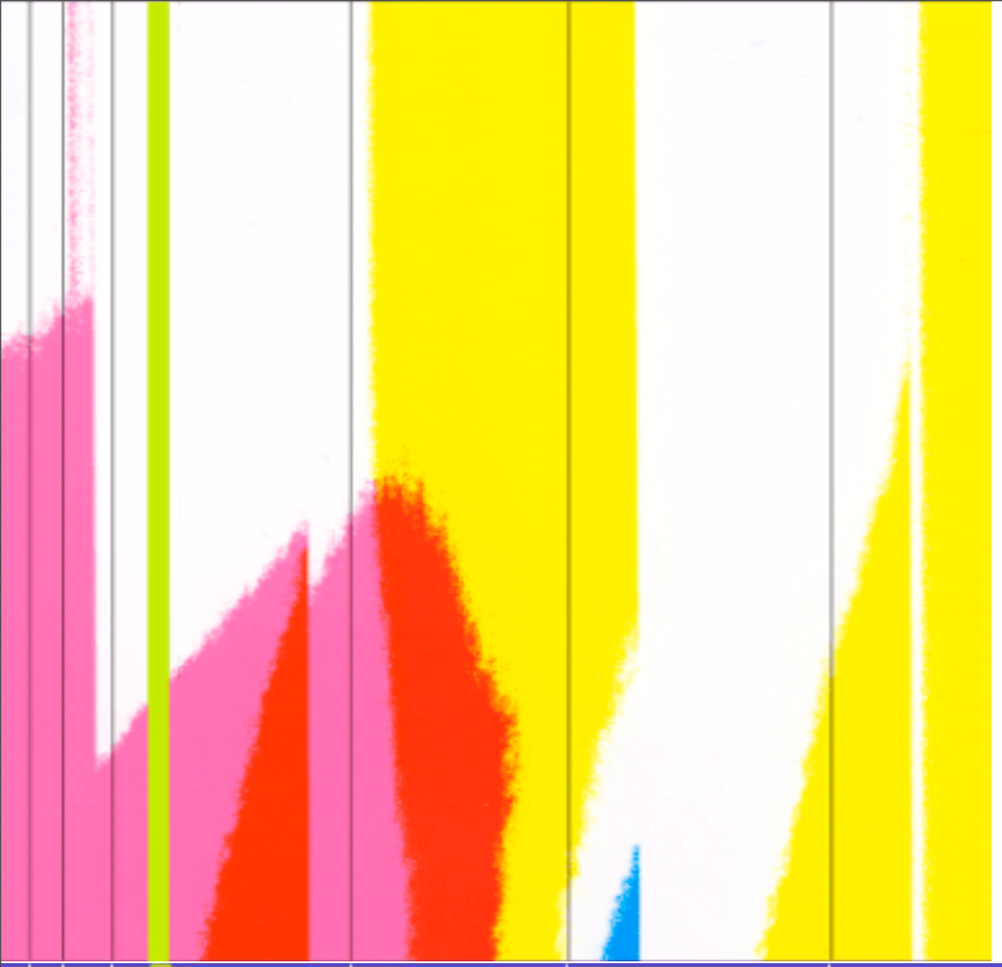

L'INRIA, les grilles et l'Institut des grilles

Thierry Priol
INRIA Rennes - Bretagne Atlantique

03/12/07

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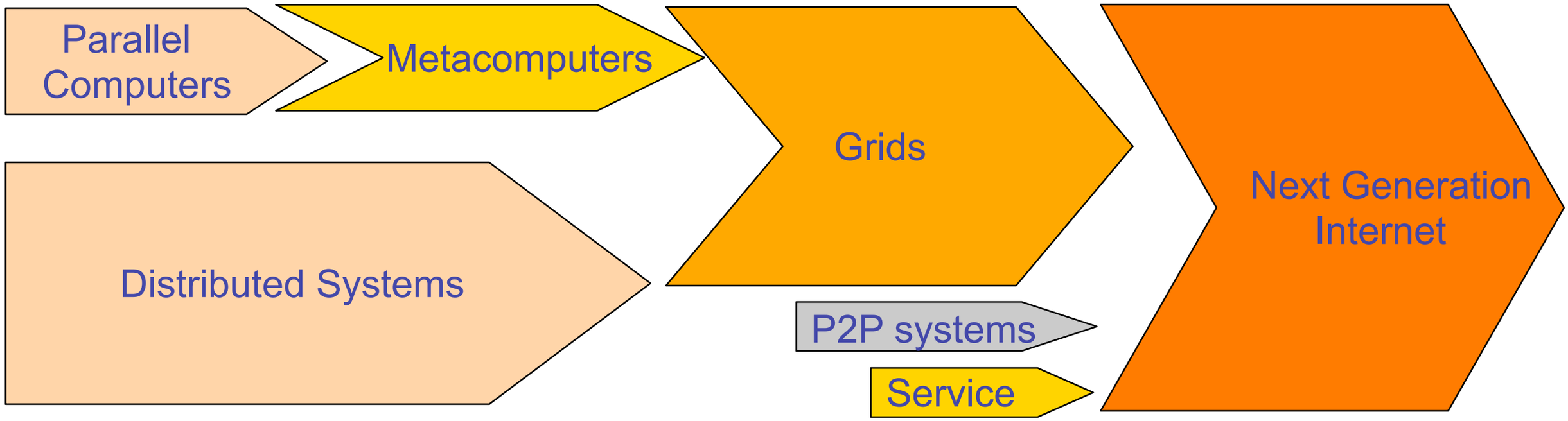
INRIA

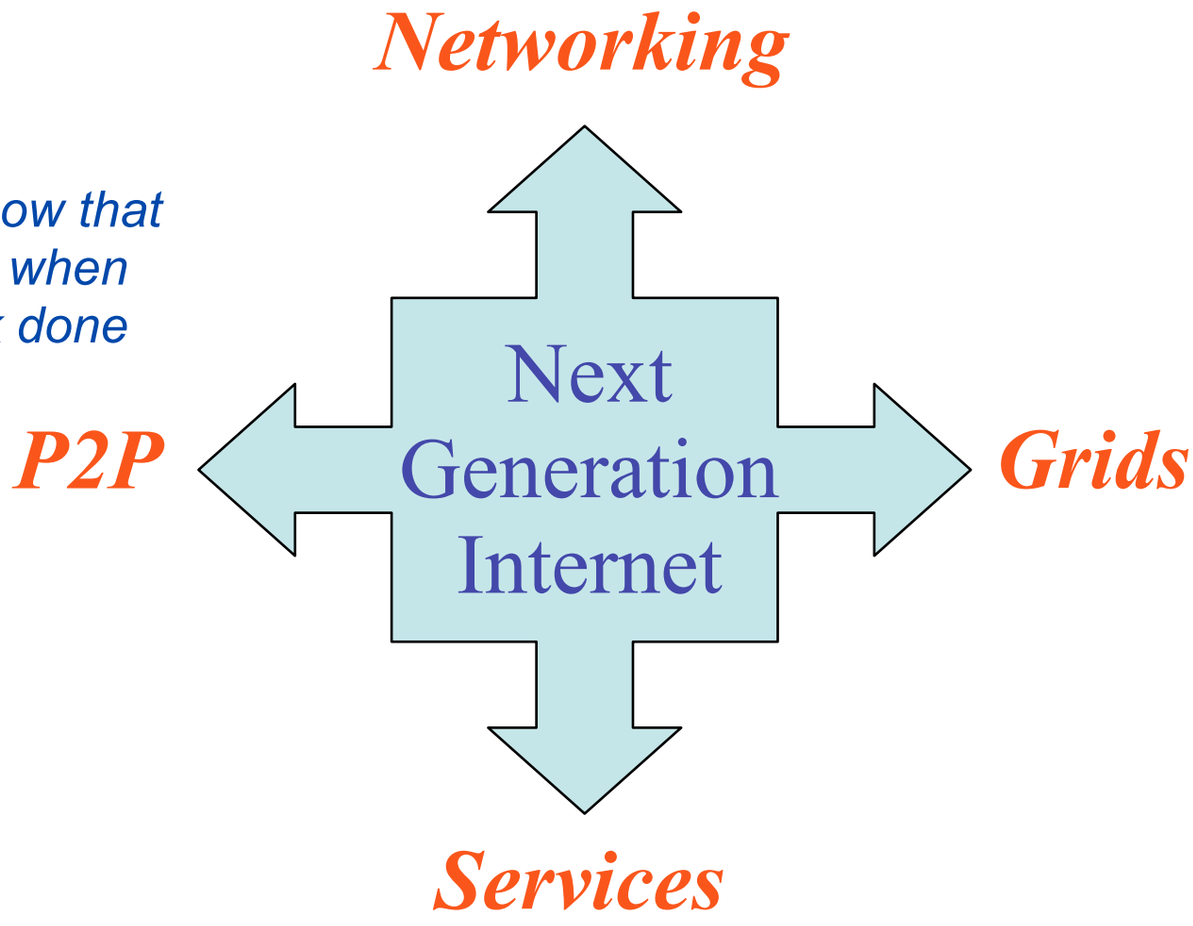
Where we come from…
… and where we are going

- Grids came from the needs to get access to more computing resources
- Grid Infrastructures: the first implementation of large scale distributed systems

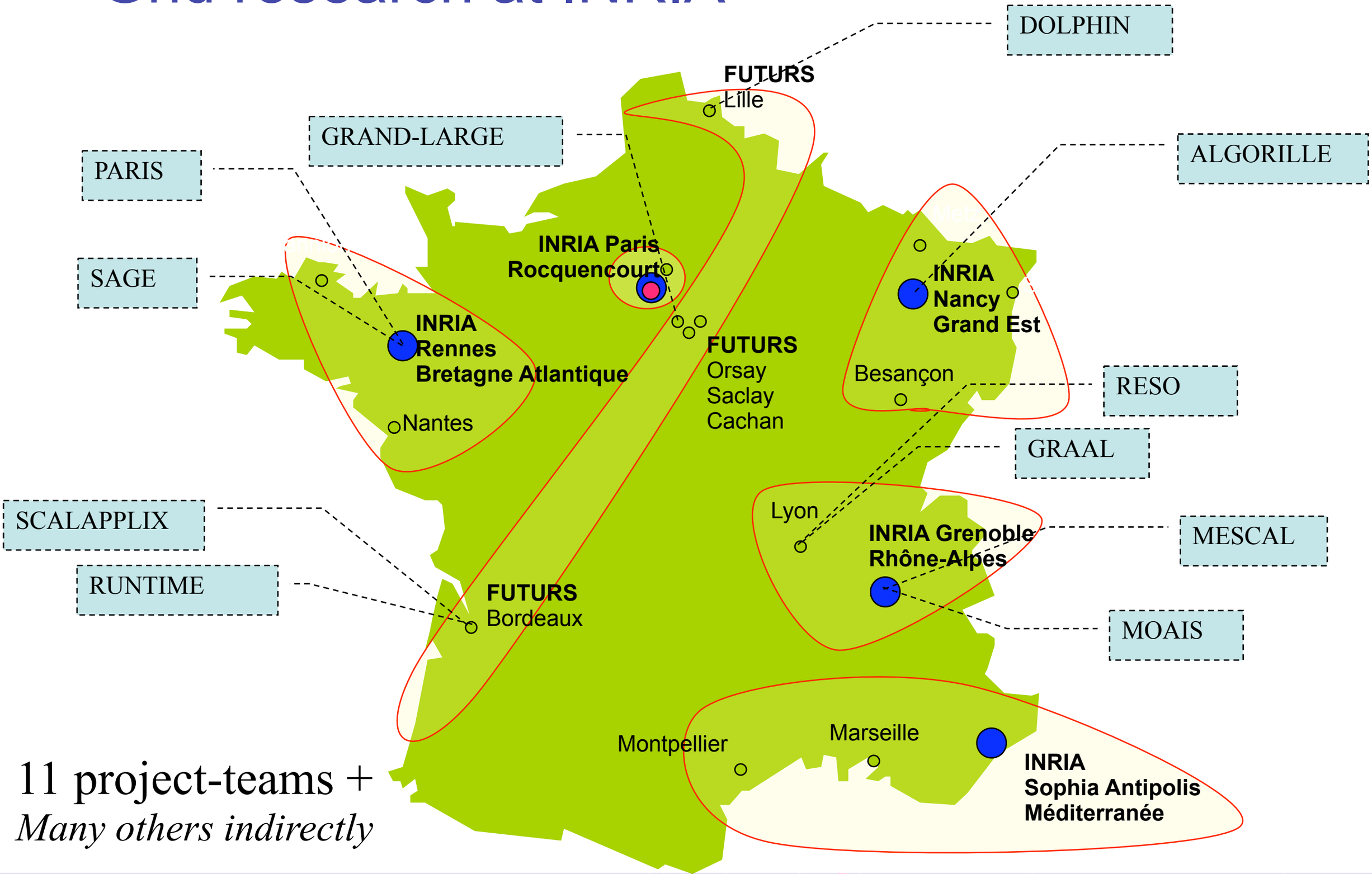


Next Generation Internet

- Not anymore a network of computing systems
  - The Internet as a computing infrastructure per se
- A “new” frontier of Computer Science
  - Computing as a service
  - Unreliable computing infrastructures
    - Failures are common events…
    - **To paraphrase Leslie Lamport,** *"You know that you are dealing with a distributed system when you are prevented from getting your work done because a node you never heard of has crashed."*
  - Insecurity, Dynamicity, Complexity
- Scientific challenges
  - Which operating systems ?
  - How to program such an infrastructure ?
  - How to design applications ?
  - How to model behaviours ?
  - ...



Grid research at INRIA



11 project-teams +

Many others indirectly

INRIA involvement in Grid
National and EU initiatives

INRIA is a key player in France in Grid research

- Direction of the ACI GRID (M. Cosnard, T. Priol)
  - INRIA project-teams involved in 14 ACI GRID projects (among 30)
  - Scientific and Technical Coordination of the ACI GRID Grid'5000

INRIA was involved in the Next Generation Grid panel of experts to help the commission drafting the FP6 workprogramme in Grid Technologies

INRIA is involved in 10 EU funded Grid projects (6 in calls 5 & 6)

- Scientific coordination of the CoreGRID NoE
- Scientific and technical coordination of the XtreemOS IP
- Scientific and technical coordination of the GridComp STREP

FP6 Grid Technologies Projects – Calls 2, 3, 5

EU Funding: 130 M€

supporting the Grid community

Challengers
Nessi-Grid
Degree
ECHOGRID
GridCoord
Grid@Asia

trust, security

GridTrust
AssessGrid
Provenance

platforms, user environments

Grid services, business models

GridEcon
Bridge
ArguGrid
Edutain@ Grid
A-Ware
Sorma

SIMDAT *industrial simulations*

BeinGrid *business experiments*

EC-Gin
Grid4all
KnowArc
Gredia
QosCosGrid
g-Eclipse
GridComp
UniGrids
HPC4U

NextGRID *service architecture*

Akogrimo *mobile services*

BREIN *agents & semantics*

XtreemOS *Linux based Grid operating system*

CoreGRID *Six Institutes*

data, knowledge, semantics

Chemomen tum
K-WF Grid
InteliGrid
Datamining Grid
OntoGrid

Specific support action
Integrated project
Network of excellence
Specific targeted research project

The CoreGRID Network of Excellence

European Research Network on Foundations, Software Infrastructures and Applications for large scale distributed, GRID and Peer-to-Peer Technologies

Scientific Coordinator: T. Priol (INRIA Rennes)
Administrative and Financial Coordinator: P. Rohou (ERCIM)

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The CoreGRID Network of Excellence

To build a European-wide research laboratory

- To avoid fragmentation of Grid research activities in Europe
- Create the European “Grid Lighthouse” and be seen as such worldwide
- To achieve integration and sustainability

To build solid foundations for GRID and P2P technologies

- Both on a methodological basis and a technological basis
- Support medium and long term research activities

Achieve and promote scientific and technological excellence within & beyond the Grid research community

Collaboration with the industry

Gather and disseminate European research

A think-tank for spin-off projects

- EC funded, bilateral projects, international cooperations, …

CoreGRID Membership

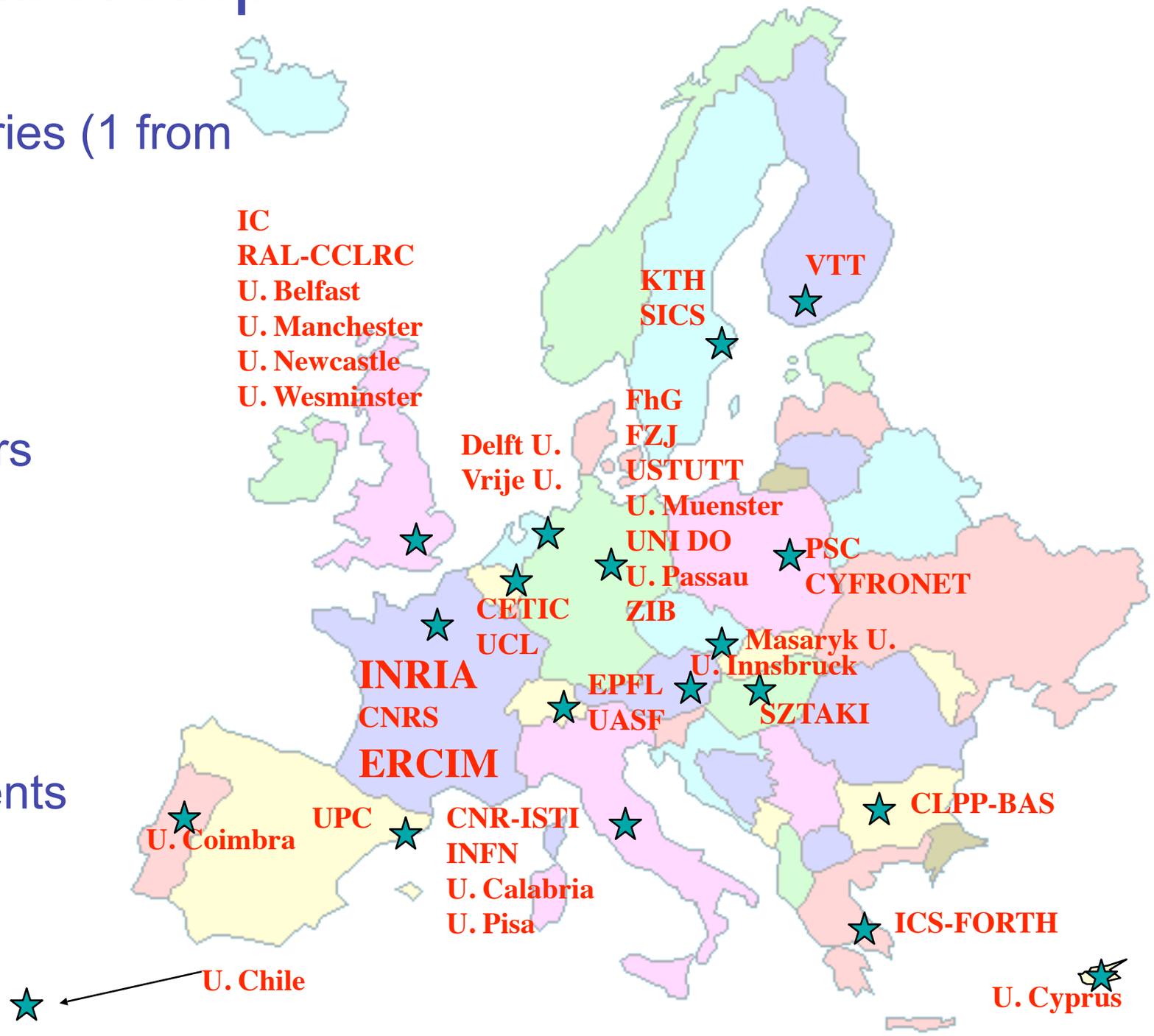
41 partners from 19 Countries (1 from S. America)

CoreGRID researchers

- Aug 2005: 145 researchers
- Today: 155 researchers

CoreGRID PhD students

- Aug 2005: 169 PhD students
- Today: 168 PhD students



A Network operated as a European-wide Research Laboratory

Integrated Activities

Spreading of Excellence

Sergei Gorlatch

WESTFÄLISCHE WILHELMS-UNIVERSITÄT MÜNSTER

Pierre Guisset

cetic

Domenico Talia

Knowledge Data Management

Research Groups

Marco Danelutto

Programming Model

Research Groups

Vivi Fragopoulou

Architectural Issues: Scalability, Dependability, Adaptability

Research Groups

Norbert Meyer

Grid Information, Resource & Workflow Monitoring Services

Research Groups

Resource Management & Scheduling

Research Groups

Ramin Yahyapour

Systems, Tools and Environments

Research Groups

Vladimir Getov

CoreGRID Institutes

Collaboration Gateway

Wolfgang Ziegler

Fraunhofer Gesellschaft

UNIVERSITÀ DELLA CALABRIA
Dipartimento di ELETTRONICA, INFORMATICA E SISTEMISTICA

UNIVERSITÀ DI PISA

FORTH ICS

SUPERCOMPUTING POZNAN NETWORKING

UNIVERSITÄT DORTMUND

UNIVERSITY OF WESTMINSTER

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Dissemination Activities

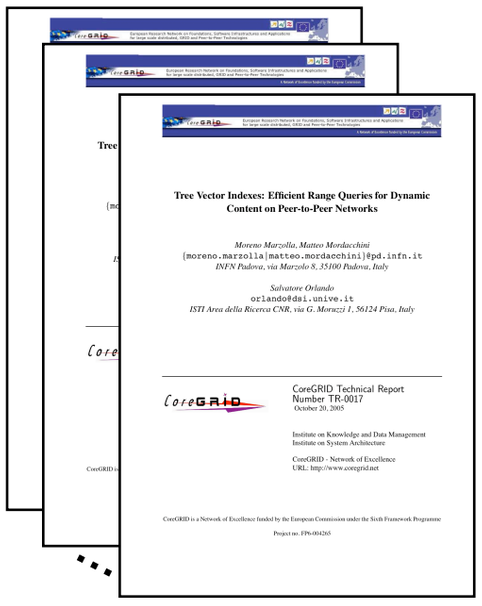
A highly visible initiative within the International Grid research communities

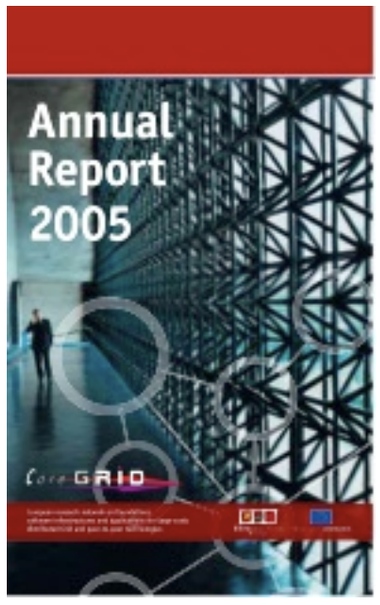
- Sponsorships to OGF, CoreGRID label
- CoreGRID Symposium

More than 120 joint Technical Reports, 5 Springer CoreGRID series volumes, two annual reports (2005, 2006)

Many joint papers published in journals/conferences/workshops

- Publication database (more than 600 references)





The XtreemOS Integrated Project

Building and Promoting a Linux-based Operating System to Support Virtual Organizations for Next Generation Grids

Scientific Coordinator: Christine Morin (INRIA Rennes)

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XtreemOS Objectives

Design & implement a reference open source Grid operating system based on Linux

- Native support for virtual organizations

Validate the XtreemOS Grid OS with a set of real use cases on a large Grid testbed

Promote XtreemOS software in the Linux community and create communities of users and developers

XtreemOS Research Challenges

- Identify fundamental functionalities to be embedded in Linux for secure application execution in Grids

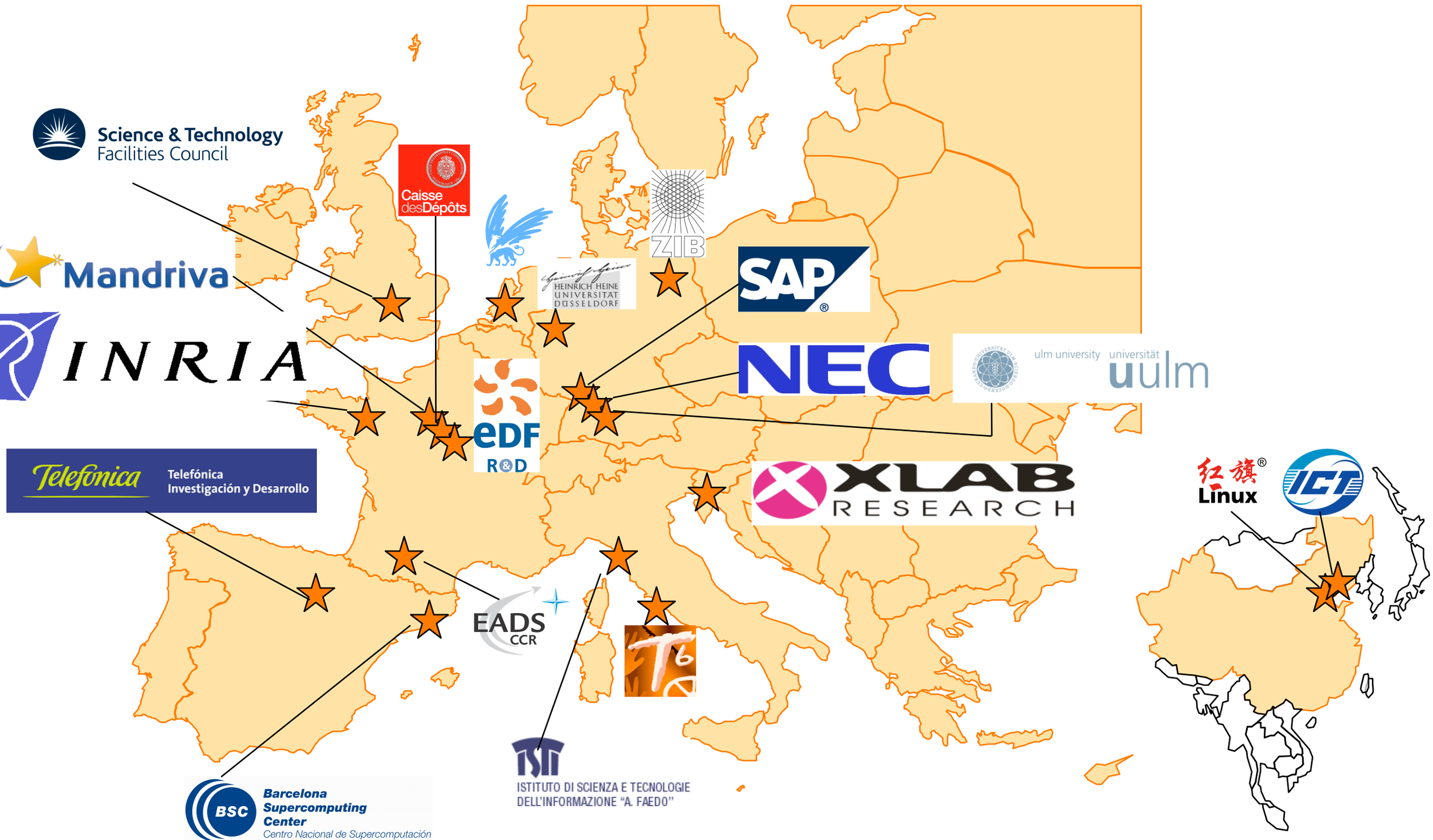
- Build a set of scalable self-healing OS services for secure resource management in very large dynamic grids

- Provide a simple Grid API compliant with Posix while adding new functionality and supporting Grid-aware applications

- Aggregate cluster resources into powerful grid nodes by integrating single system image mechanisms in Linux

- Build an XtreemOS flavour for mobile devices enabling ubiquitous access to grid resources

XtreemOS consortium



ALADDIN

A LArge-scale DIstributed and Deployable Infrastructure

Thierry Priol, Director
Franck Cappello, Scientific Director
David Margery, Technical Director

direction-aladdin@inria.fr

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INRIA

Why ALADDIN ?

- INRIA has an imperative need to get access to a large scale distributed system
  - To carry out experiments in various research fields: P2P systems, Service infrastructures, Networking, Grid systems, …
  - Commitment to provide a testbed within European projects (CoreGRID, XtreemOS, S-CUBE, …)

- The ACI GRID, that gives the funding for Grid'5000, ended last July
  - A very positive evaluation done by a scientific committee with Jean-Claude ANDRÉ (CERFACS) and Domenico LAFORENZA (CNR-ISTI, Italie)
  - This committee has expressed a clear recommendation to continue this initiative

- L'INRIA provided funding support to acquire hardware and to hire engineers in the context of the GRID'5000 national initiative
  - To continue to provide funding, a new structure has to be set up internally (Technological Development Action)

ALADDIN Objective

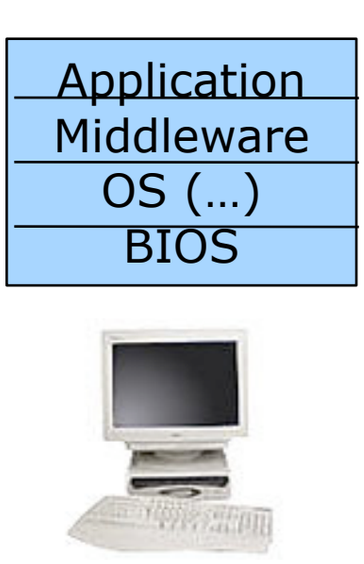
Deploy an experimental large scale computing infrastructure

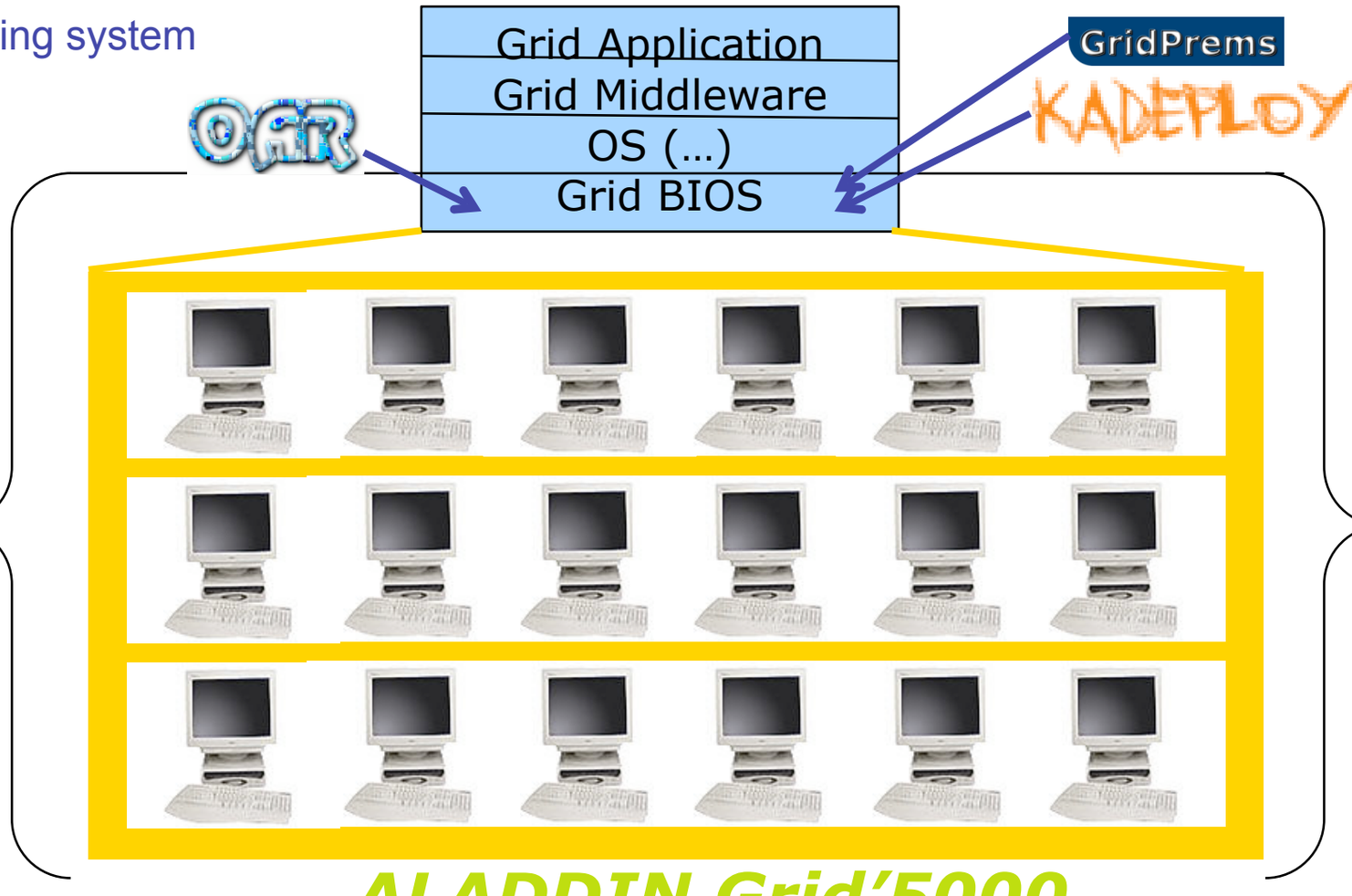
Experiments of any kind of distributed systems

- Experimental conditions
- Configuration of the entire software stack
  - from the application to the operating system

Distributed System Testbed

Single Computer testbed

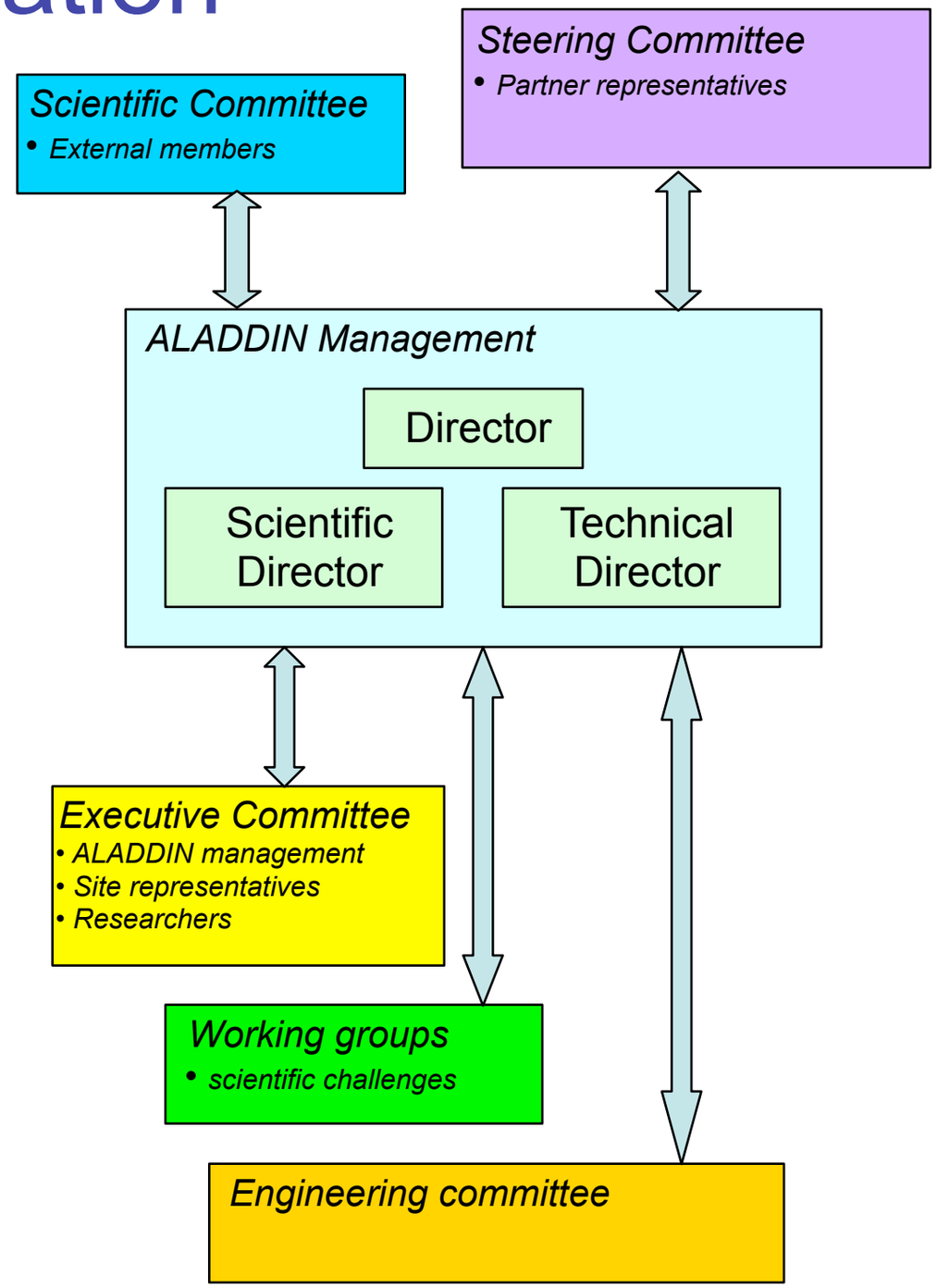




ALADDIN Grid'5000

Structure and organization

- Management
  - Director: T. Priol
  - Scientific Director: F. Cappello
  - Technical Director: D. Margery
- Duration
  - 4 years starting from 2008
- Collaboration with other institutions
  - CNRS with its IDG
  - Grandes écoles
  - Universities
  - International



Conclusion

- INRIA is one of the key players in Grid research
- CNRS is one of the key players in the development and use of Grids
- INRIA has already strong collaborations with CNRS in Grids
  - Many joint INRIA-CNRS project-teams
  - CNRS is a partner of the CoreGRID NoE
  - Both INRIA and CNRS were involved in Grid'5000
- INRIA and CNRS agreed to collaborate to make Grid'5000 a sustainable infrastructure
  - Set up a common structure involving ALADDIN and the IDG

Questions ?