Establishing HPC computational environments in industry: a view from inside

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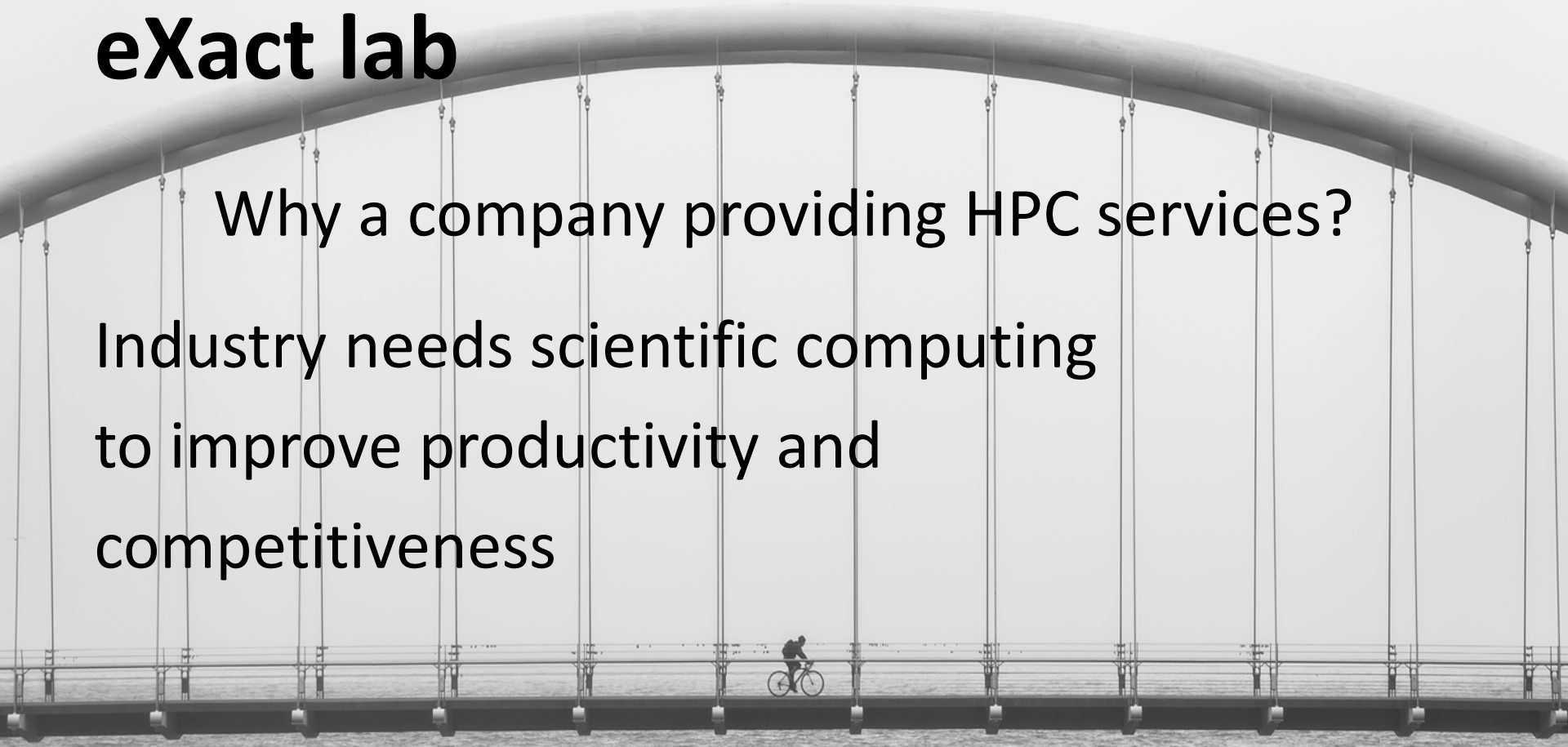
Agenda

- eXact lab in a nutshell
- eXact ideas:
  - HPC computational environment
- How our ideas are working
- Issues/solutions
- Conclusions

eXact lab

Why a company providing HPC services?

Industry needs scientific computing
to improve productivity and
competitiveness



eXact lab is able to drive the needs and enable high performance solutions

Our mission

eXact lab offers solutions, training and on-demand access in the high performance computing market

HIGH PERFORMANCE COMPUTING
FOR YOUR BUSINESS

HIGH PERFORMANCE COMPUTING
FOR RESEARCH & DEVELOPMENT

HIGH PERFORMANCE COMPUTING
FOR THE PUBLIC SECTOR

Our vision

eXact lab wants to ease access to computational resources, for SME and public sector, dismantling the notoriety that still relegates HPC to an elite only playground.

eXact lab: the team

The core team

- Founders: strong background in HPC and scientific computing
- Collaborators: HPC sysadmins and HPC developers

Network of professional contacts

- Consultants/Professionals for specific tasks

Network of academic researchers

- Joint collaboration in R&D projects

What are we offering?

HPC consulting

- HPC infrastructure planning/installing/maintenance
- Scientific/technical package optimization/parallelization
- Development of Advanced Services for HPC system usage

HPC on-demand

- Provide access to to HPC facilities at different level
- Cloud approach to HPC

Portfolio


Universität Zürich[UZH]


EUMETSAT


cosint
EUROTECH


insiel


OSPEDALE
SAN RAFFAELE

Portfolio

High performance version of L2VDP, the end-to-end processor for the processing of MTG-IRS satellite data observations

Portfolio

EUROTECH

Provide services for Installation, configuration, monitoring and tuning of high performance, energy efficient, computing Eurotech systems

Portfolio

San Raffaele Hospital

Personalized medicine - customization of healthcare by use of genetic information

Our team built an high performance, highly available, computing infrastructure for genomic research

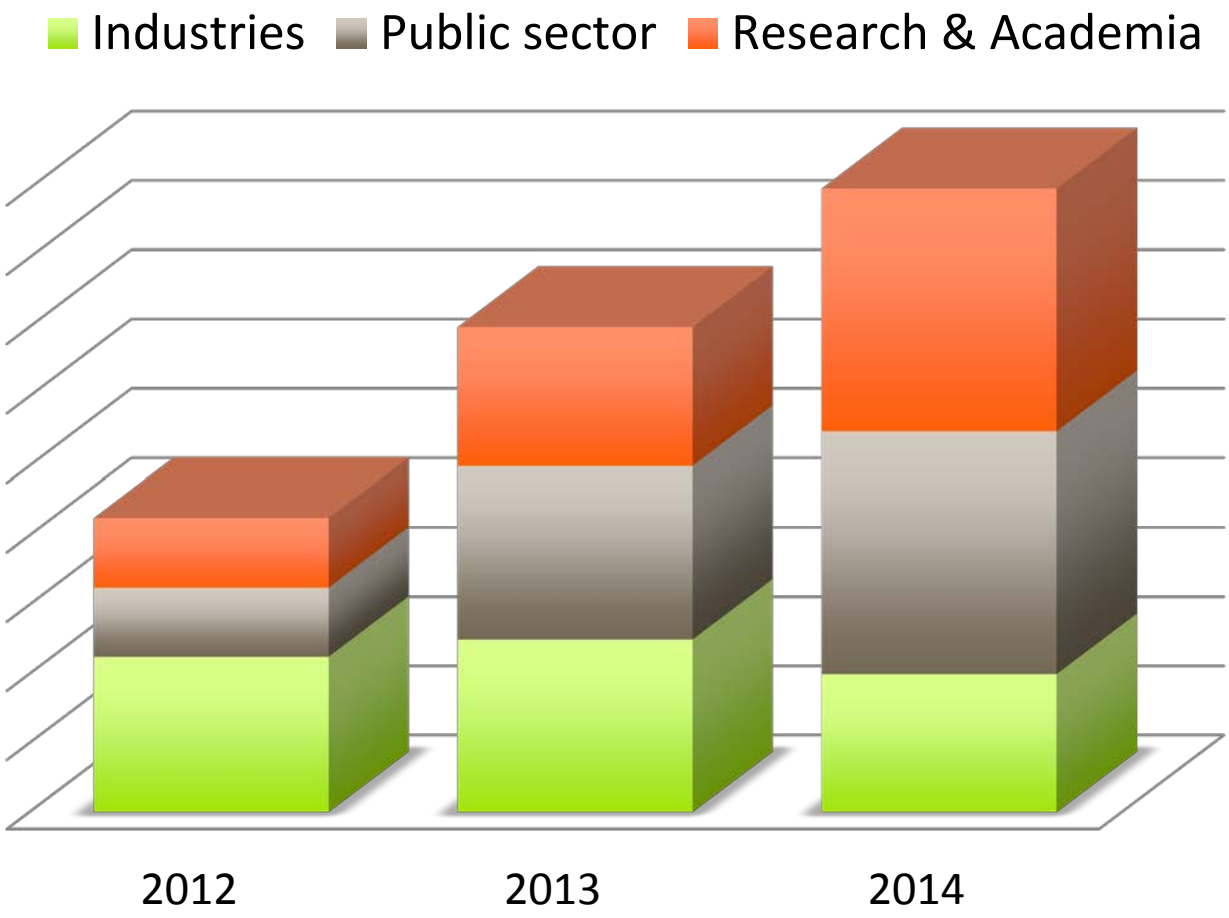
OSPEDALE
SAN RAFFAELE

An innovative startup

- eXact lab enlisted in the italian *"registro imprese innovative"*
- We are meeting two criteria:
  - 100% founder with certified research experience
  - Investment in research more than 20% of the overall turnover

START UP

3 years activity



So far so good

But …

Mainly consultant activities which does not scale

We need a scalable solution to provide services…

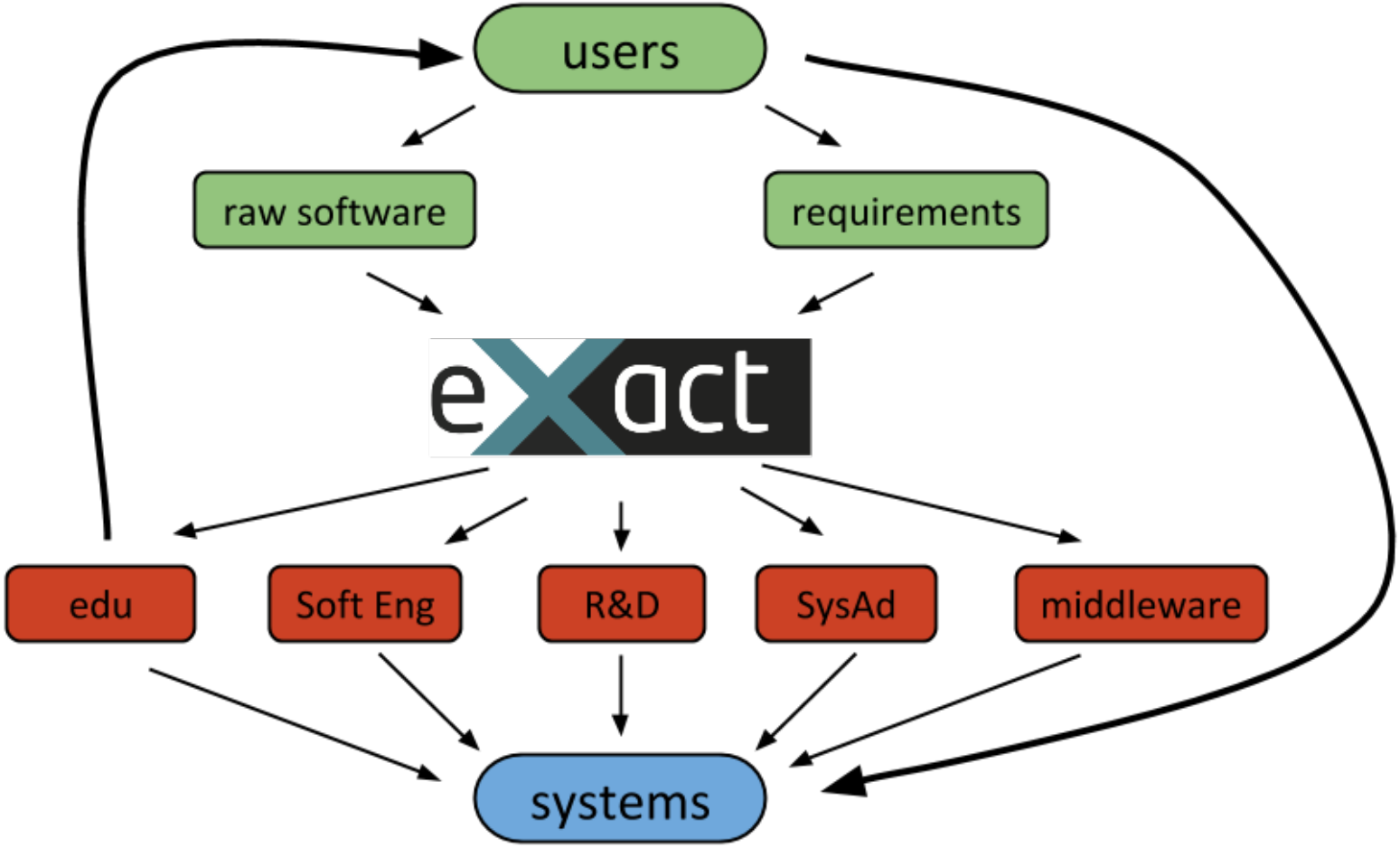
The eXact HPC computational environment

Our target: S(μ)MEs

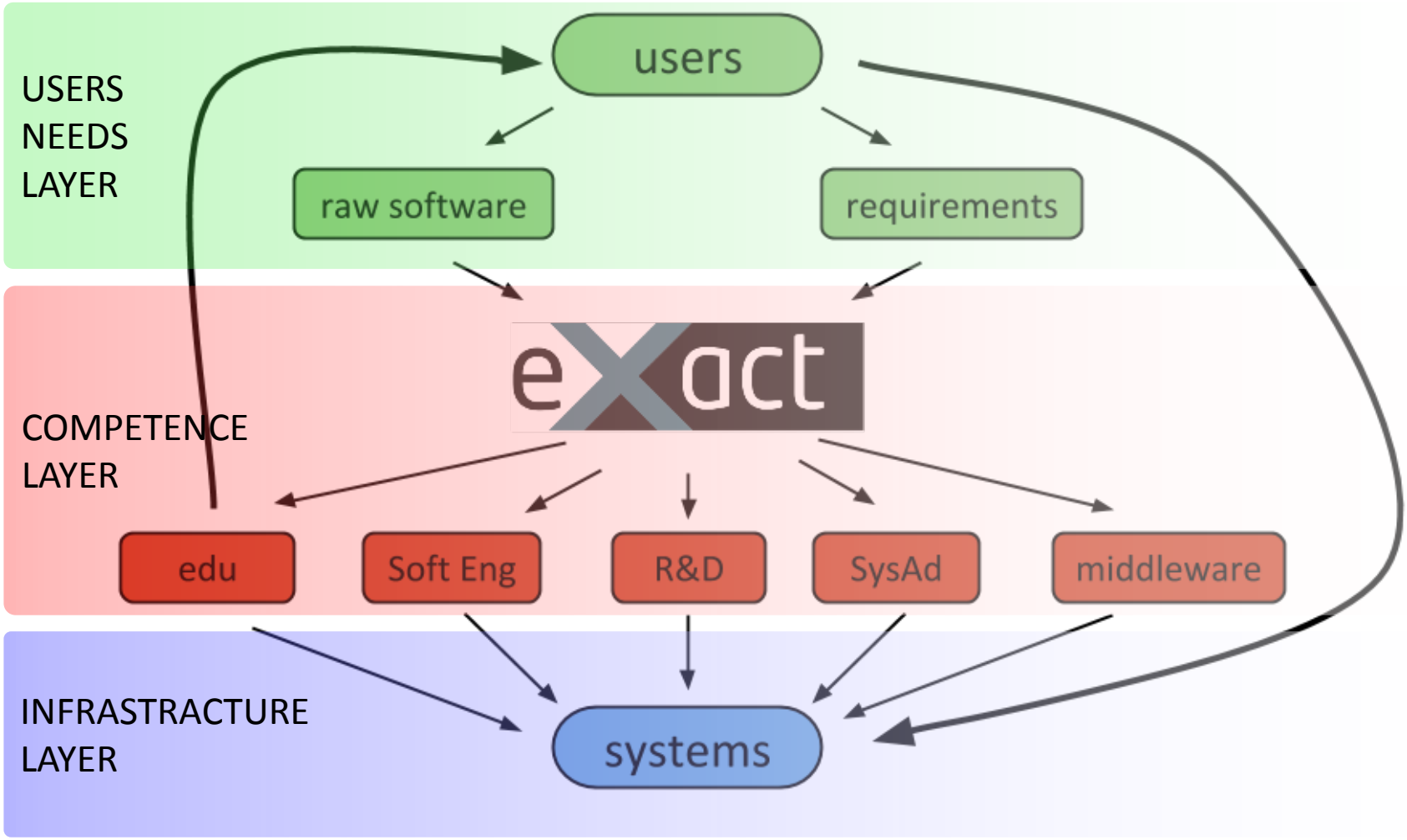
Where:

- No or very limited HPC infrastructure
- Simulations already in place but
- HPC needs still to be properly identified
- Wide spectrum of activities
  - from rendering to CFD

The many aspects of the problem



A three layer view

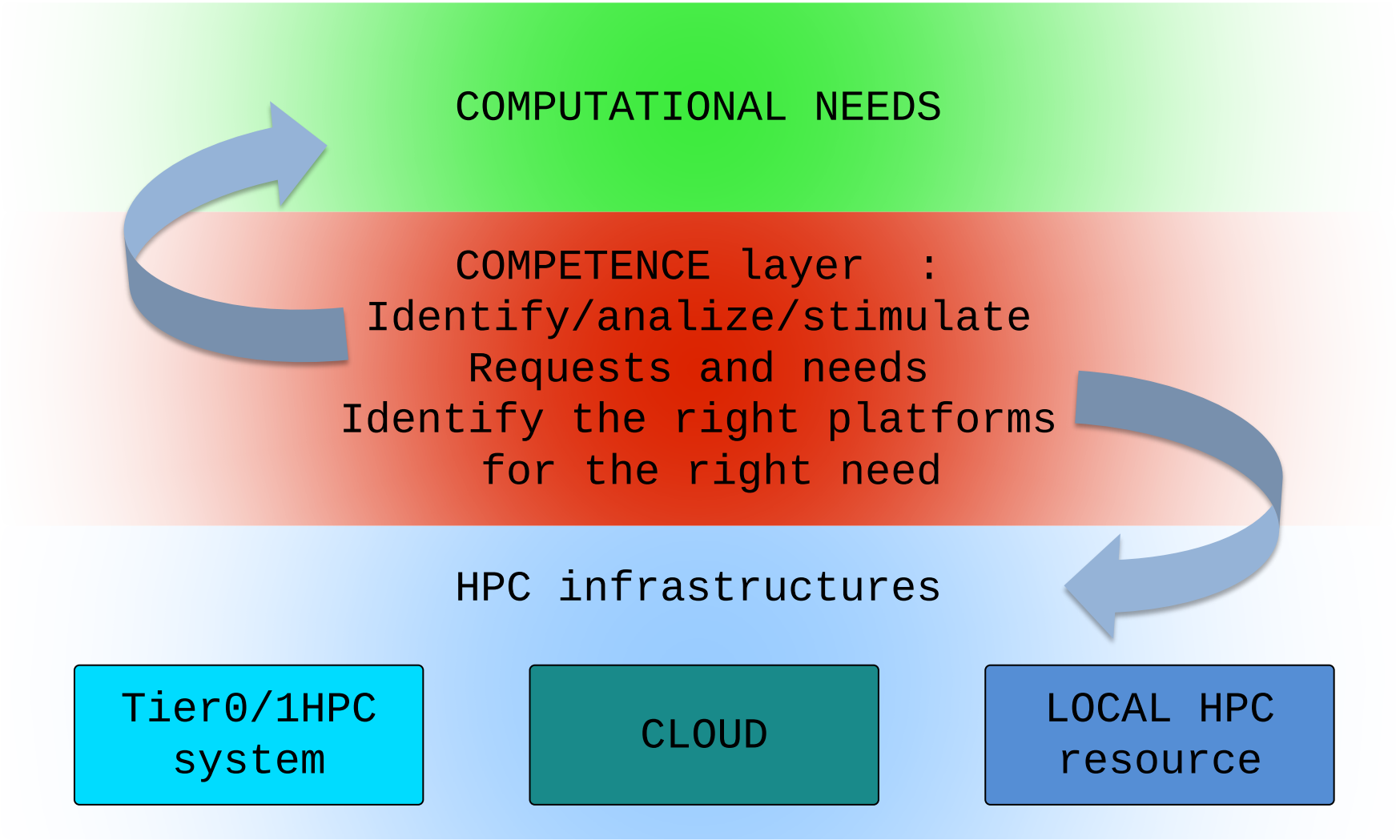


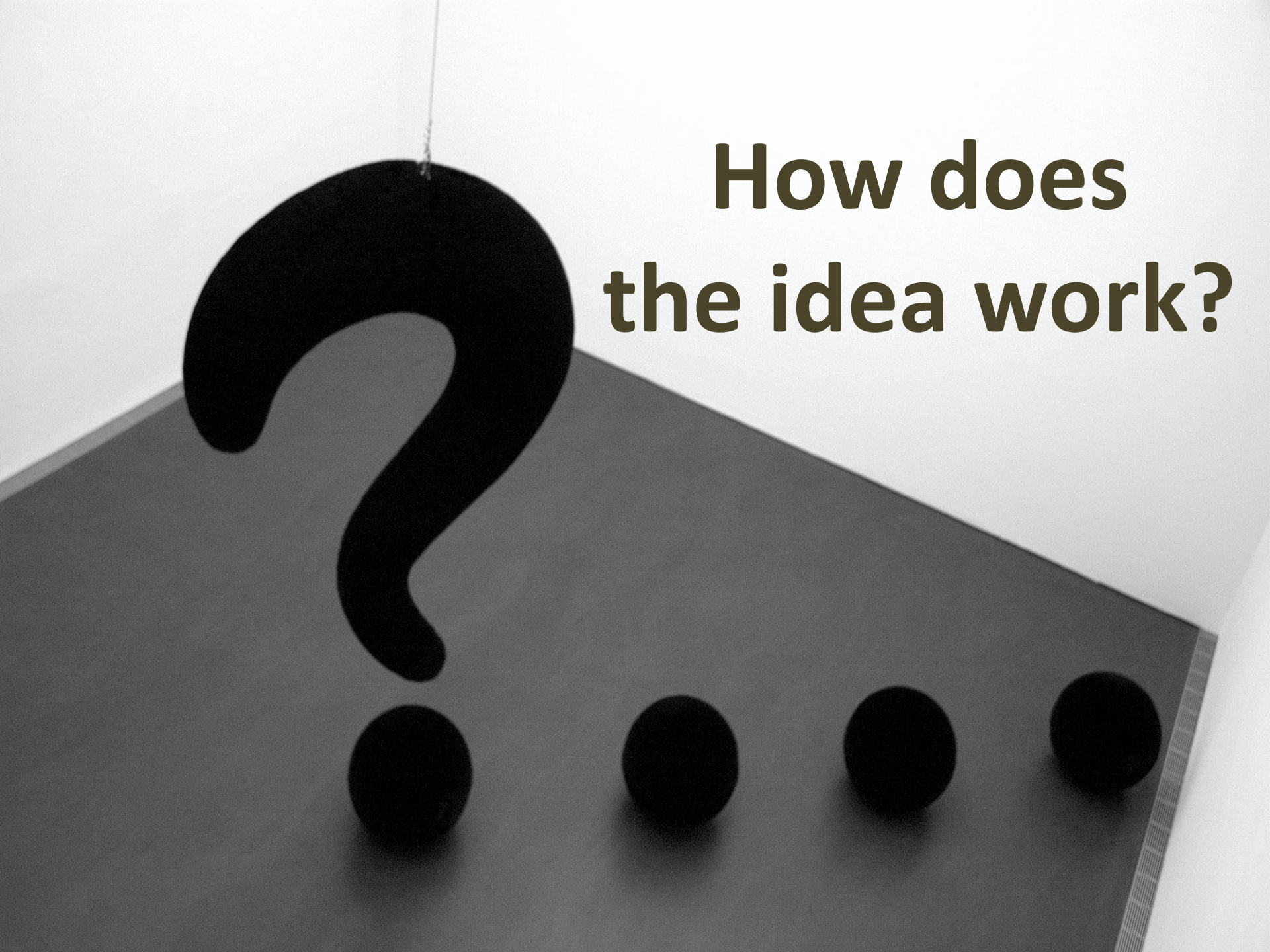
HPC competence layer

- Identify/analize/stimulate requests and needs
  - Competences to create advanced services for HPC final users (technical and scientific skills needed and available)

- Identify/ Provide the right platforms for the right need
  - Technical competences to plan/install/mantain/provide HPC resources and platforms

The integrated view..




How does
the idea work?

Case study 1: XeRiS

The Cloud Platform for Advanced Seismic Hazard Assessment (www.xeris.it)

- Joint collaboration with Math and Geological dept. UNITS
- Innovative DSHA

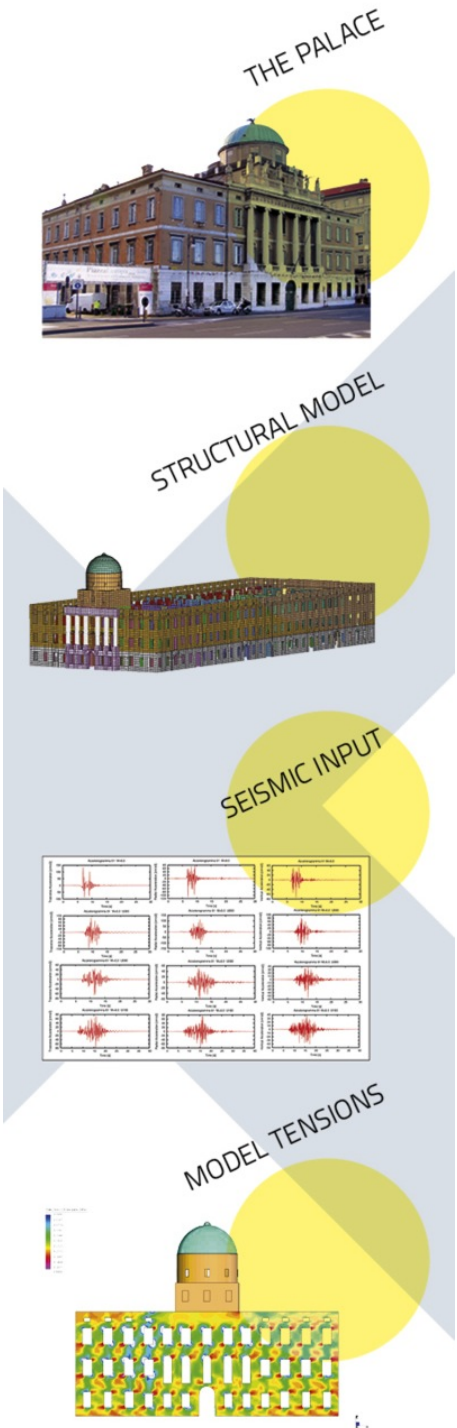
  methodology developed

- Now on the market..

XeRiS: what does it do ?

Seismic assessments of buildings

- Model the seismic input using NDSHA
- Highlight local amplifications of ground shaking, due to the combined effect of source, propagation and site conditions;
- Provide seismic input for detailed engineering analyses, including the dynamic analysis of the structure.



Xeris: the computational environment

- HPC infrastructure: external through cloud (SAAS)
- Competence layer:
  - Internal: HPC/ software re-engineering of scientific software
  - External: seismologist from University of Trieste
- Users
  - Swiss nuclear power plant planning
  - National Institute for Earth Physics, Romania
  - University of Skopje, Macedonia
  - Provincia di Trieste

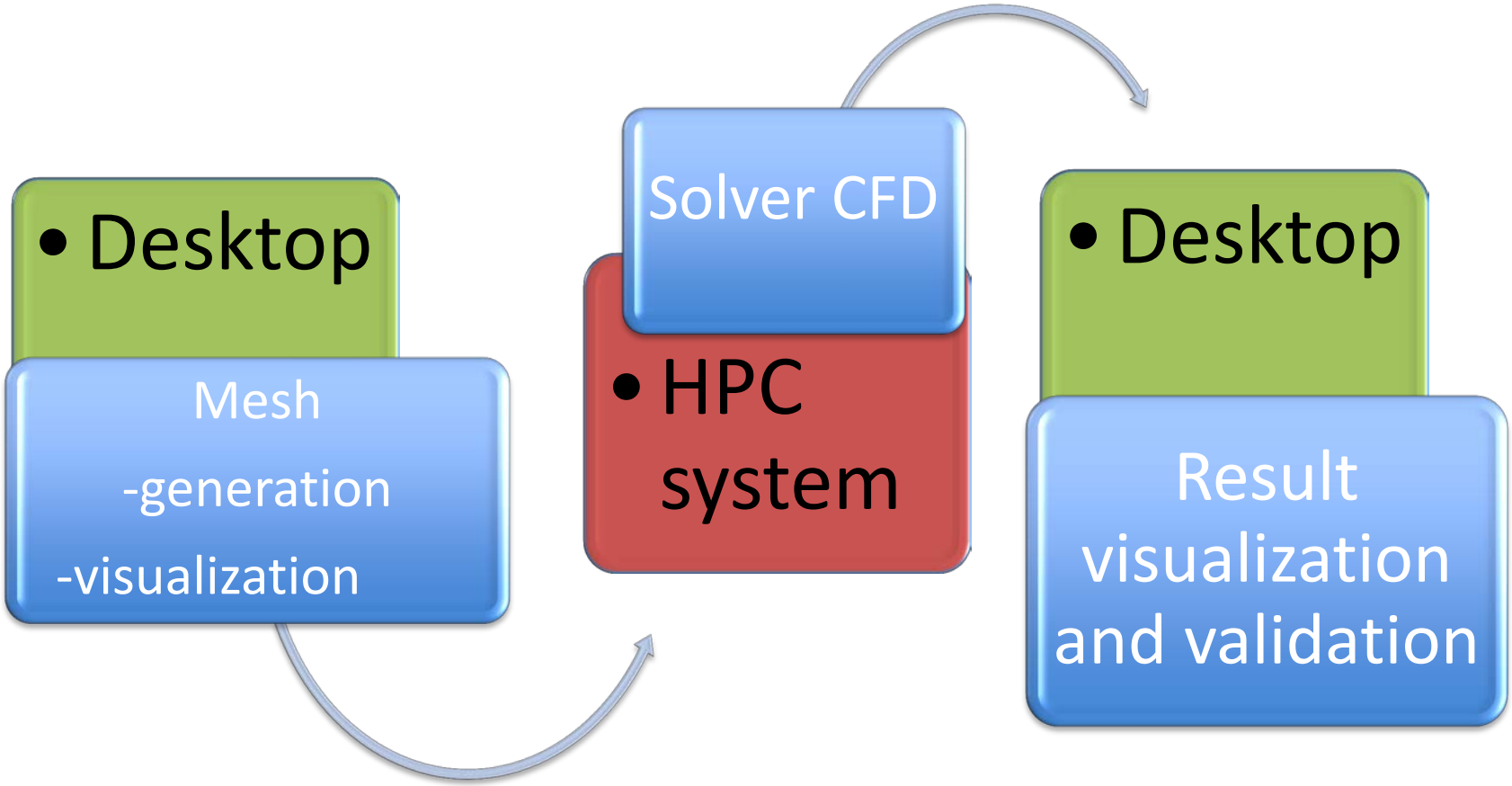
Case study 2: openViewSHIP

FVG funded joint industrial/academic project - **Leaded/Proposed by eXact lab**

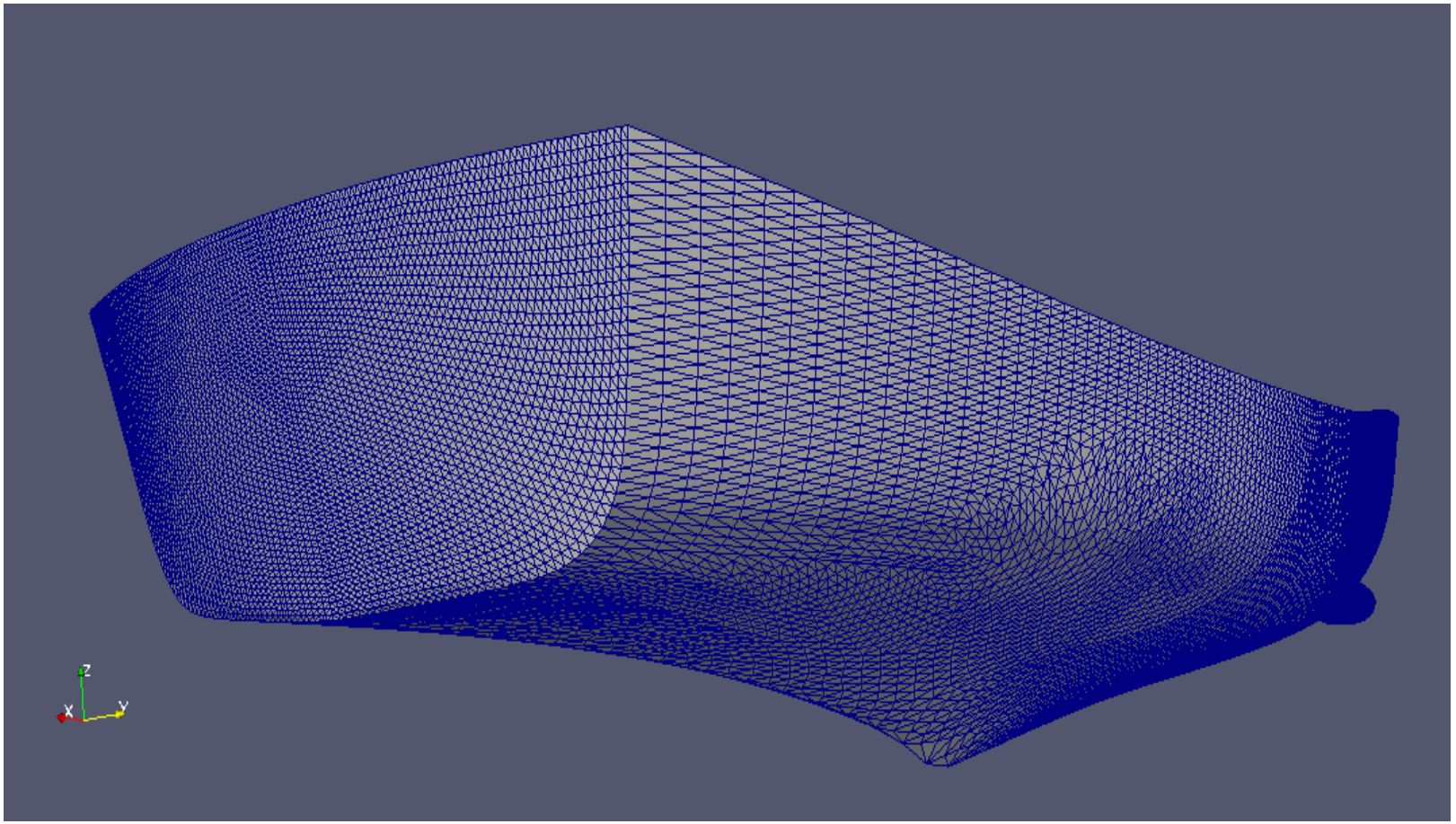
GOAL

Setup an integrated computational ecosystem for CFD hydrodynamics simulations for naval industrial sector in FVG region

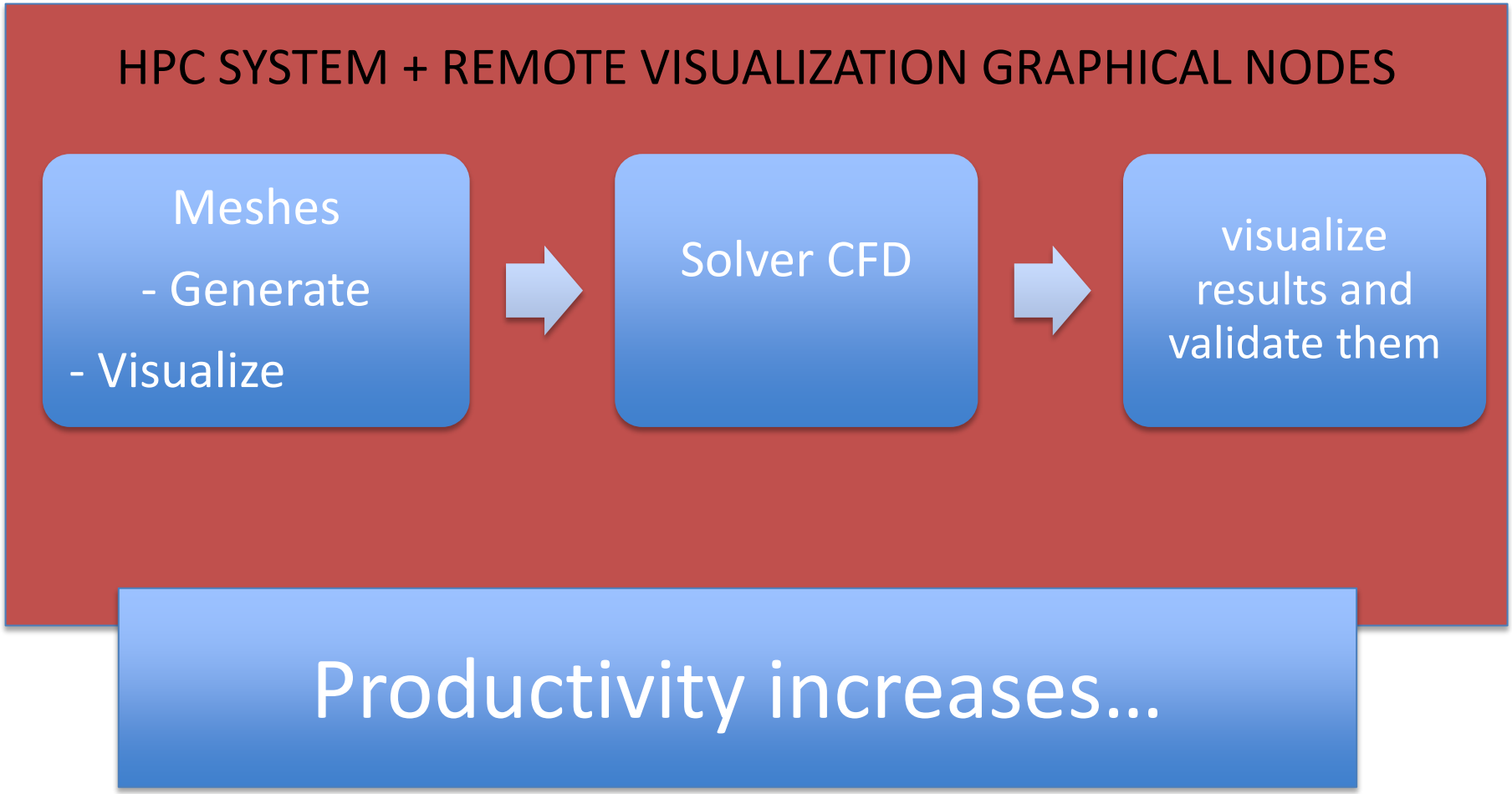
The cumbersome workflow..



The Mesh



our Open*View*SHIP proposal



OpenViewSHIP: the computational environment

- HPC infrastructure: provided by partners and complemented by the “remote visualization facilities”
- Competence layer:
  - Internal: HPC/ software re-engineering of scientific software/ remote visualization tools
- Users:
  - much larger community than the current project

Lesson learned so far …

- Size does not matter (in term of HPC resources) at least in the preliminary phase.
- Size matters in term of enterprise dimension: SME and start-up require a critical mass to be effective
- Industrial approaches/environment requires skills often not in our DNA as academic/research spin-off
- HPC trained young people are in shortage…

Challenges ahead

- Find HPC trained people
- Networks /team–ups of SME at national and transnational level a way to create critical mass and stimulate cooperation among SME
- Define our European dimension
  - Moving from research to industry driven market
  - Interact with large research e-infrastructure

HPC human resources

- Train, with the help of Academia our own human resource
- Sponsor/collaborate with

MHPC
Master in High Performance Computing

www.mhpc.it

Networking with SMEs

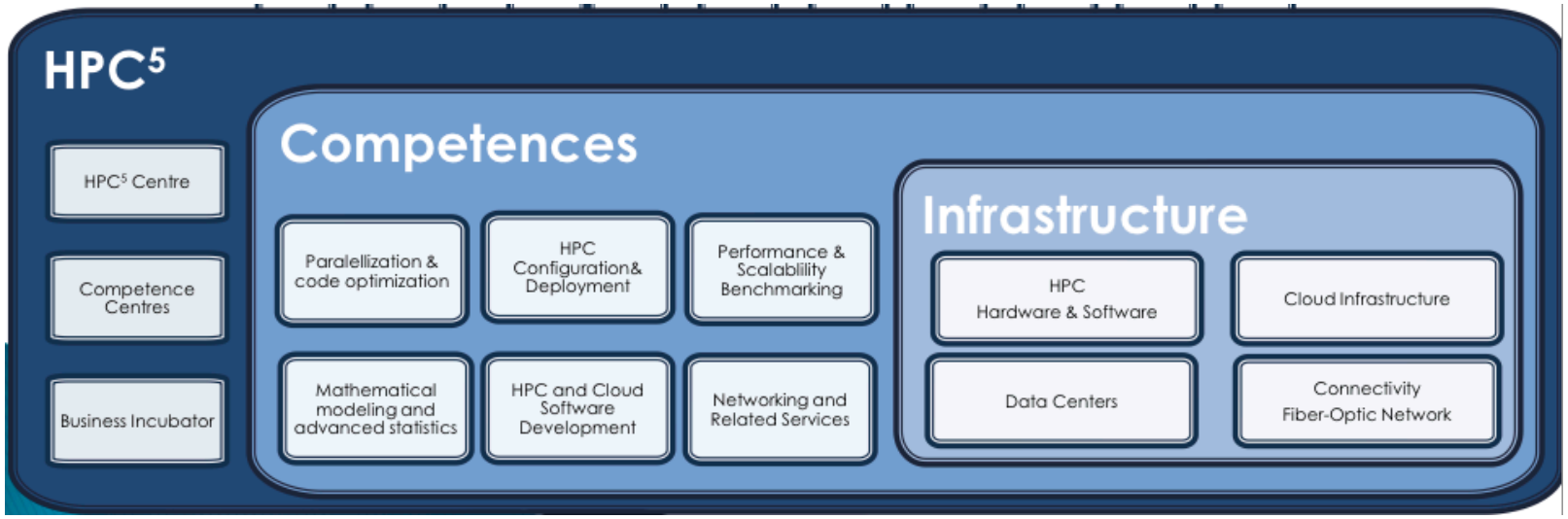
hpc5

high performance
and cloud computing
cross-border comptence
consortium

European Economic Interest Grouping (EEIG) and registered as innovative cluster on

www.clustercollaboration.eu

HPC5: an integrate ecosystem



8 SMEs involved

ARCTUR universe

Spin internetworking

info.era

VAHTA

XLAB NOT IDLE

eXact

conecta RESEARCH

COGITO

www.hpc5.eu

hpc5

high performance and cloud computing cross-border comptence consortium

Contact: info@hpc5.eu slovensko italiano

consortium

partners

mission and objectives

projects

news

The Future of engineering in the Cloud - First CloudFlow Project Conference

The CloudFlow Project Conference is an excellent opportunity for potential experiment proposers to pitch their project idea, to receive valuable feedback form CloudFlow Project Expert Group, and to find

Consortium

Our vision is that, with the combined efforts of the diverse partners, HPC5 will create the most innovative, creative and powerful network for HPC and cloud computing services in the Slovenia-Italy cross-border region. HPC5 will stimulate, facilitate and sustain a business growth system in technologically oriented vertical niches that will generate employment opportunities, improved living standards, fuel innovation, increase competitiveness and create greater investment opportunities in the region. The network aims to be the catalyst for attracting cutting-edge skills needed to spawn research and innovation in the cross-border region.

Building an European dimension

- ETP4HPC
  - We are associated partners participating as SME in the discussion
- HORIZON2020 calls
  - We are part of the eXaneST EU project now under negotiation, expected to start in fall 2015
- PRACE
  - Interaction through SHAPE?

From Prace web site:

The Programme aims to raise awareness and equip European SMEs with the expertise necessary to take advantage of the innovation possibilities opened up by High Performance Computing (HPC), thus increasing their competitiveness.

The Programme will help European SMEs overcome barriers to using HPC such as :cost of operation, lack of knowledge, lack of resources.

It will facilitate the process of defining a workable solution based on HPC and defining an appropriate business model

We are trying to doing the same here ☹

This is our business again ☹

NOT our business here..

HERE we can collaborate.

Our humble proposal

- Devise a tool/mechanism to address jointly the HPC need in European SMEs within our target
- A two phase system:
  - First phase
    - Awareness by SMEs and first play within SME ecosystem
  - Second phase
    - “final user” ready to exploit PRACE large scale facilities

Take home message

- eXact lab is playing hard to find its own best way on the HPC market
- We are setting up/defining HPC services by means of an integrated ecosystem based on competences
- We are open to collaborate with other SME to gain critical mass
- Interaction with e-infrastructure European project could be strategic and new methods/way should be found together

THANKS !

www.exact-lab.it

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