

COLLABORATIVE PLATFORMS FOR MULTIPHYSICS DESIGN PROBLEMS

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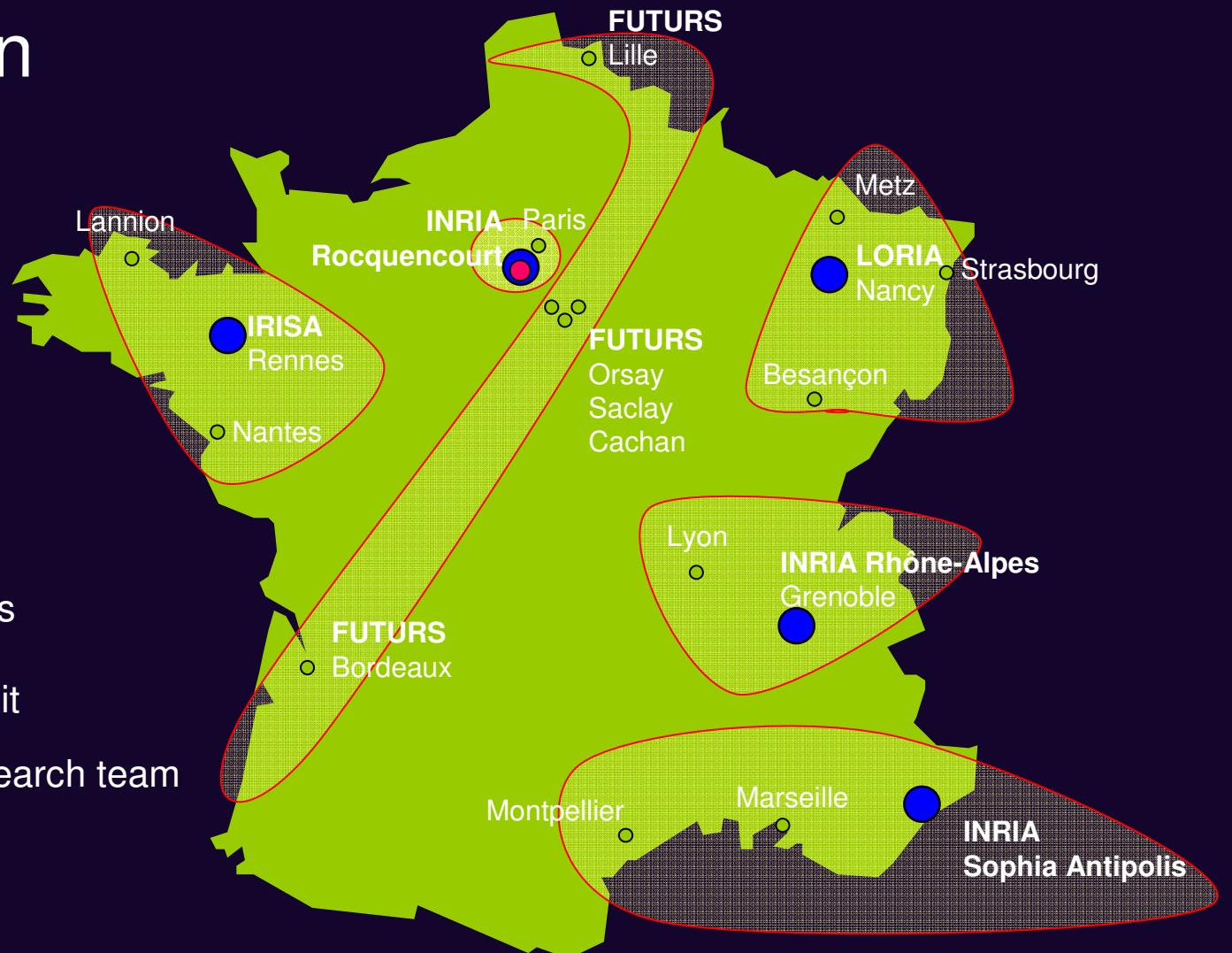


INSTITUT NATIONAL
DE RECHERCHE
EN INFORMATIQUE
ET EN AUTOMATIQUE



Location

- Headquarters
- Research unit
- External research team



Key figures

Jan. 2005



A workforce of 3,500

including 1,800 paid by INRIA

2,700 scientists
950 doctoral candidates
500 post-docs and expert engineers

1031 budgetary positions
468 research scientists
560 ETA

300 interns

Budget: 135 M€ (tax not incl.)

including 20% from contracts, software licenses, etc.

The organizational model

Research project-teams

- The key link in the organization (160 project-teams)

Research units

- Decentralized, self-supporting structure with strong connections with the regional environment,

Scientific and functional departments

- Coordination and organization role

Discussion structures

- Center committee in the research units and discussion committee at the national level

Evaluation bodies

- Research project-teams committee in the research units, evaluation committee at the national level

Steering bodies

- Research units management teams, national management committee

INRIA today

Scientific renown

- 2,600 scientific publications

Technology transfer

- Some 80 companies, 40 of which are still active
 - 7 companies founded in 2004
- 750 ongoing contracts, 175 active patents

120 freely available software packages and software marketing licenses

International visibility

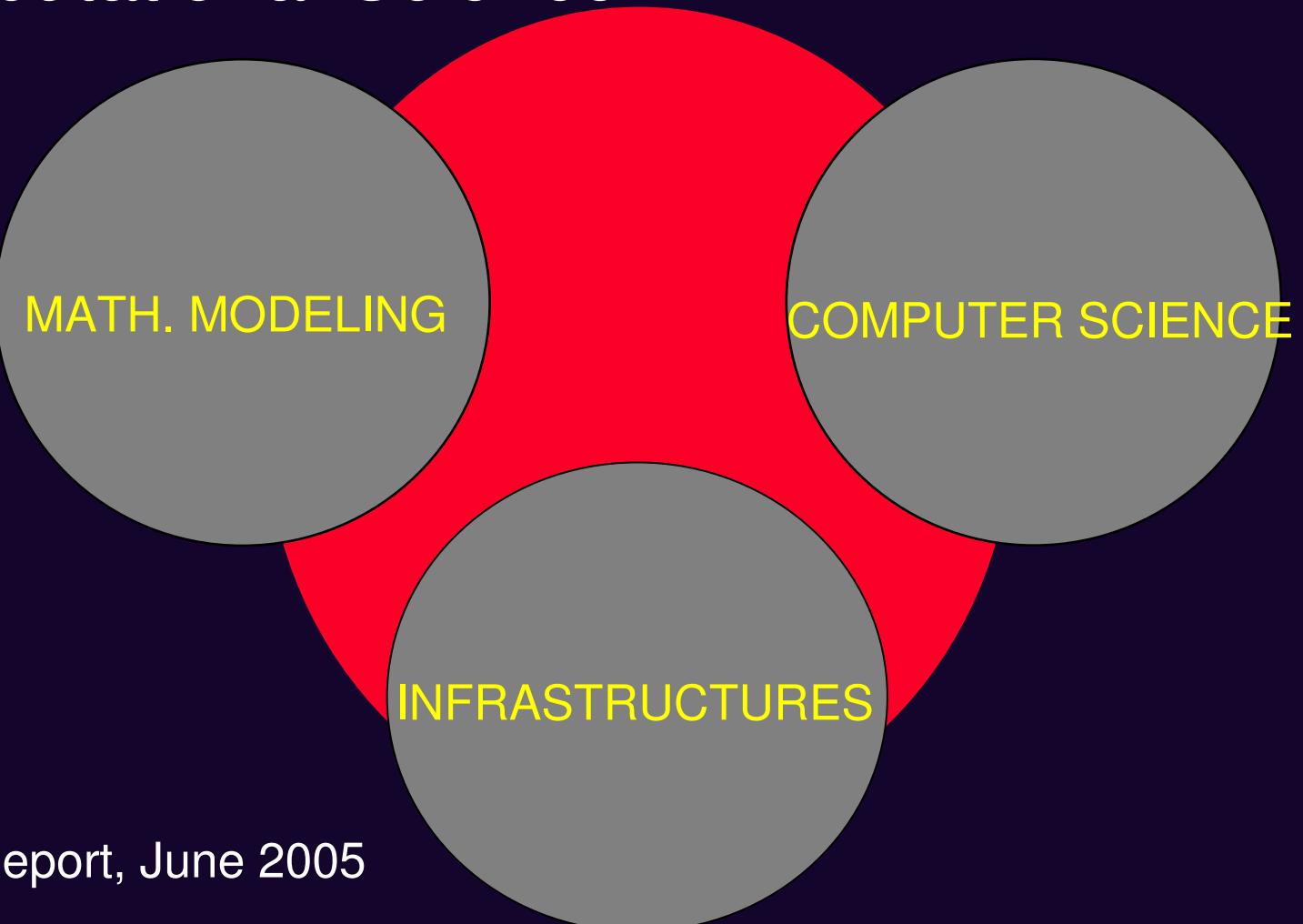
- 25 international conferences every year
- 260 foreign visitors staying over three months

Training through research

- Over 950 doctoral candidates, 11,500 teaching hours

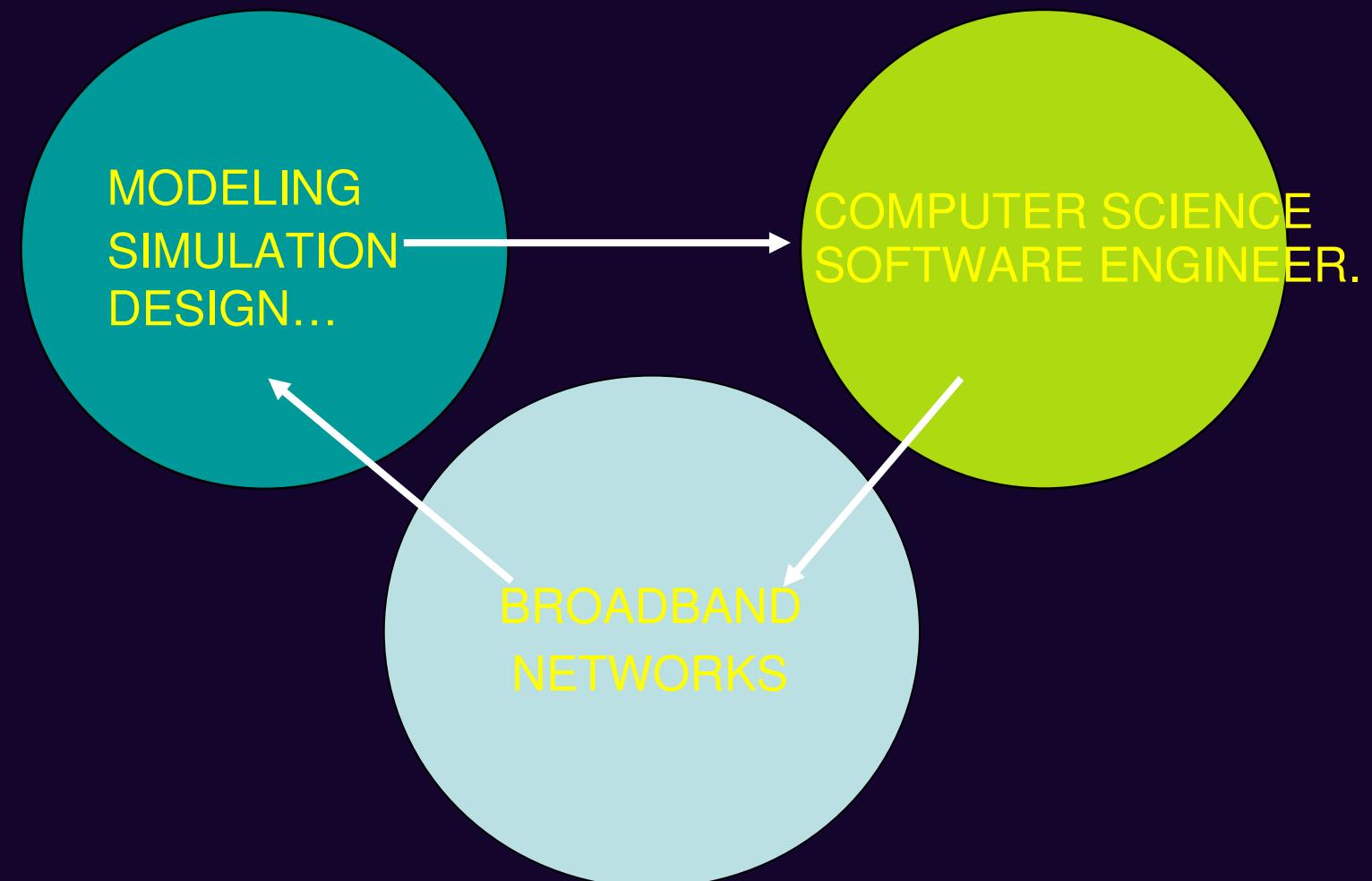


Computational Science



PITAC Report, June 2005

Computational Science



Requirements

- USERS NOT AWARE OF UNDERLYING HW, OS, GRIDS...
- DISTRIBUTION, FAILURE, SECURITY TRANSPARENT
- OPEN INFRASTRUCTURE & REUSE LEGACY APPs
- NO USE OF EXOTIC LANGUAGE & COMMANDS : GUI++
- COMPLIANT WITH CURRENT & UPCOMING STANDARDS
SOA, WSDL, WSRF, OGSA, Globus GT3 & GT4, UNICORE...

Complex Technical Background

- LARGE VARIETY SOFTWARE AVAILABLE
- LANGUAGES : Fortran, C, C++, JAVA, J2EE, ...
- MIDDLEWARE : GLOBUS, UNICORE, OBJECTWEB, CCM
- TECHNOLOGY : WEB SERVICES, ESB, ...
- PARALLEL TOOLS : MPI, OpenMP, ...
- INFRASTRUCTURES : Grids, PC-clusters, supercomputers

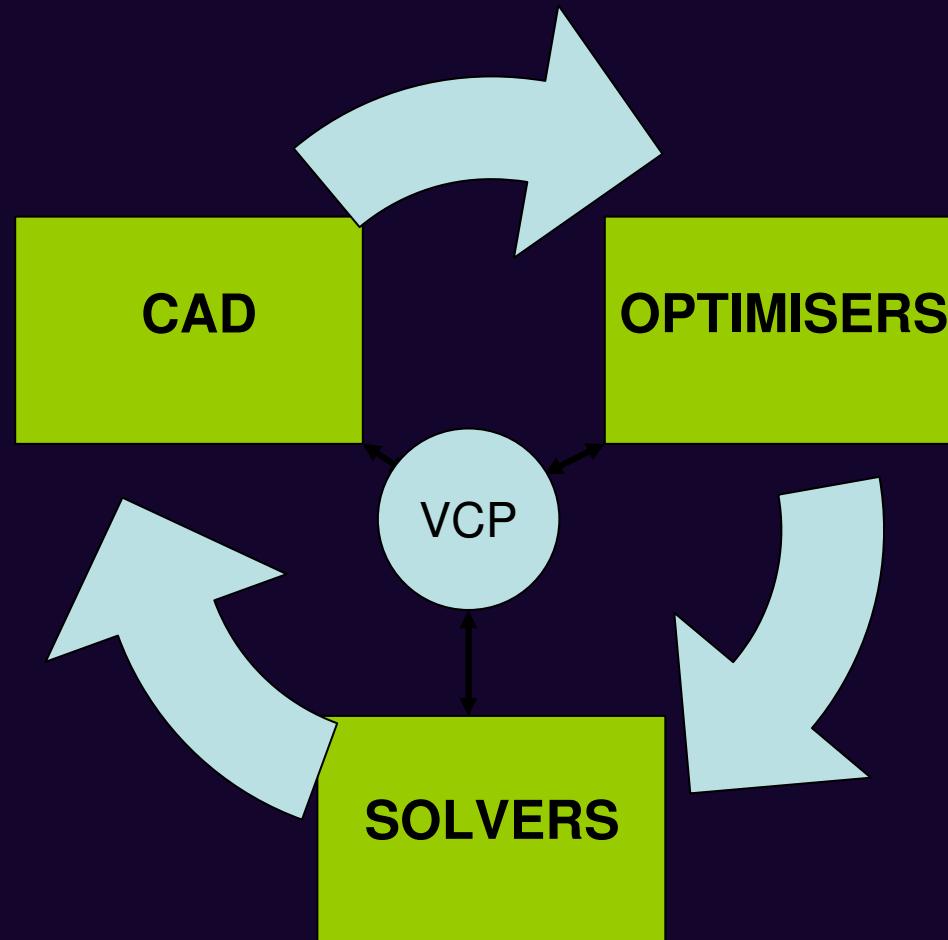
IT contribution to Multiphysics Design

- SOFTWARE INTEGRATION PLATFORMS
- DISTRIBUTED AND PARALLEL hardware AND software
- COLLABORATIVE ENVIRONMENTS
- USER CENTRIC NOT TECHNOLOGY PROTOTYPES
- MULTI-APPLICATIONS AND MULTI-DISCIPLINES
- SEAMLESS WORKFLOW SYSTEMS

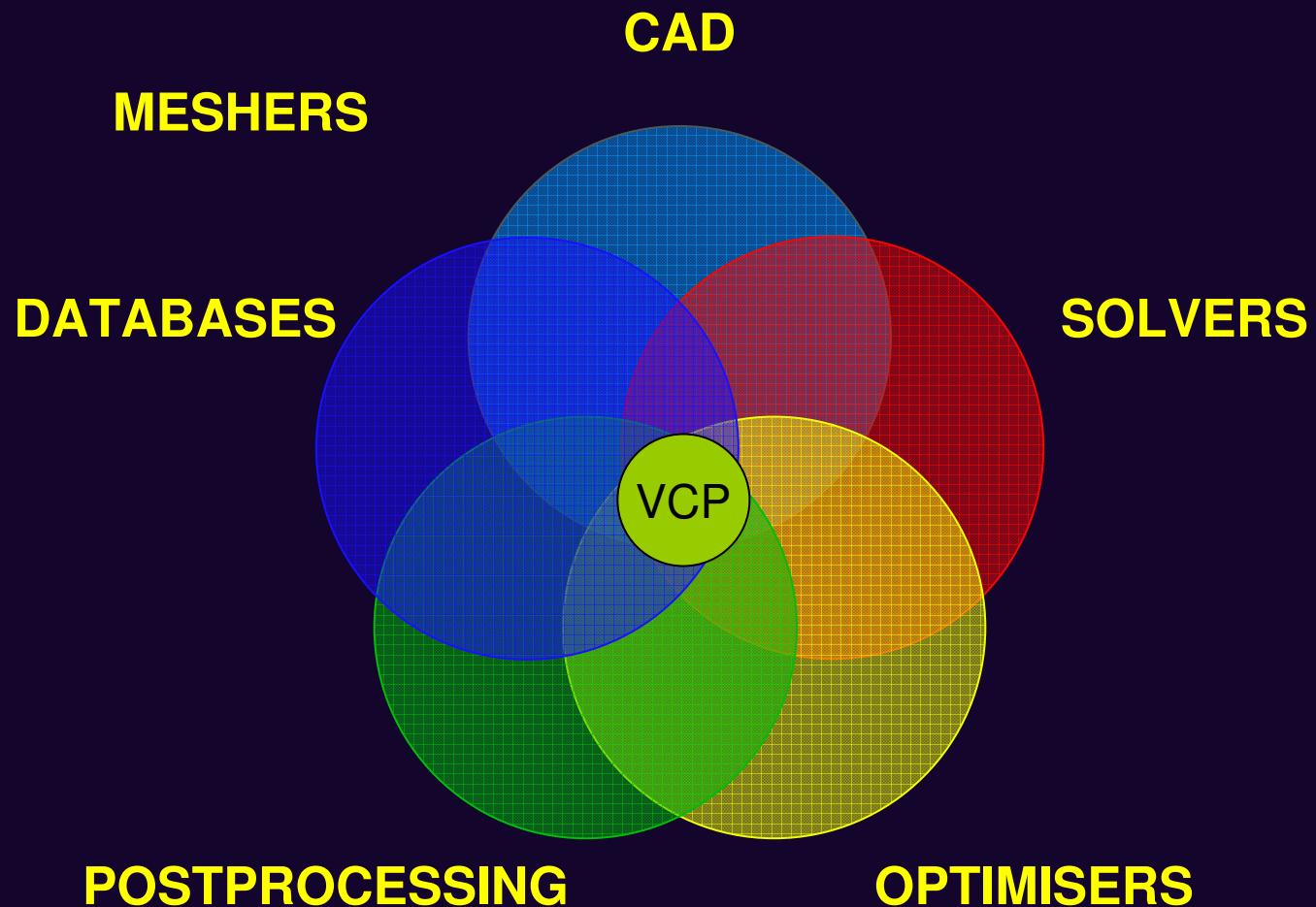
Collaborative Platforms for Multiphysics Design

- PLUG-IN COMPONENTS, DATABASES AND SOFTWARE
- INTERACTIVE MULTI-USER PLATFORMS
- MULTI-DISCIPLINE TRIAL/ERROR ENVIRONMENTS
- PRODUCE LARGE (PETA SCALE) VOLUMES DATA !
- EXHIBIT APPLICATION PROTOCOLS
- SIMPLIFY DESIGN ENGINEERS' LIFE

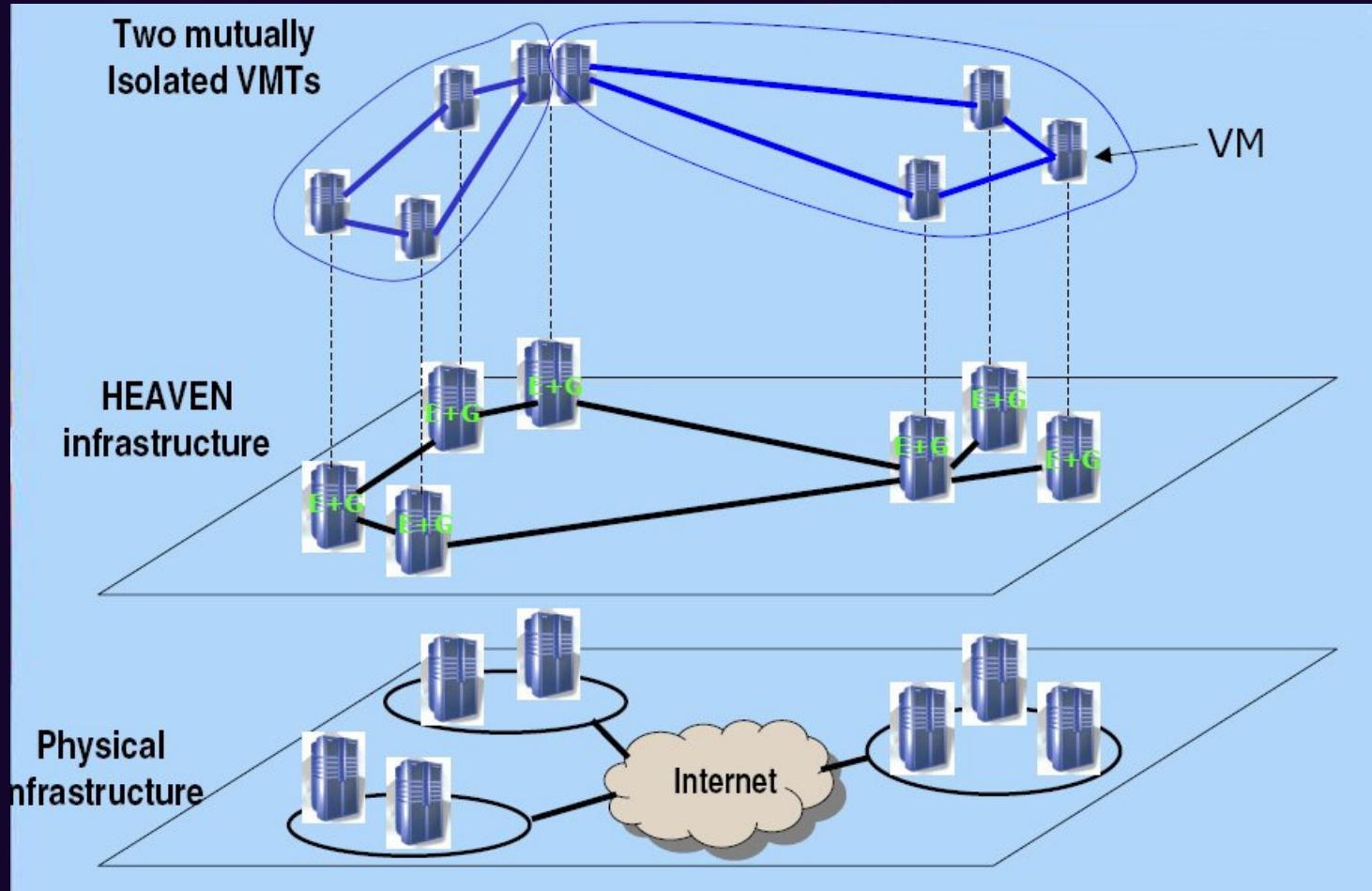
Tool interactions: complex processes



Integration of tools: multiple interactions

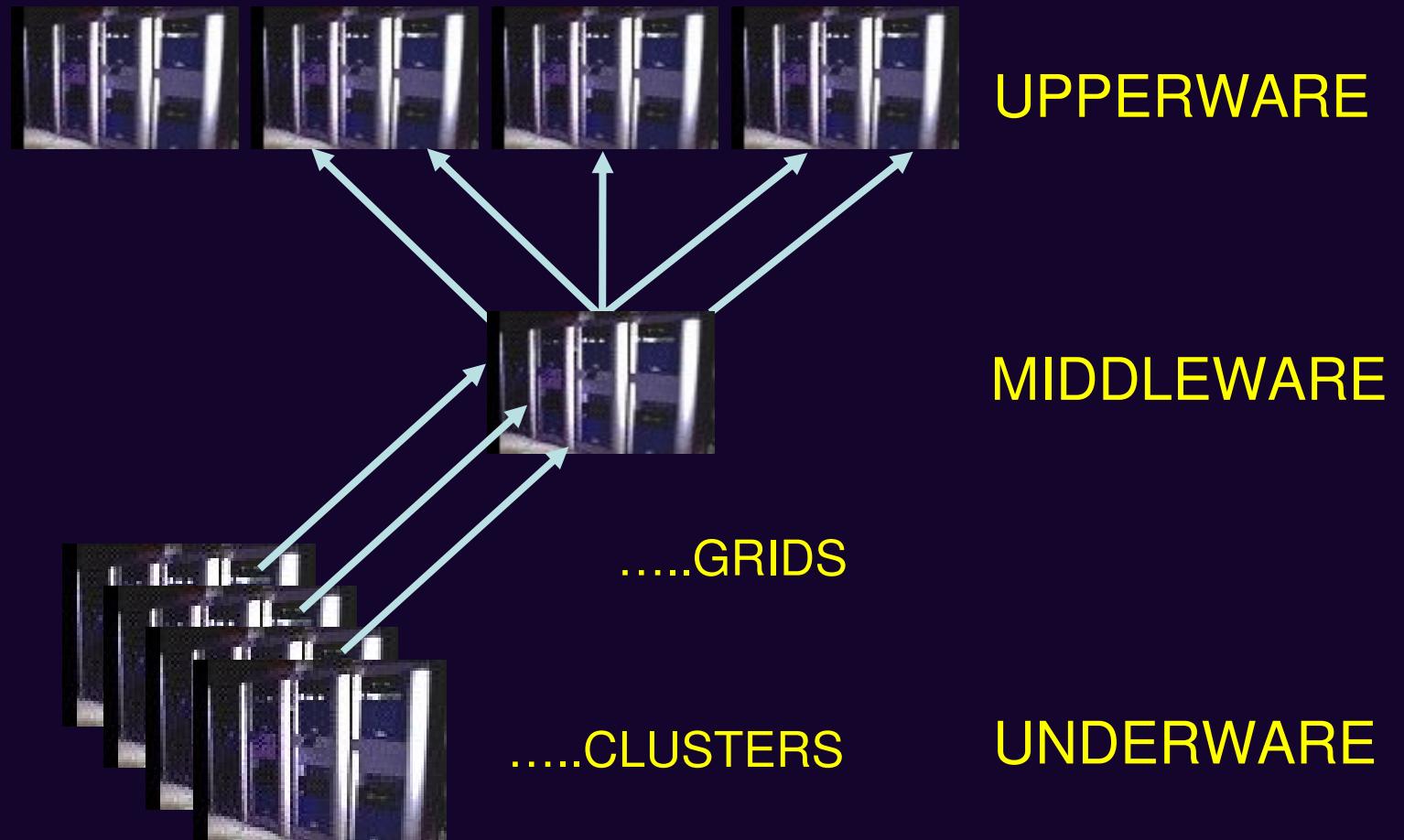


Virtual Environments: isolating applications



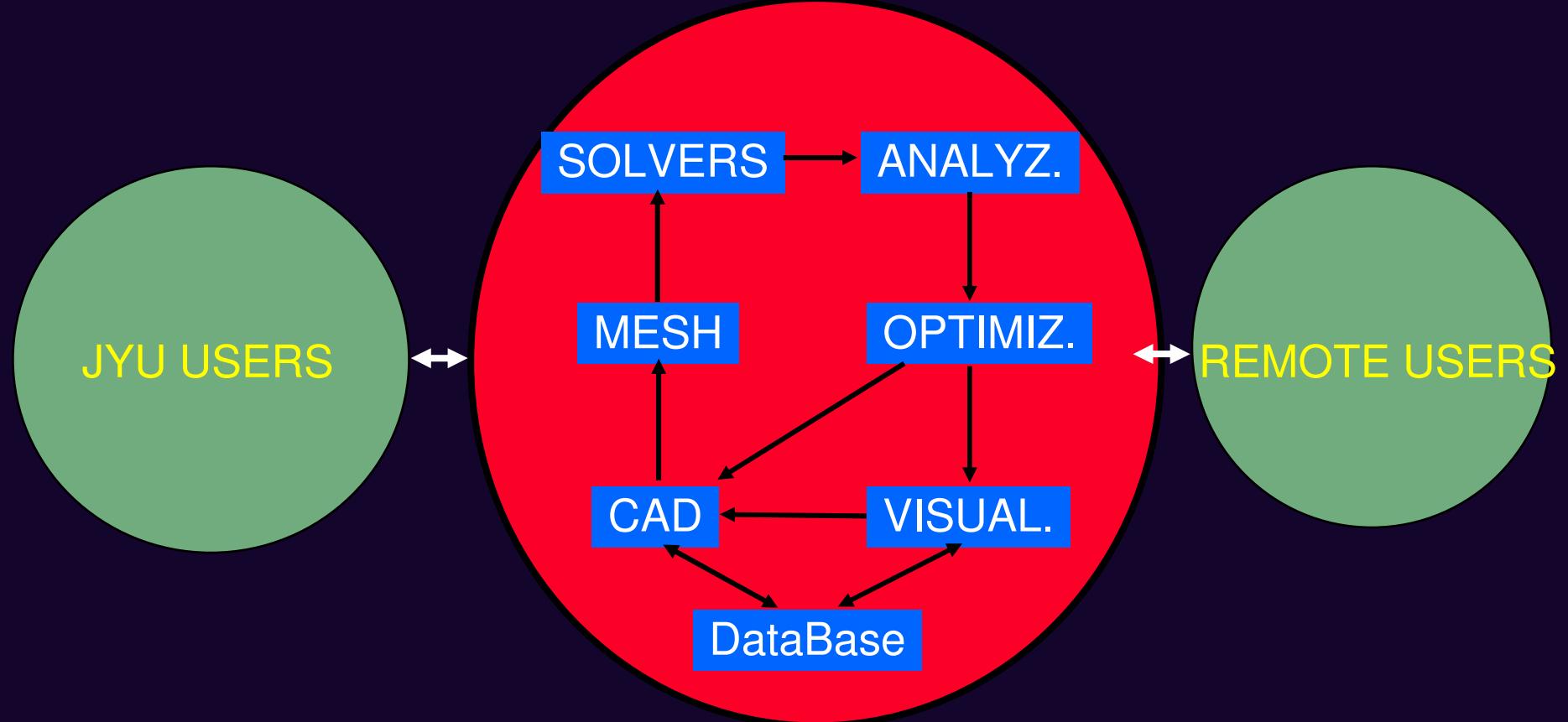
Virtual Environments: infrastructure

VMware, XEN, ...



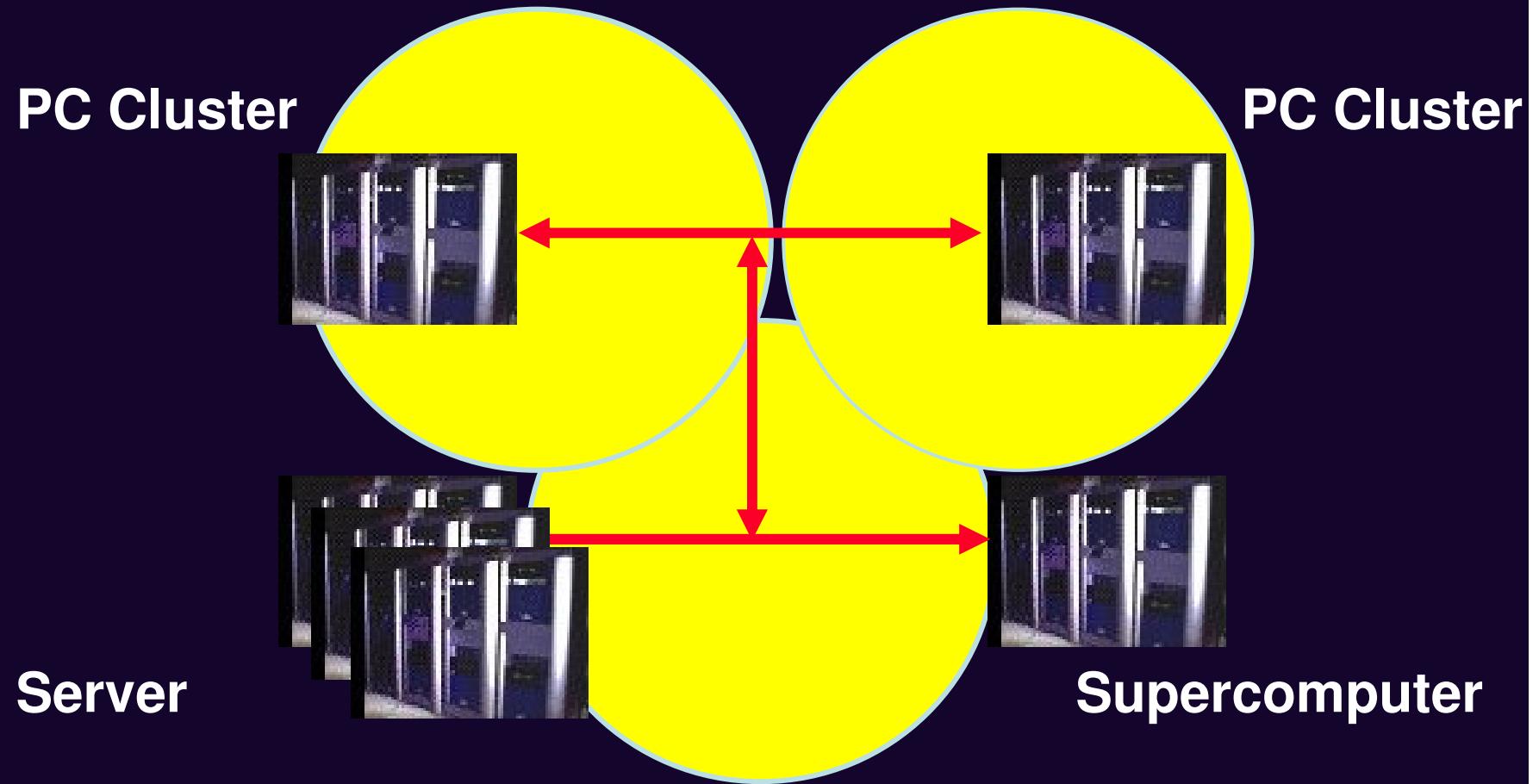
Collaborative Platforms: virtual frameworks

SEEN BY USERS AS A SINGLE COMPUTERISED ENVIRONMENT

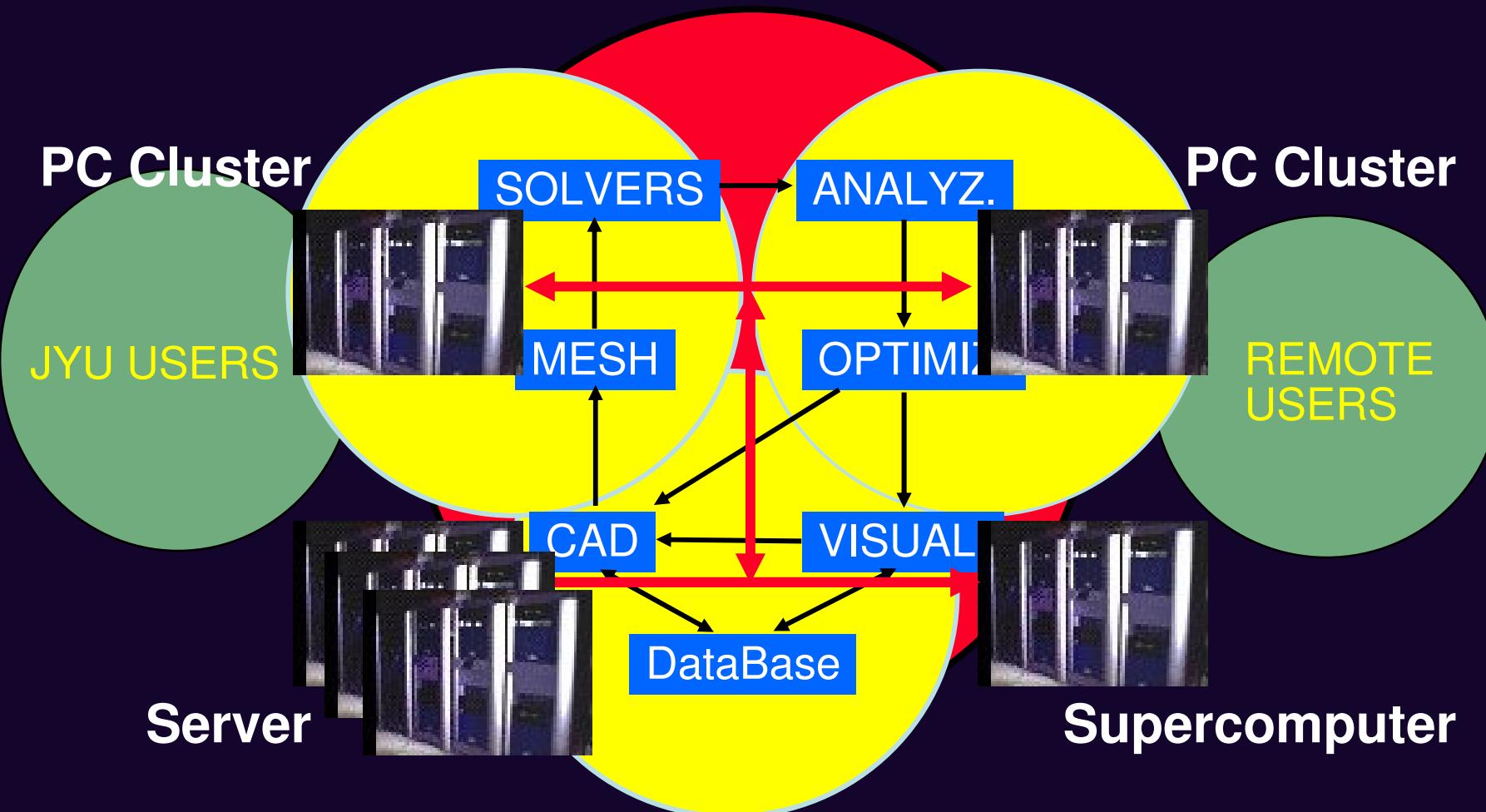


UNCHANGED WHATEVER THE UNDERLYING INFRASTRUCTURE AND USERS

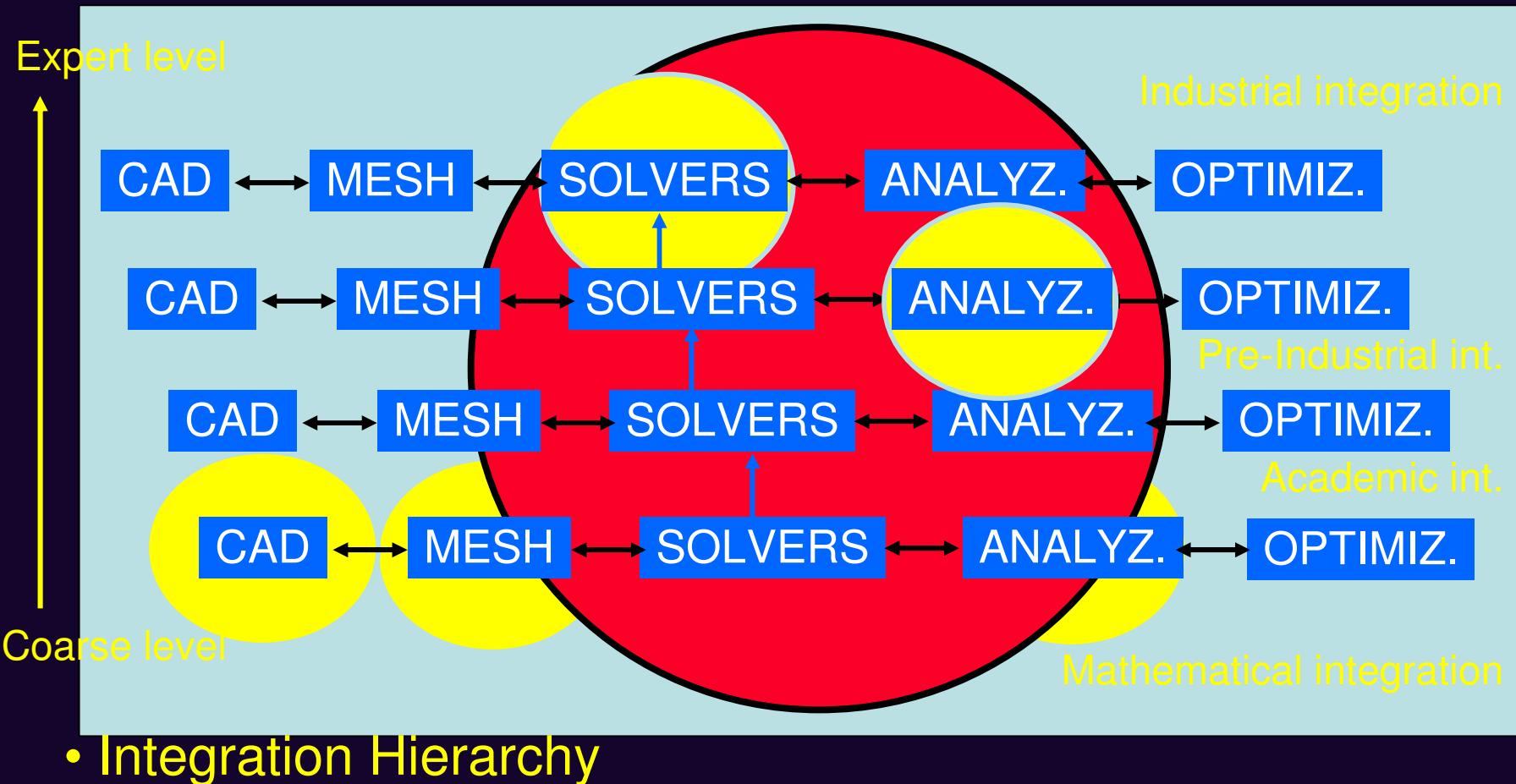
Collaborative Platforms: infrastructures



Collaborative Platforms: putting it all together



Collaborative Platforms: customization



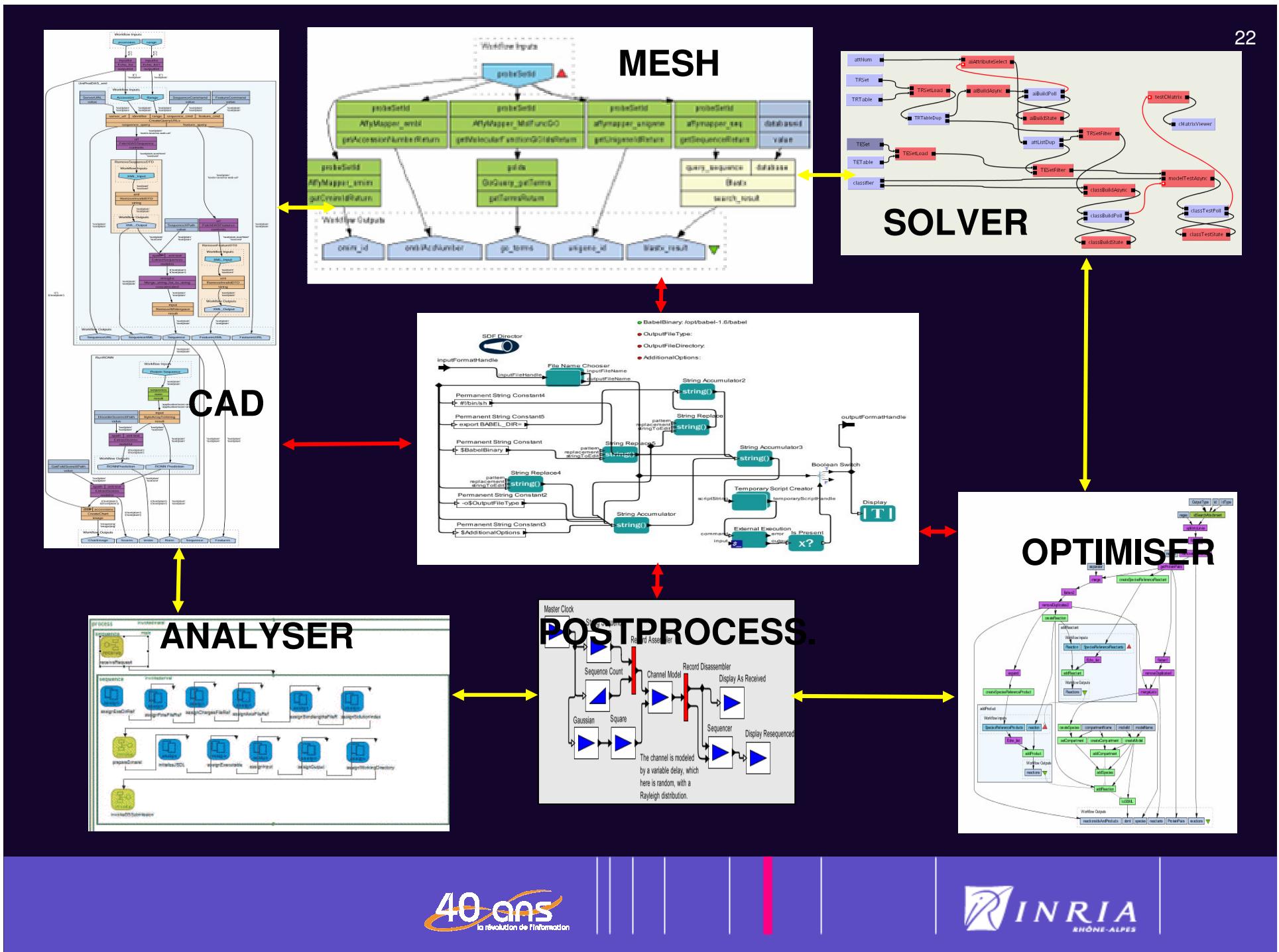
- Integration Hierarchy

Workflow contribution to Multiphysics Design

- DATA STREAMING
- IN PLACE REFERENCING
- RUNTIME BINDING
- META WORKFLOW
- APPLICATION FACTORIES
- NETWORK INFLUENCE !
- META DATA FOR WF COOPERATION

Workflow contribution to Multiphysics Design

- MANY WORKFLOW candidates: Taverna, Kepler, Bonita...
- WORKFLOW BUS
- COMPOSITE WORKFLOWS
- SERVICE ORIENTED ARCHITECTURES
- REUSABLE WORKFLOWS
- WORKFLOWS PRODUCE CONTENT !



References

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