- Connectivity
 - ~ gigabit /10 gigabit
- Storage
 - Disks/SAN/Parallel Filesystems
 - hundreds of Terabyte < ---> Petabyte

Components of HPC ecosystem: SW

- Software:
 - middleware
 - Scientific/technical software



Last but not least : People

- Human capital is by far the most important aspect
- Two important roles:
 - HPC providers (plan/install/manage HPC resources) ?
 - HPC user

Mixing/interplaying roles
increases competence levels

HPC users..

High Performance Technical Computing (HPTC)

- Applications in science and engineering
- Top markets: academia, government labs, defense, manufacturing, bio/life science, oil/gas exploration

High Performance Business Computing (HPBC)

- Applications include trading, pricing, risk management, logistics, fraud detection, online games, analytics, ...
- Top markets: financial services, ultrascale internet, online games, retail, entertainment

HPC competences.

- 2 main aspects:
 - Technical competences to plan/install/maintain HPC resources and platforms
 - Competences to create advanced services for HPC final users

HPC5 aims, capitalizing on the strong cross border background, to develop and increase all these competences

Challenges ahead in HPC

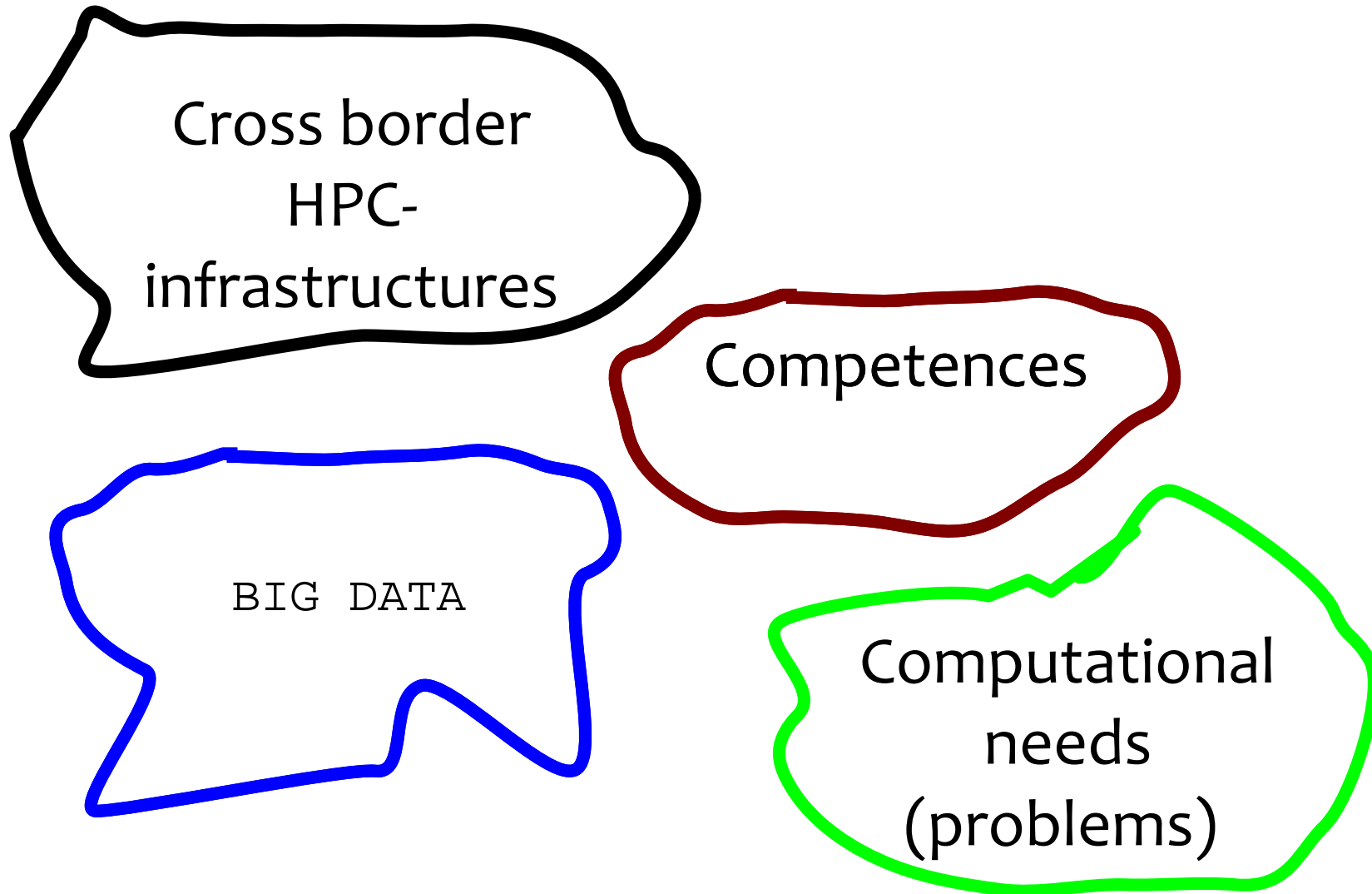
- Weak application performance improvement/ Highly parallel programming
- System imbalance (the "memory wall")
- Power and space usage
- Ease-of-use – dealing with the growing system complexity
- Big data !

Big data challenge:

“*BigData*” is a growing trend affecting many HPC applications touching large datacenters, and research

- Fueled by creation and availability of many data
- Organizations seek to bridge the gap between having better data and making better decisions
- Application areas include: enterprise analytics, research analytics, real-time analytics, complex event processing, data mining, visualization ...
- Growth in these application areas creates a market opportunity for providers of HPC technologies

The Puzzle



Our integrated vision :

COMPUTATIONAL NEEDS

COMPETENCE CENTER :
Identify/analyze/stimulate
Requests and needs
Identify the right platforms for the right need

HPC5 infrastructures

HPC

GRID

CLOUD

LOCAL

Conclusions

TODAY

- In the cross-border regions there are
- HPC infrastructure
 - competences
 - needs

TOMORROW

HPC5
 Integrated ecosystem
 ready to a world wide
 challenge

