

NexTech 2009

ADVCOMP, AP2PS, CENICS, ECUMN, EMERGING, SEMAPRO, UBICOM

October 11 – 16, 2009 – Sliema, Malta

Grid and Cloud Infrastructures for e-Science Applications

Avirtek, Dar El Tech, eXludus, GridwiseTech, Manjrasoft, NICE

Wolfgang Gentsch, DEISA & OGF

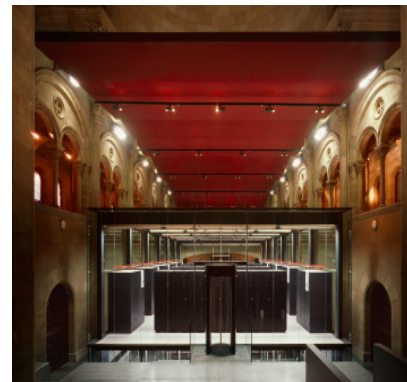
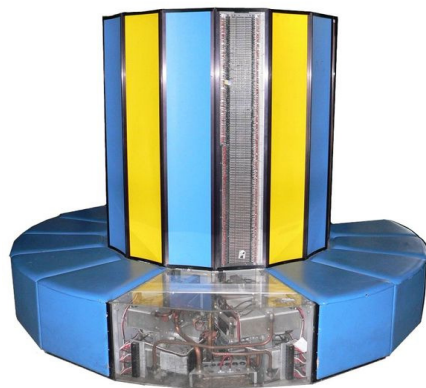
DEISA

NexTech Communities

- **ADVCOM:** Advanced engineering computing and applications in sciences
- **AP2PS:** Advances in P2P systems
- **CENICS:** Advances in circuits, electronics, and micro-electronics
- **ECUMN:** Universal, multiservice networks
- **EMERGING:** Emerging network intelligence
- **SEMAPRO:** Advances in semantic processing
- **UBICOM:** Mobile ubiquitous computing, systems, services, and technologies

45 years ago: HPC centers

- HPC centers are service providers
- For research, education, and industry
- Computing, storage, apps, data, services



NexTech, Malta 2009

Wolfgang Gentzsch

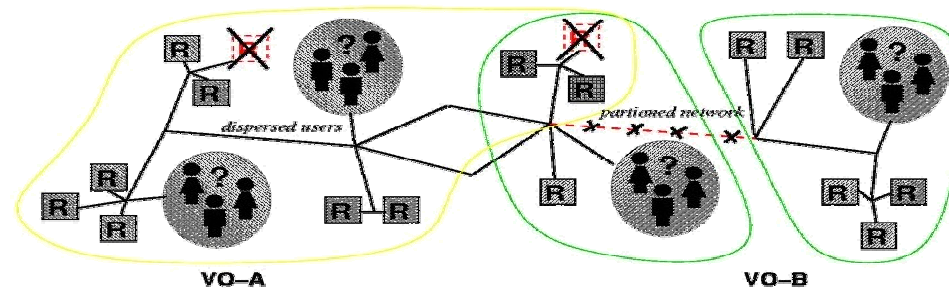
Then we moved to Grids

1998: The Grid: Blueprint for a New Computing Infrastructure

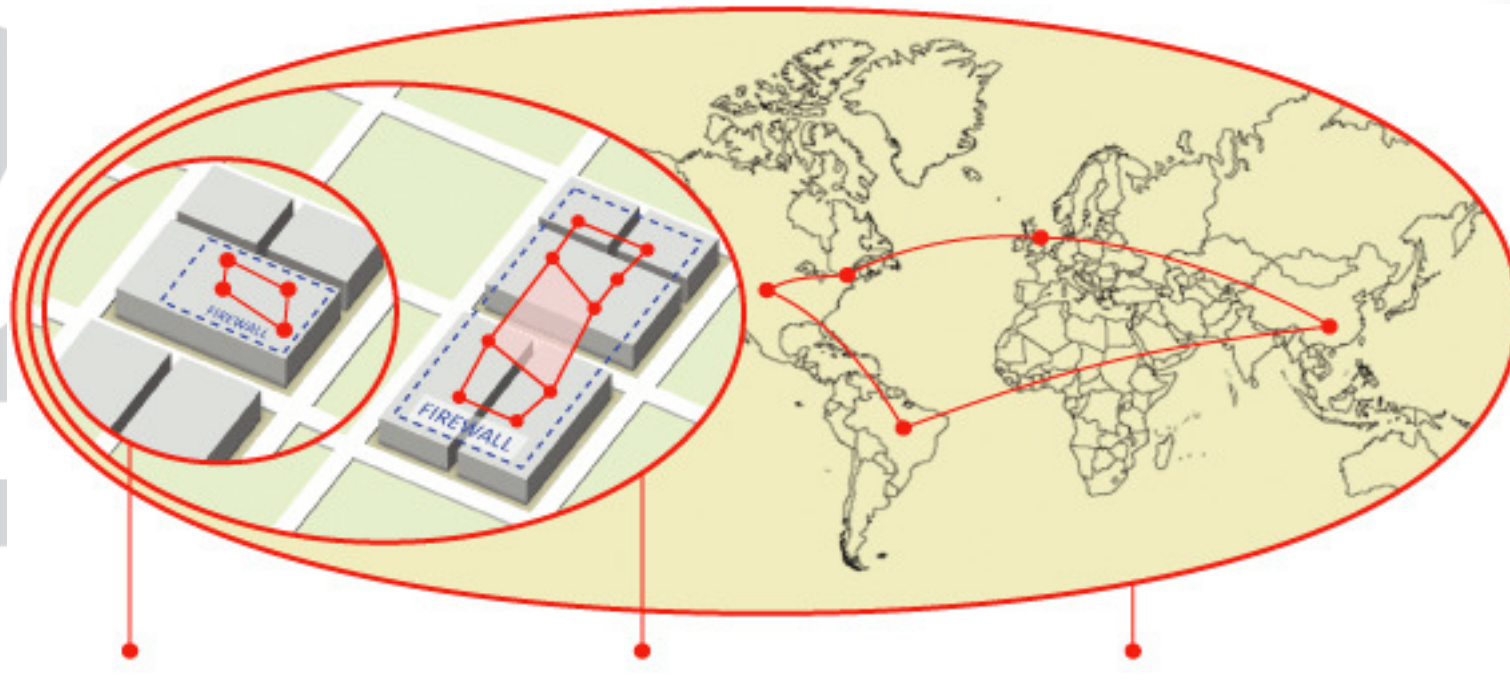
Ian Foster, Carl Kesselman

2002: The Anatomy of the Grid

Ian Foster, Carl Kesselman, Steve Tuecke



Grids (e.g. Sun in 2001)

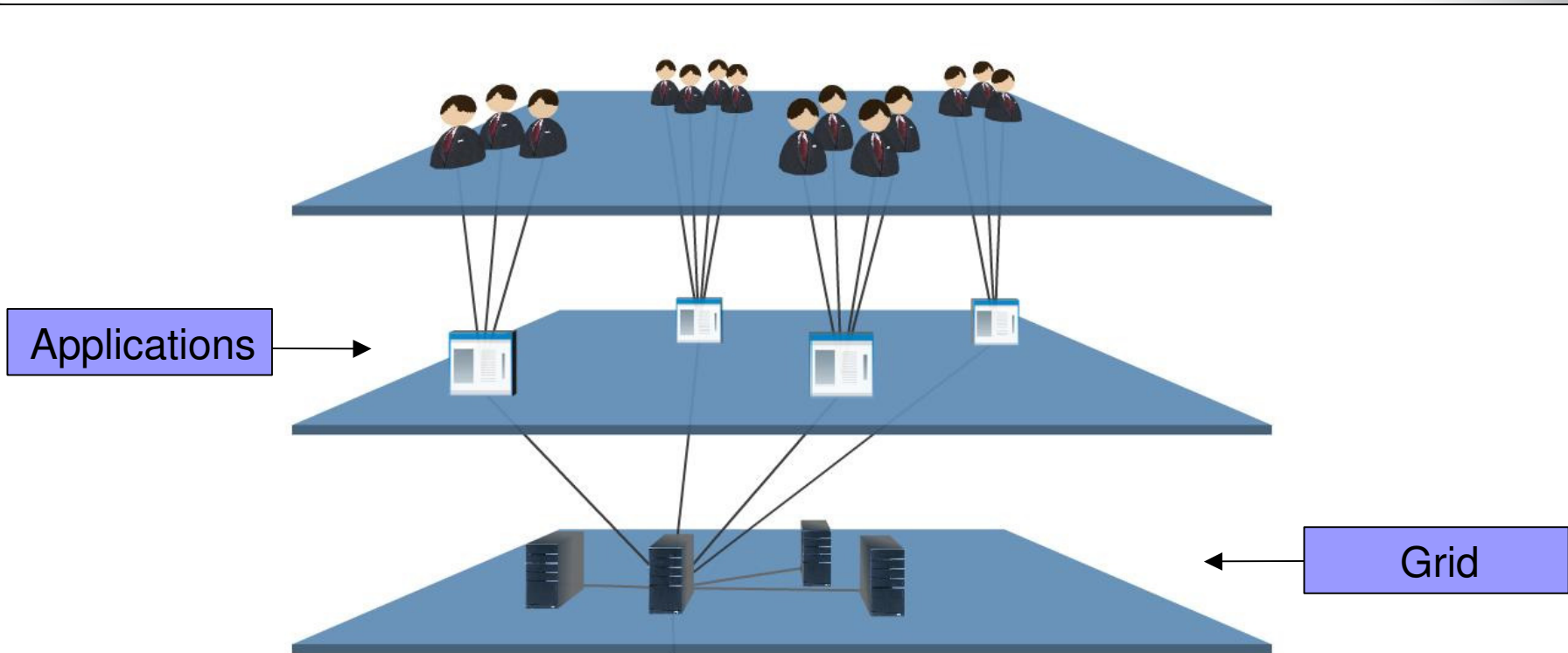


**Departmental
Grids**

**Enterprise
Grids**

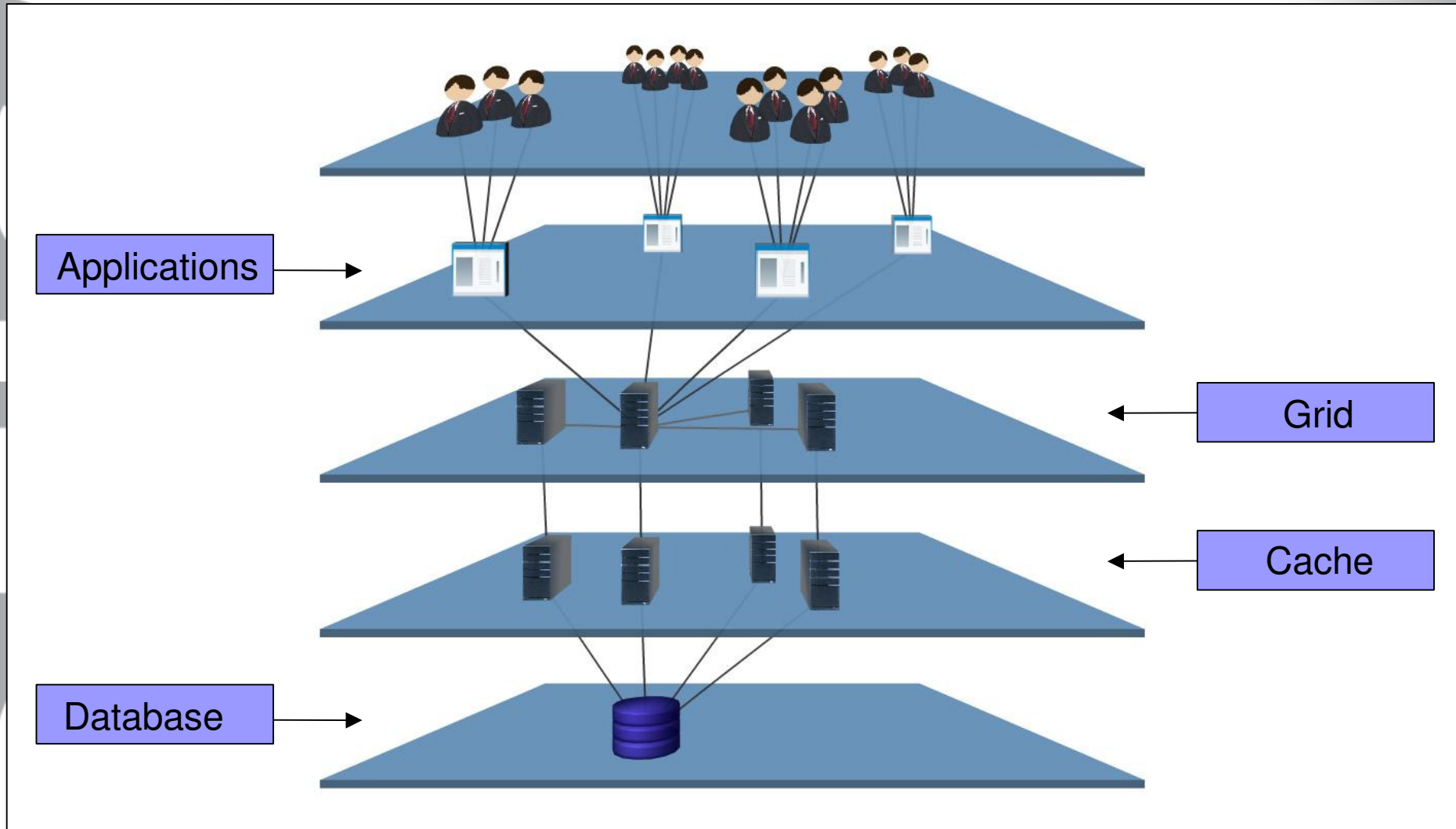
**Global
Grids**

Standard Grid Concepts (often not scalable)

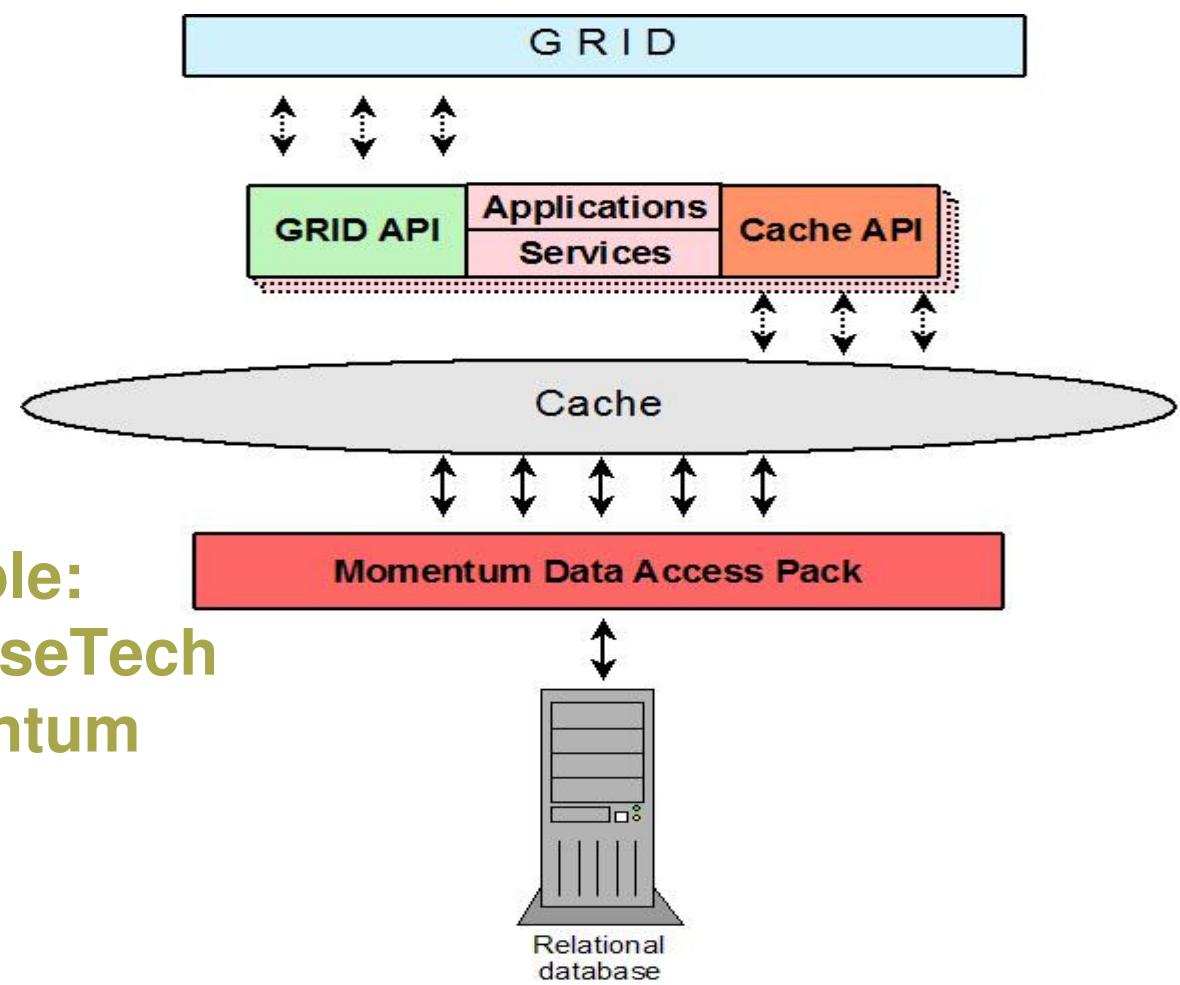


Courtesy: GridwieTech

Cache and Grid concept



A Scalable Data Grid Infrastructure



Example:
GridwiseTech
Momentum

- IaaS, PaaS, SaaS

- Access

- Elasticity

- Abstraction

- Public, private, hybrid

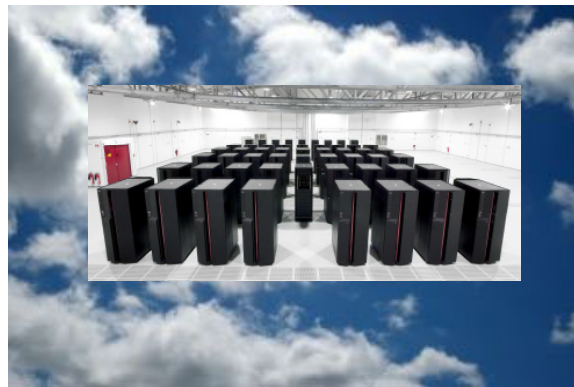
- Capex => Opex

- Pay-per-use

- Scaling

Finally: Clouds

- and
- we
- have
- all
- the
- components
- available
- today



Benefits of moving HPC to Grids

- Closer collaboration with colleagues (VCs)
- More resources => faster/more processing
- Different architectures serve more users
- Failover: move jobs to another system

... and Clouds

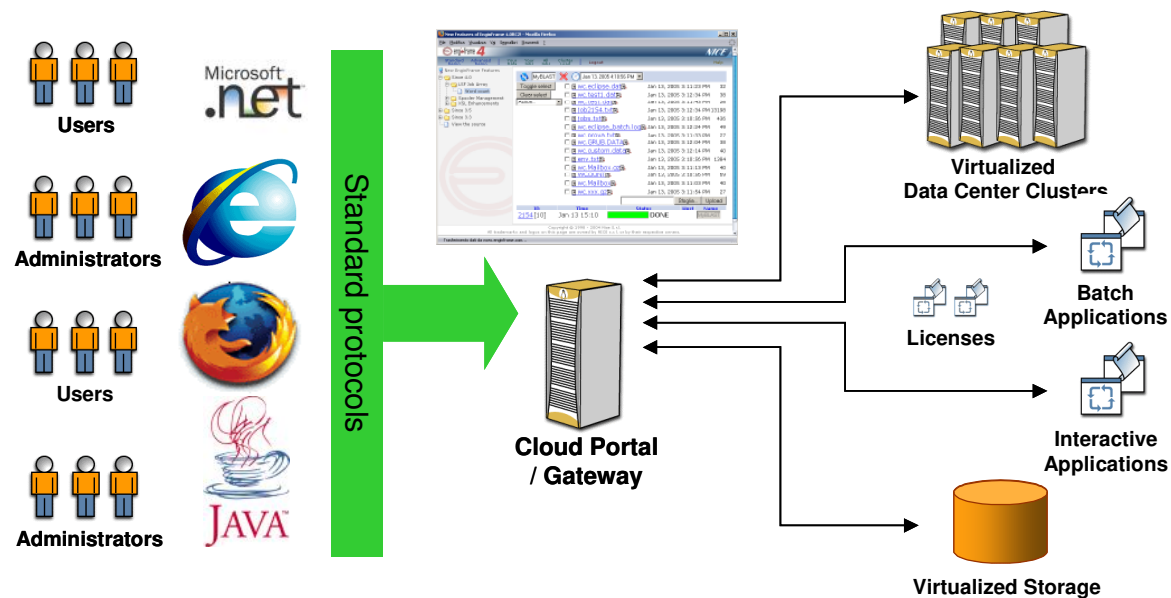
- No upfront cost for additional resources
- CapEx => OpEx, pay-per-use
- Elasticity, scaling up and down
- Hybrid solution (private and public cloud)

The Cloud of Cloud Companies

- Amazon
- Google
- Sun
- Salesforce
- Microsoft
- IBM
- Oracle
- EMC
- Cloudera
- Cloudsoft
- Akamai
- Areti Internet
- Enki
- Fortress ITX
- Joyent
- Layered Technologies
- Rackspace
- Terremark
- Xcalibre
- Manjrasoft / Aneka
- GridwiseTech / Momentum
- NICE/EnginFrame

NICE EnginFrame Cluster/Grid/Cloud Portal

Remote, interactive, transparent, secure access to apps & data on corporate Intranet or Internet, or in the Cloud.



ANEKA Cloud Platform

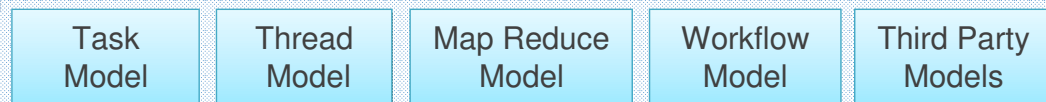
SaaS



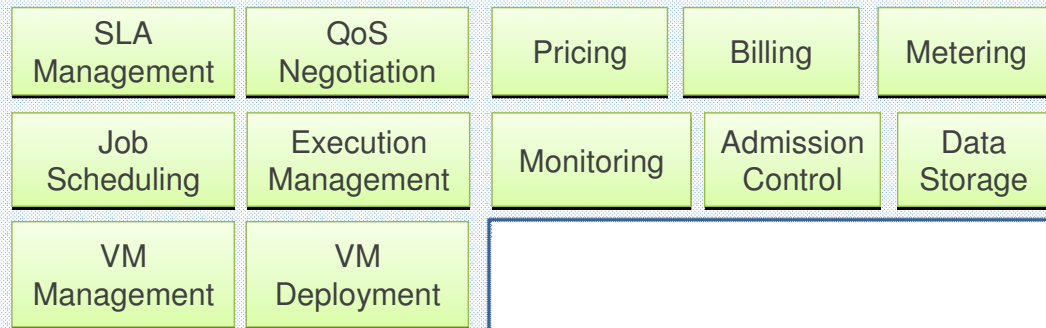
Cloud applications

Social computing, Enterprise, ISV, Scientific, CDNs, ...

Cloud Programming Models & SDK



Core Cloud Services

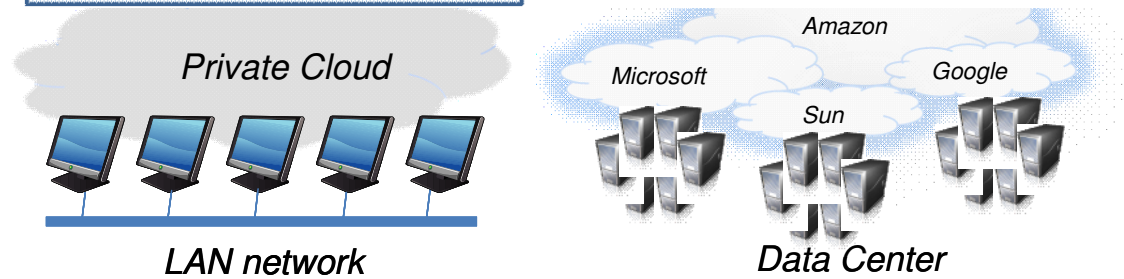


Aneka Cloud Platform

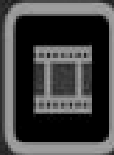
PaaS



IaaS



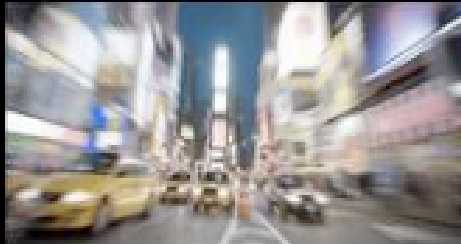
Courtesy: Manjrasoft



ANIMOTO beta

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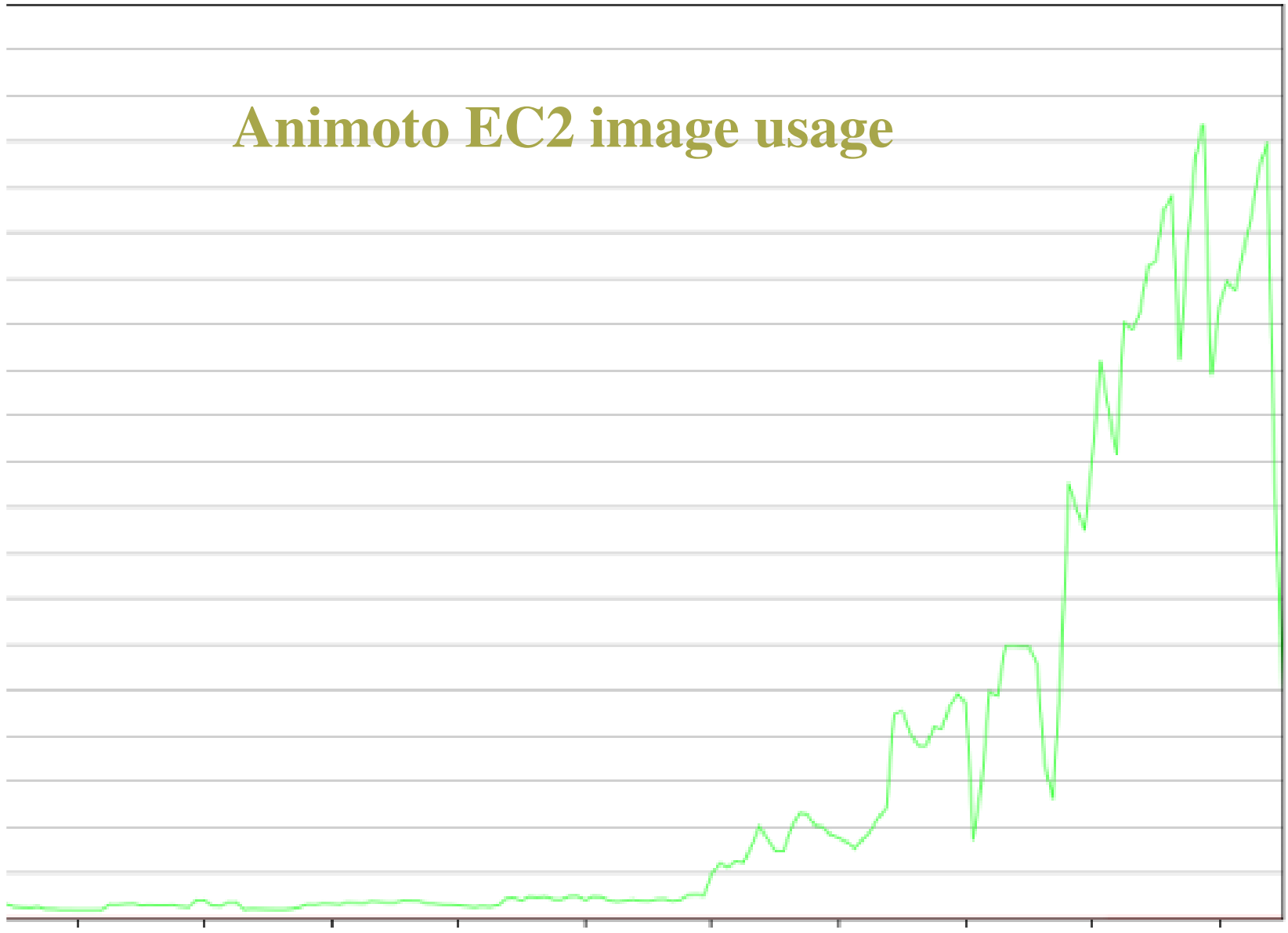
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Animoto EC2 image usage

0

Day 1

Day 8



Next: e-infrastructures

Infrastructure: “The basic systems and services ... a country or organisation needs to work efficiently” Cambridge dictionary

- **Maturity**

- Ubiquity
- Accessibility
- Transparency
- Reliability

- **Formation**

- through connecting isolated systems and networks

...for Research

- to support excellence and innovation
- production quality ICT-based services for all researchers

Courtesy Costas Glinos EU
eConcertation'09, Brussels

The EU's e-Infrastructures vision: *empower research communities through ubiquitous, trusted and easy access to services for data, computation, communication and collaborative work*



Scientific facilities, research communities

Courtesy Costas Glinos EU

e-Infrastructures in action



Innovating the scientific process:
global virtual research communities



Accessing knowledge:
scientific data



Experimenting *in silico*:
simulation and visualisation



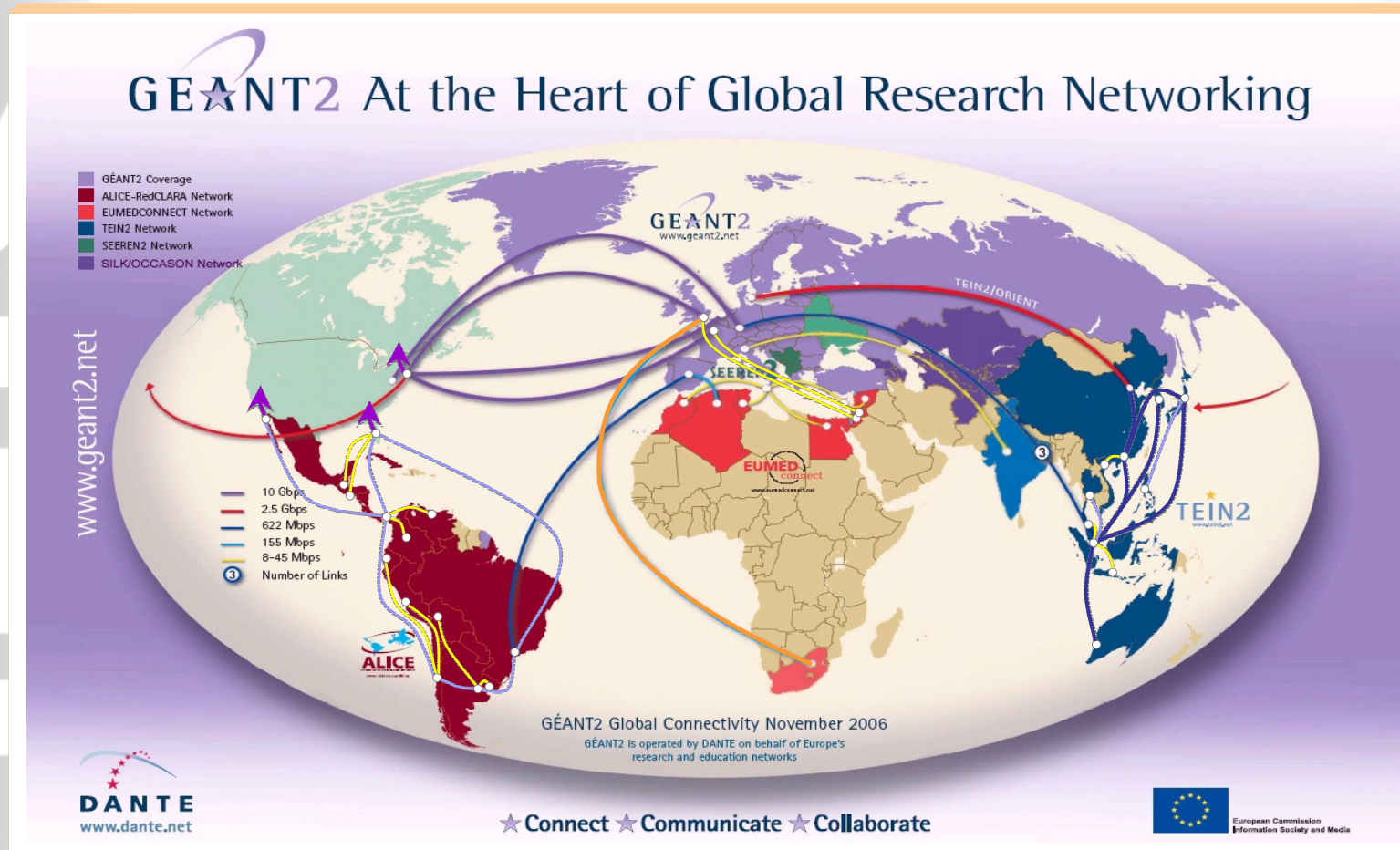
Sharing the best computational resources:
e-Science grid, supercomputing, clouds



Linking at the speed of the light:
GÉANT

Courtesy Costas Glinos EU

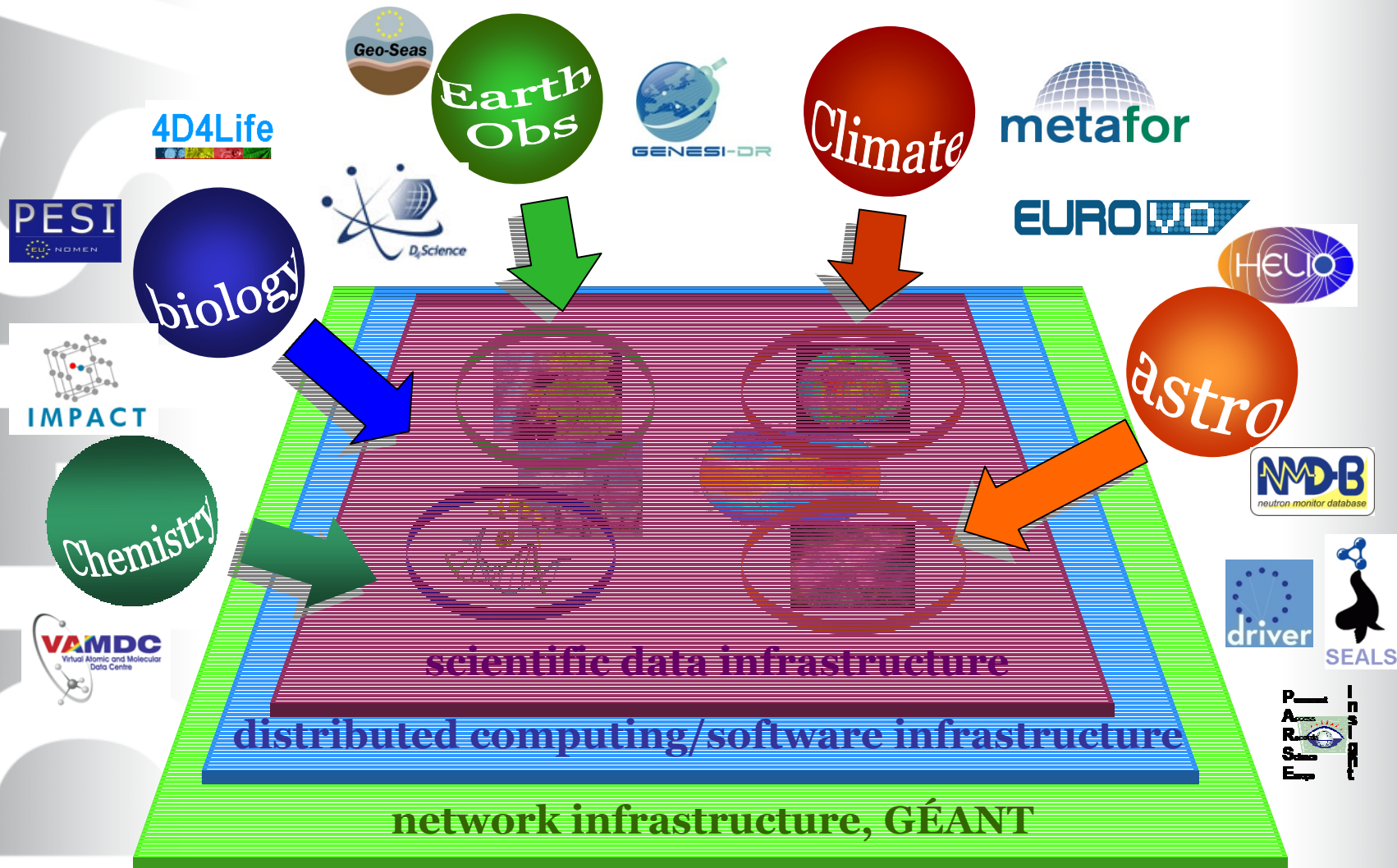
Europe's global connectivity



Courtesy Costas Glinos EU

Computing & Data e-Infrastructure

 Distributed
European
Infrastructure for
Supercomputing
Applications



„My‘ current project:

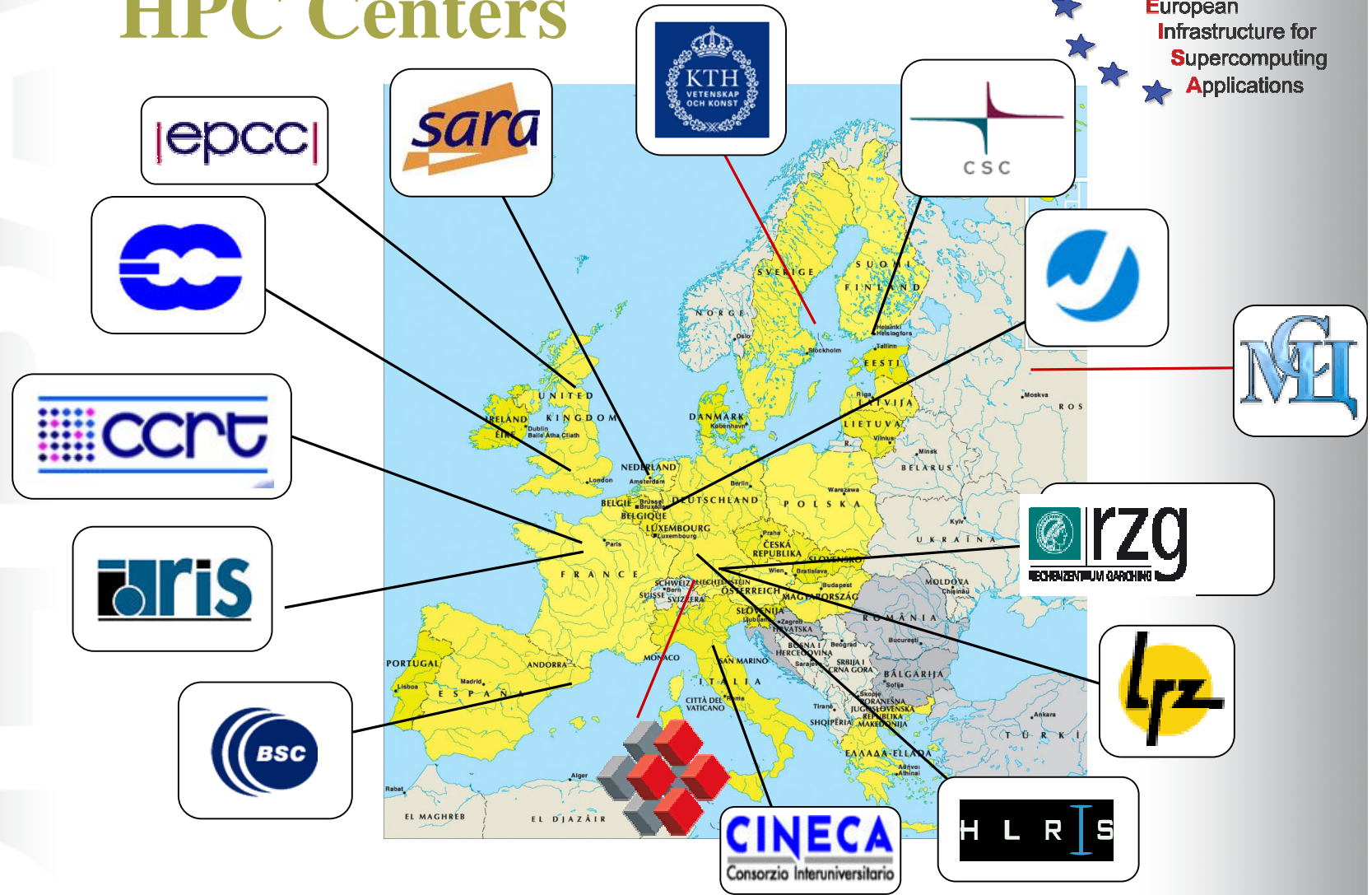
DEISA: Grid or Cloud ?

Distributed European Infrastructure for Supercomputing Applications

HPC Ecosystem for Grand-Challenge Applications

HPC Centers

 Distributed European Infrastructure for Supercomputing Applications



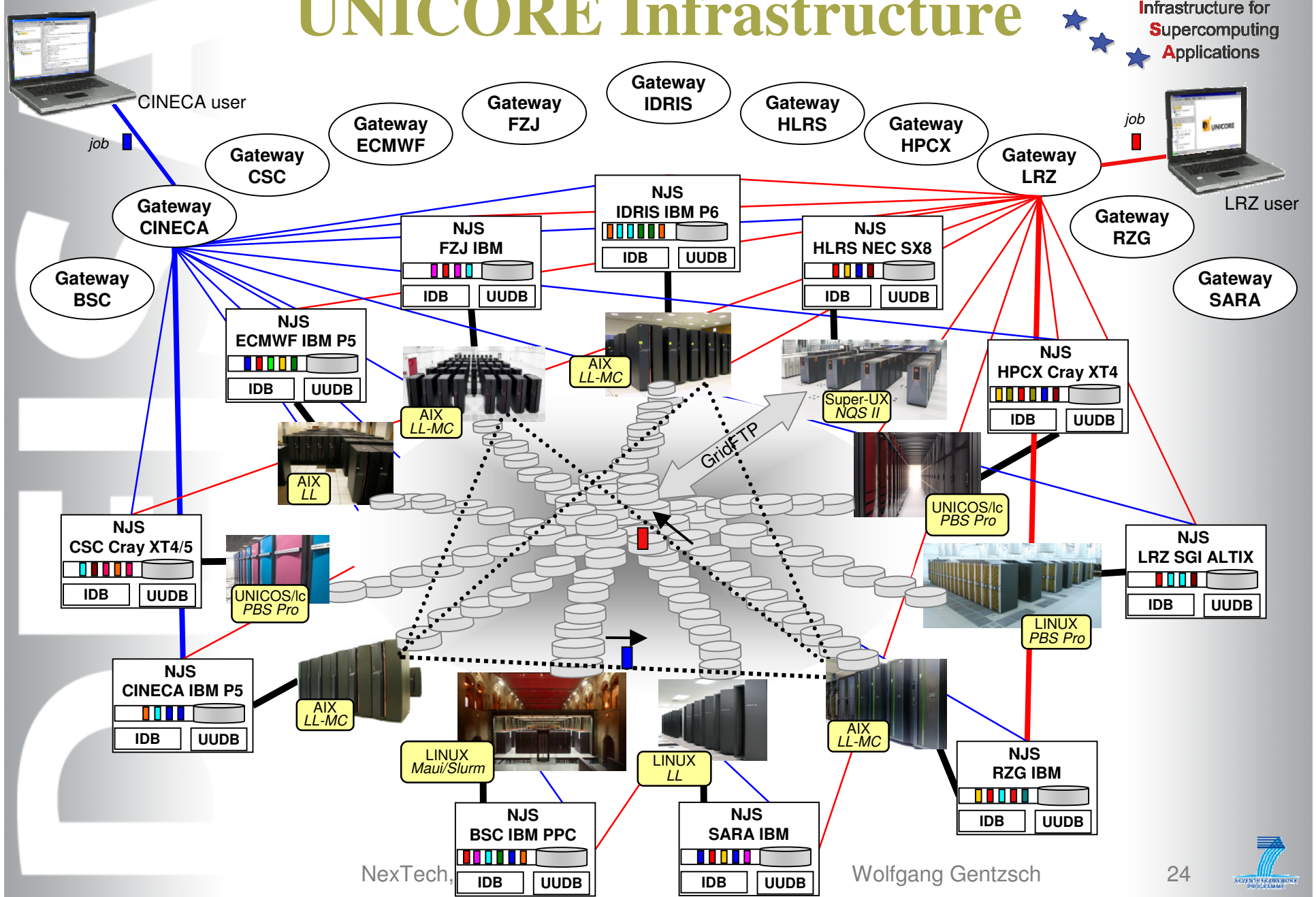
DEISA1: May 1st, 2004 – April 30th, 2008

DEISA2: May 1st, 2008 – April 30th, 2011



UNICORE Infrastructure

Distributed European Infrastructure for Supercomputing Applications

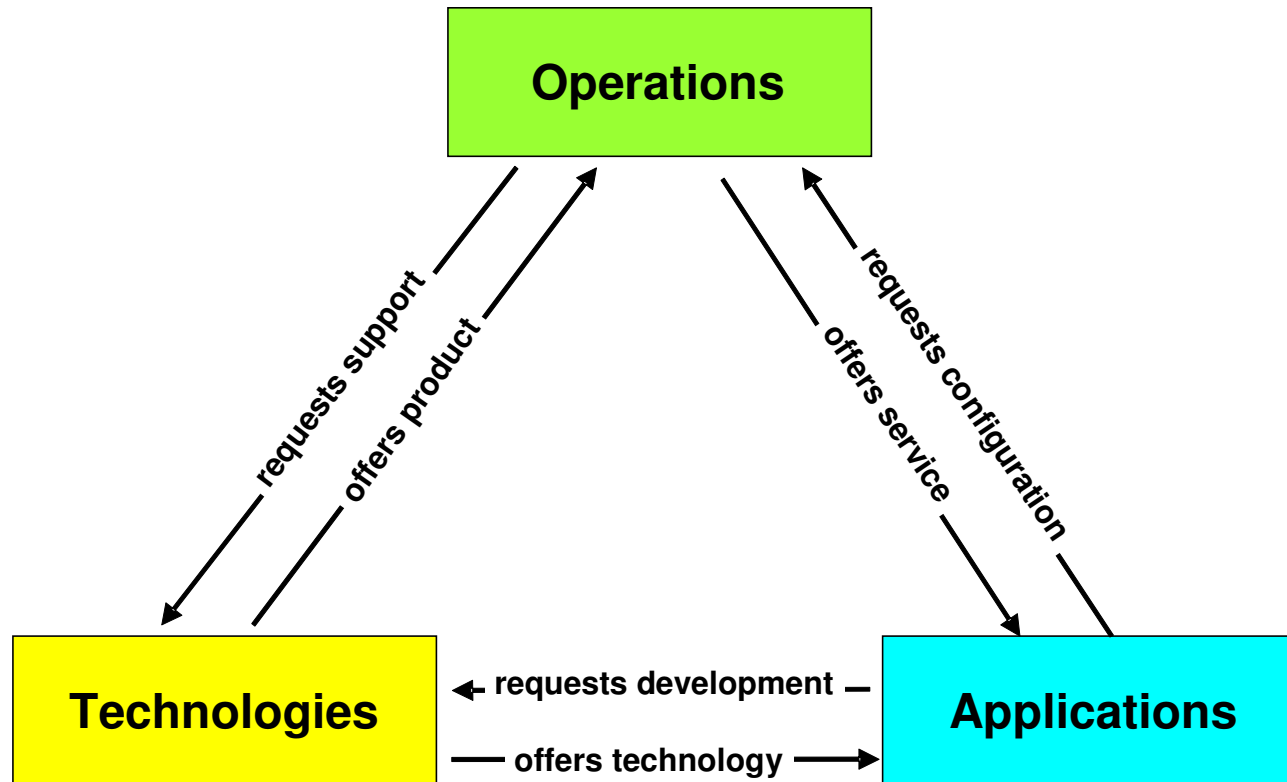


NexTech,

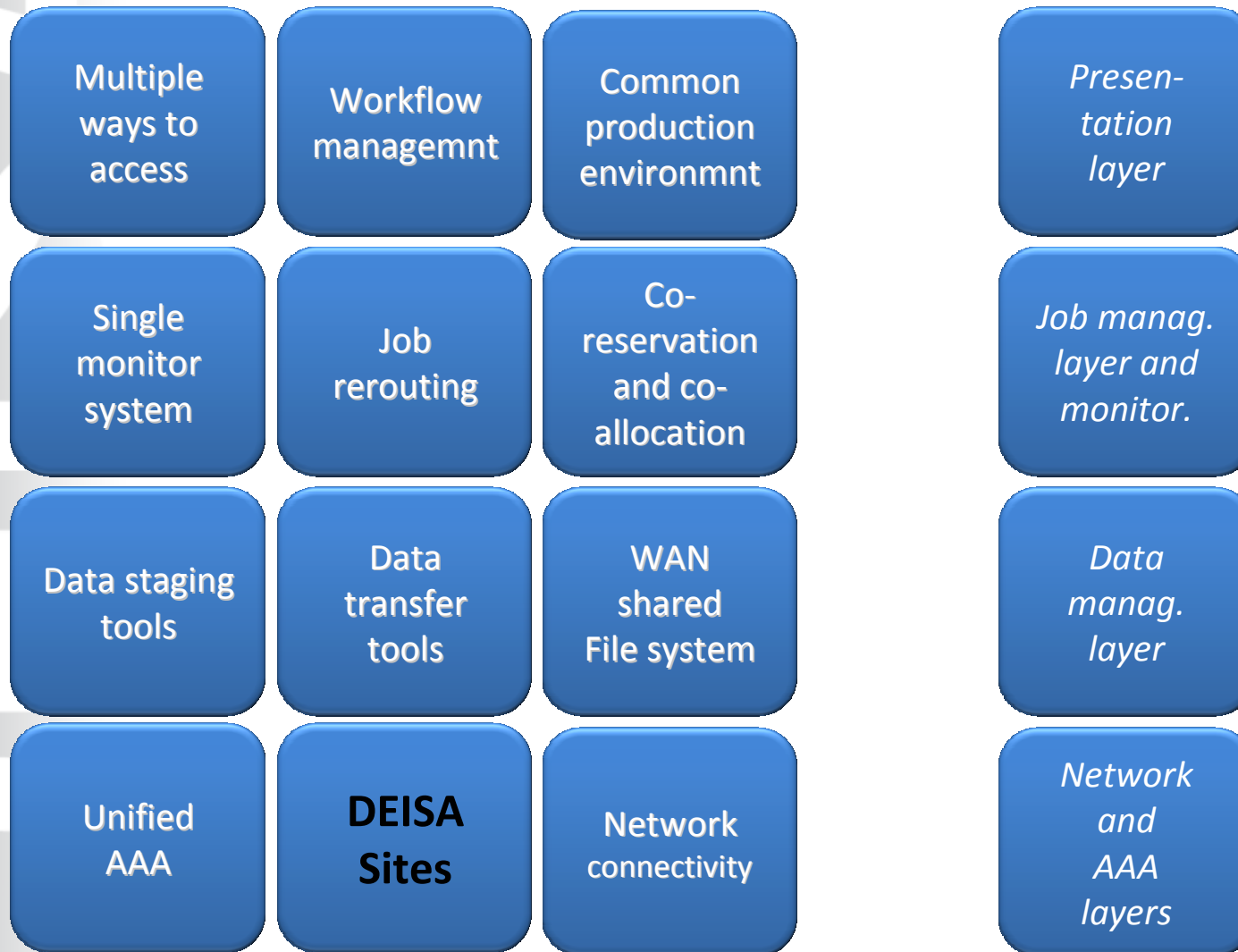
Wolfgang Gentzsch

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Categories of DEISA services

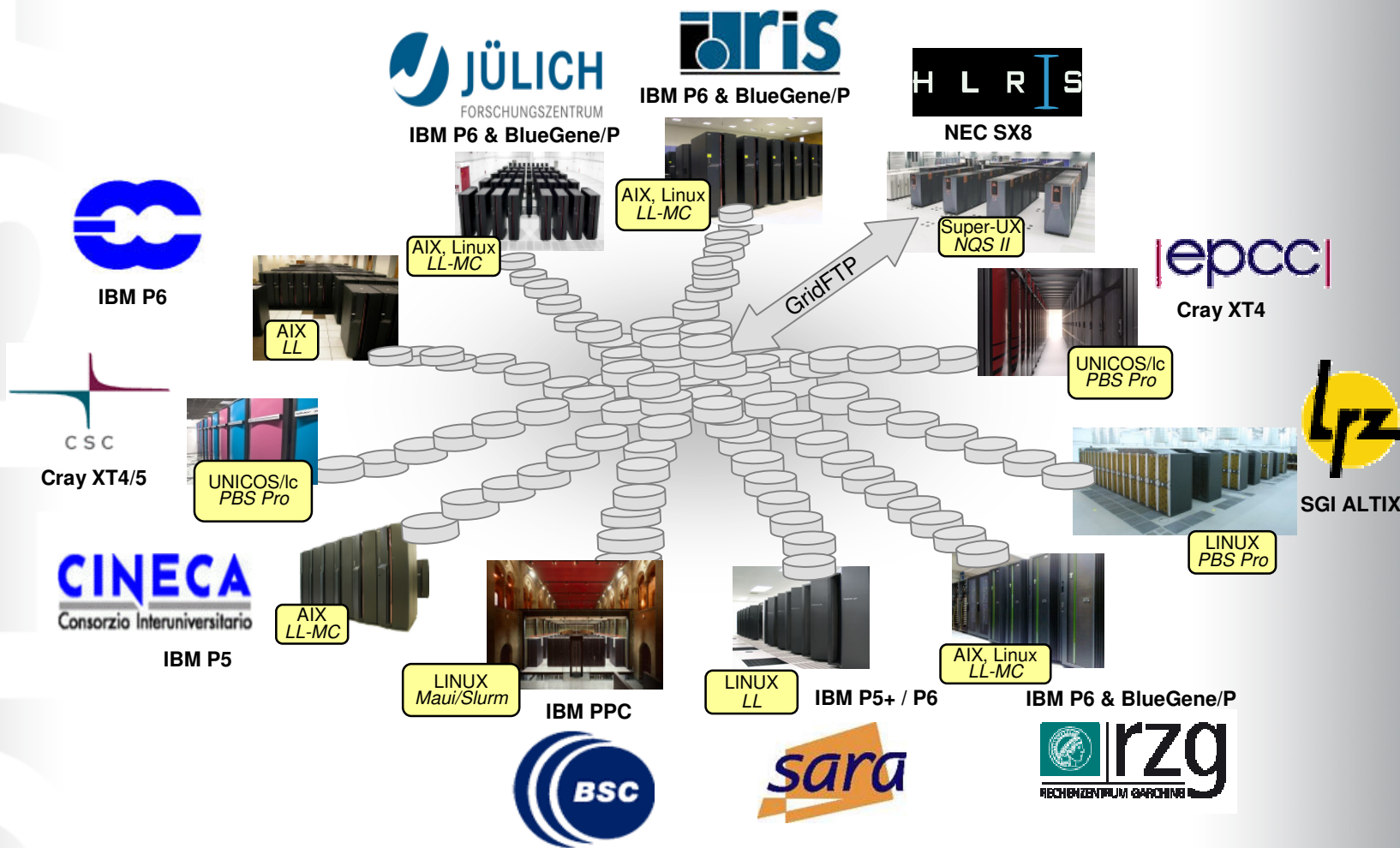


DEISA Service Layers



Global File System

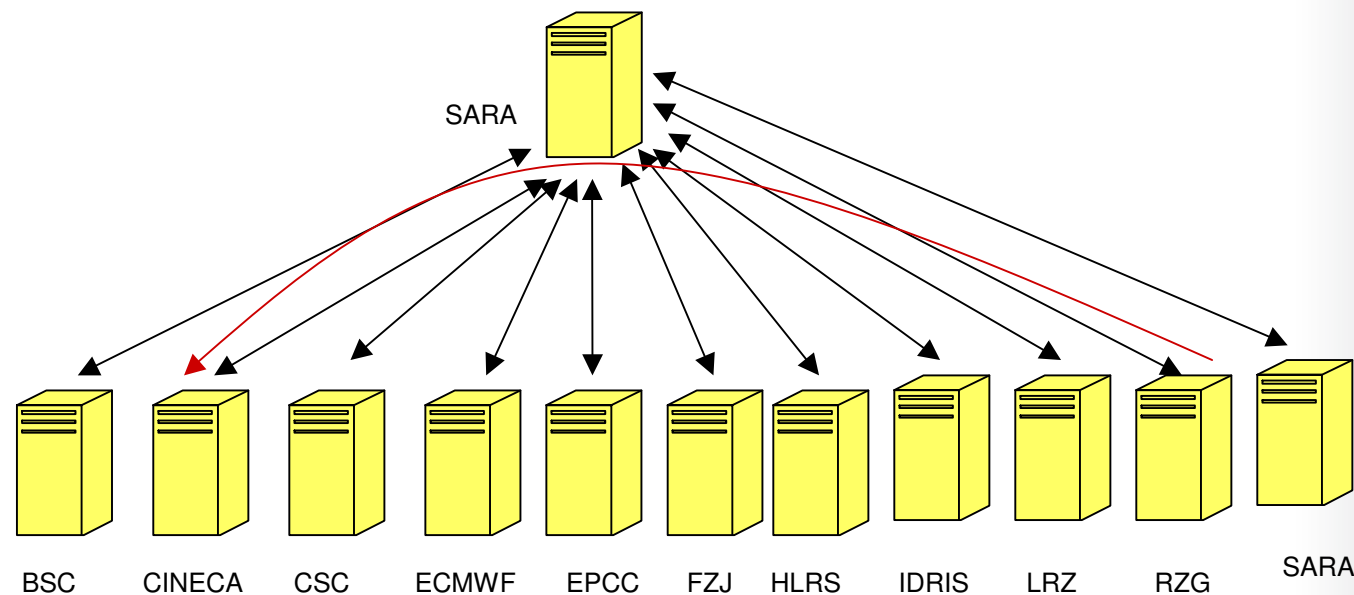

Distributed European Infrastructure for Supercomputing Applications



Global transparent file system based on the Multi-Cluster General Parallel File System (MC-GPFS of IBM)

User management

- A dedicated LDAP-based distributed repository administers DEISA users
- Trusted LDAP servers are authorized to access each other (based on X.509 certificates) and encrypted communication is used to maintain confidentiality



DEISA: Grid or Cloud ?

- Built on top of **proven**, professional **infrastructure** of HPC centers with expertise in implementation, operation, services.
- Ecosystem of resources, middleware, applications **respecting** administrative, cultural and political **autonomy** of partners.
- Globalizing existing HPC services - from local to global - according to user requirements: revolution by **evolution**.
- User support: user-friendly access to resources, **porting** user applications onto turnkey architecture.
- After EU funding, DEISA HPC ecosystem will operate in a **sustainable** way, in the interest of the ‘global scientist’, as...

... almost an HPC Cloud !

Thank You

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DEISA