

COLLABORATIVE PLATFORMS FOR MULTIPHYSICS DESIGN, SIMULATION AND OPTIMIZATION

Toàn NGUYỄN

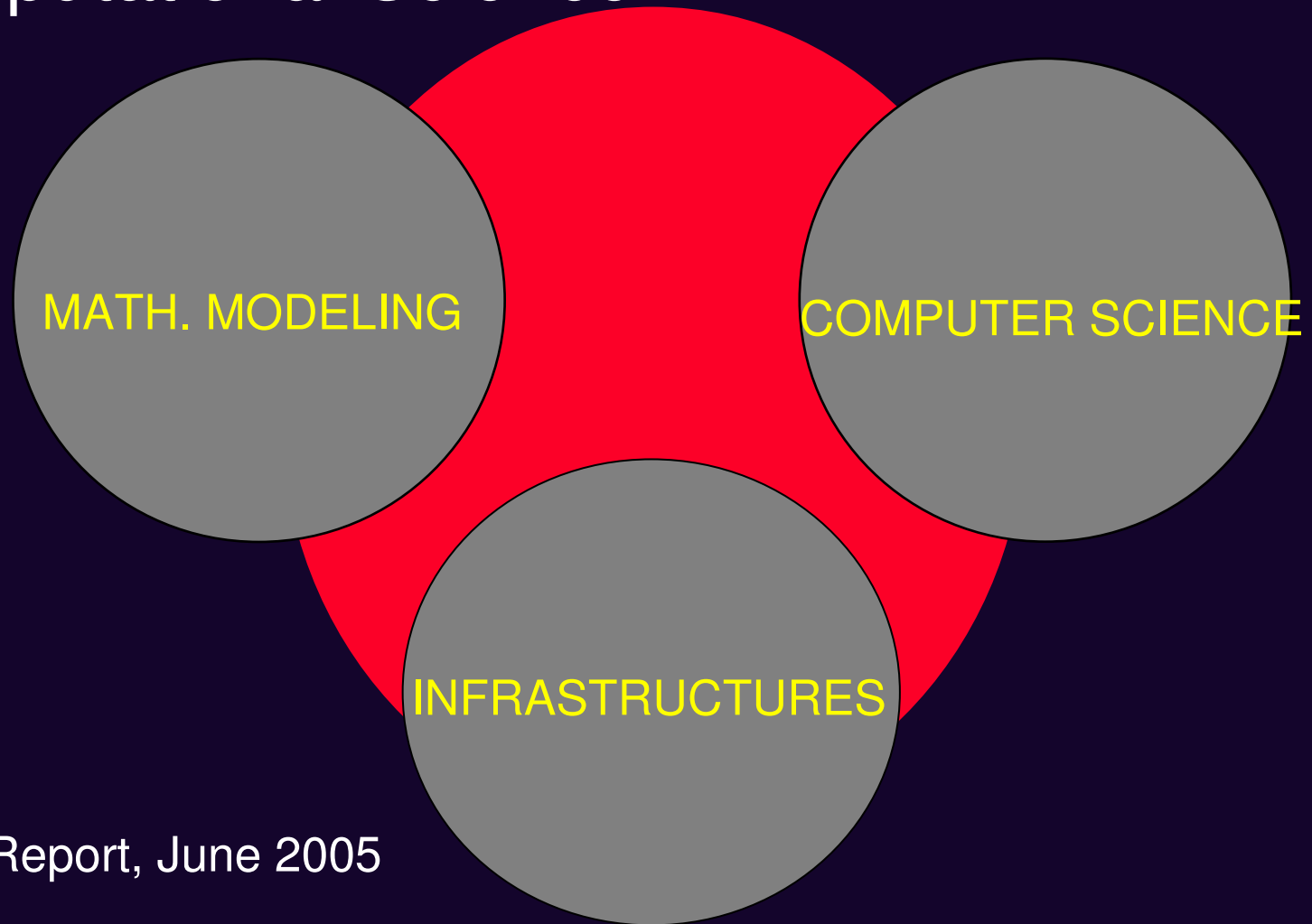
Sophia-Antipolis - January 24th, 2008



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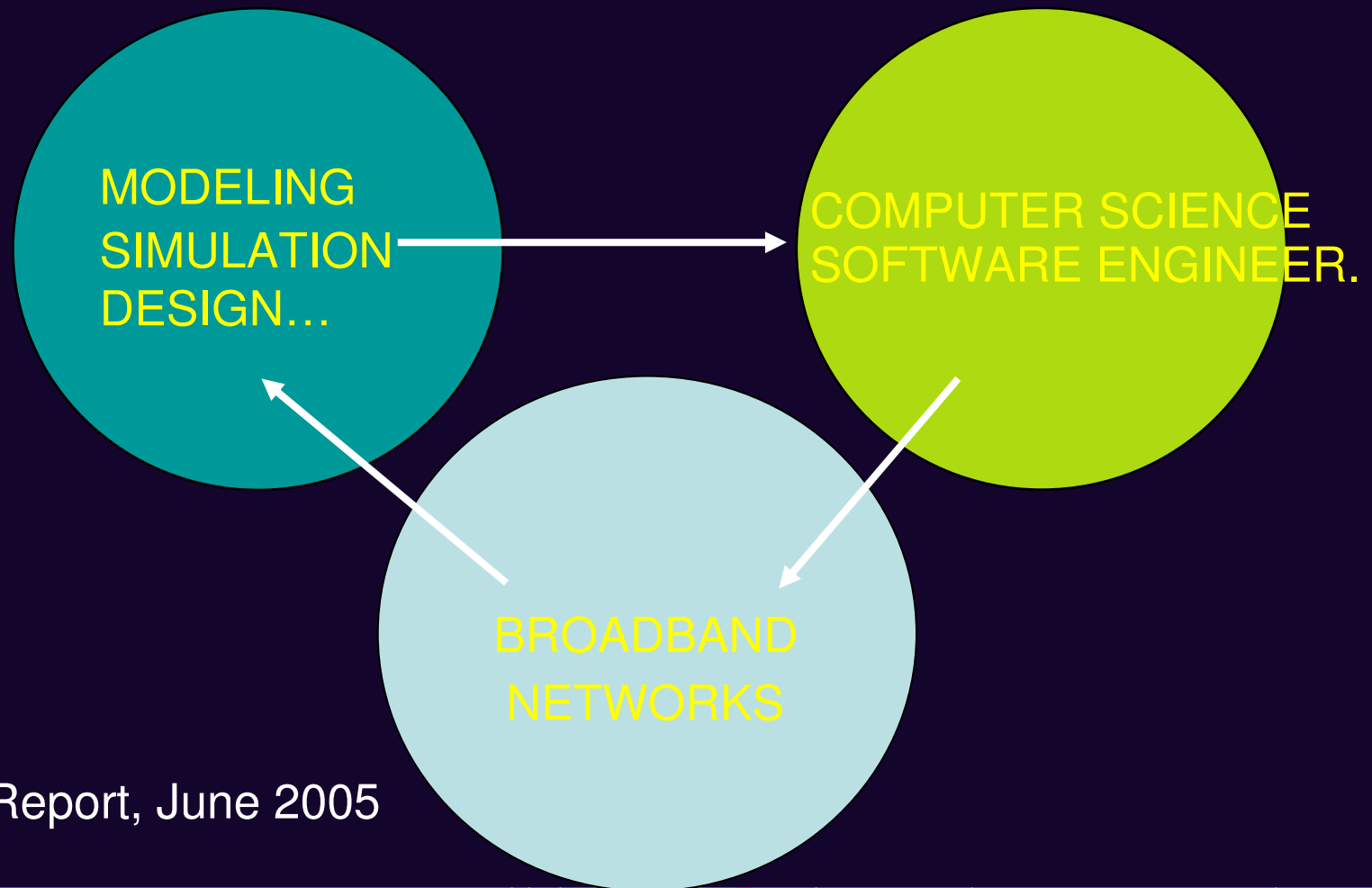


Computational Science



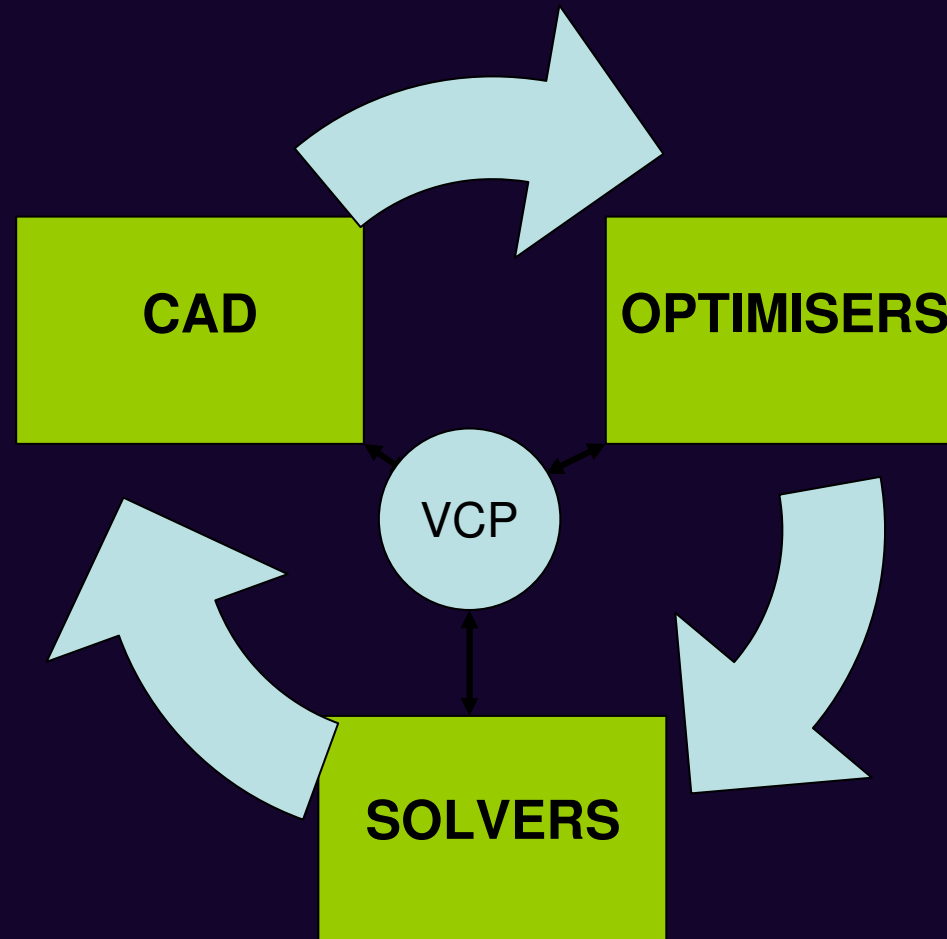
PITAC Report, June 2005

Computational Science

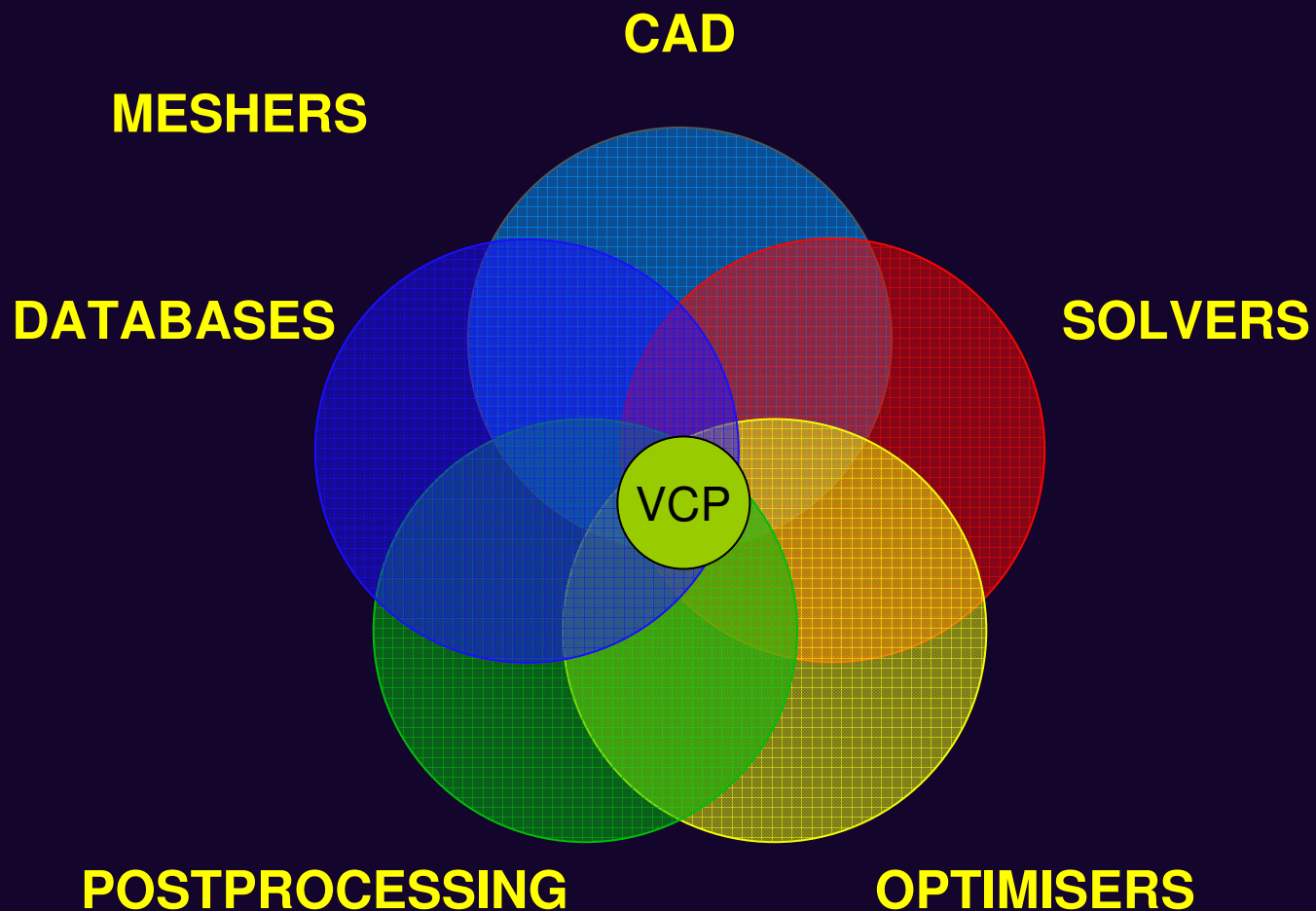


PITAC Report, June 2005

Muti-physics design: complex processes



Integration of large-scale multi-physics apps



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...

IT contribution to Multiphysics Design

- SOFTWARE INTEGRATION PLATFORMS
- DISTRIBUTED AND PARALLEL hardware AND software
- COLLABORATIVE ENVIRONMENTS
- USER CENTRIC NOT TECHNOLOGY PROTOTYPES
- MULTI-USERS AND MULTI-DISCIPLINES
- COMPUTATIONAL GRIDS + WORKFLOW SYSTEMS

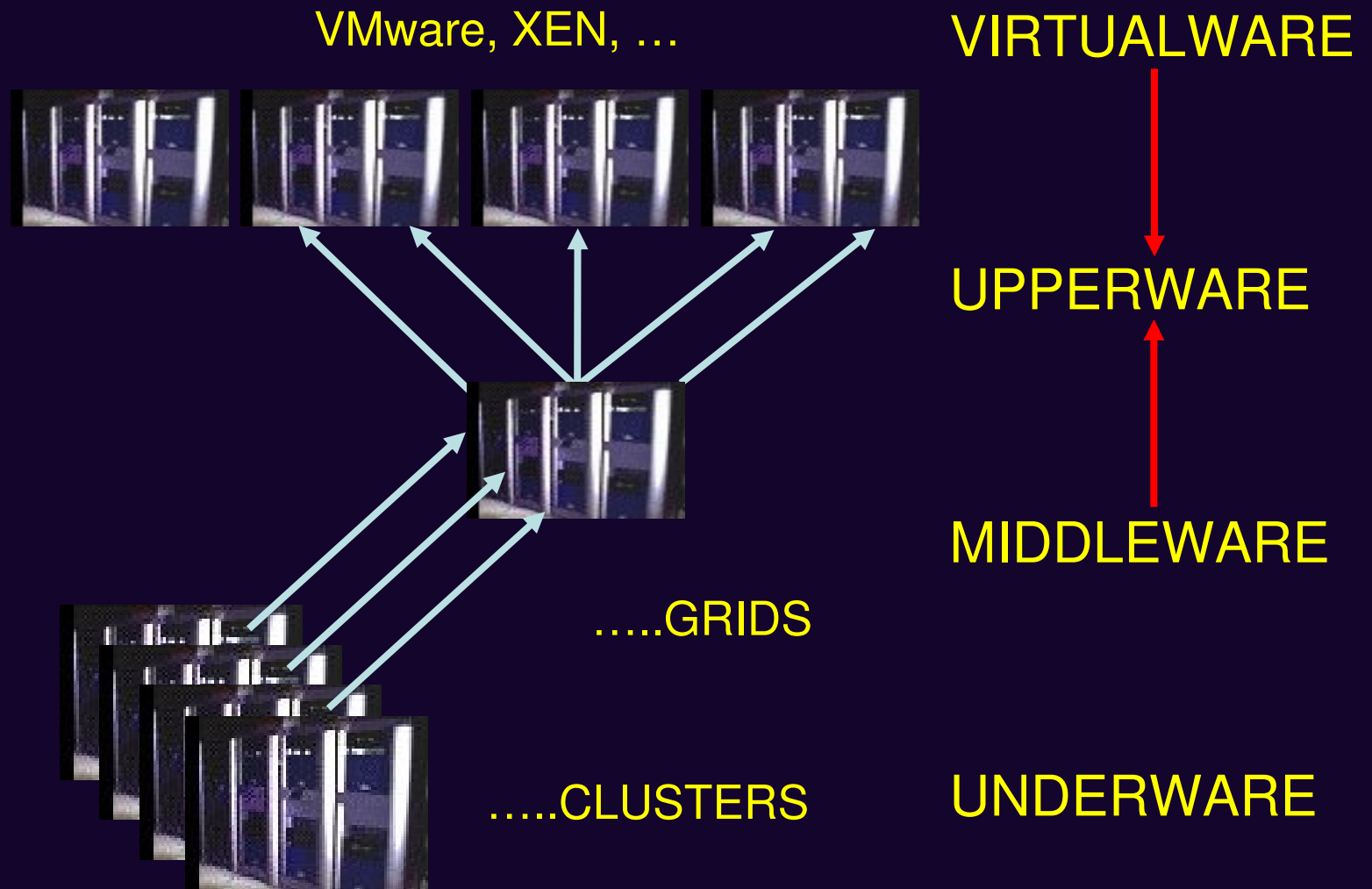
Complex Technical Background

- 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

Collaborative Platforms for Multiphysics Design

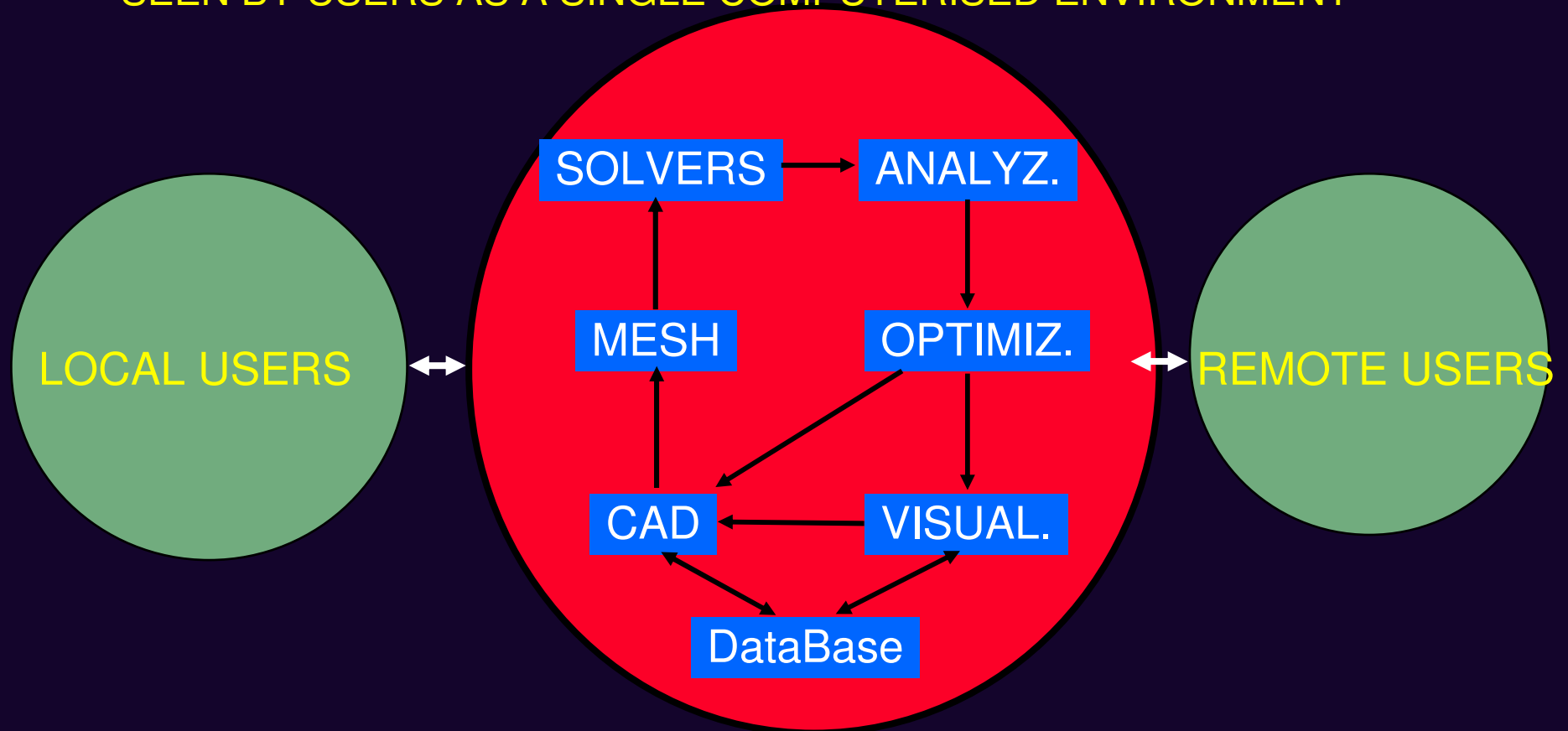
- PLUG-IN COMPONENTS, DATABASES AND SOFTWARE
- INTERACTIVE MULTI-USER PLATFORMS
- MULTI-DISCIPLINE TRIAL/ERROR ENVIRONMENTS
- PRODUCE LARGE (PETA SCALE) VOLUMES DATA
- EXHIBIT APPLICATION PROTOCOLS
- SIMPLIFY DESIGN ENGINEERS' LIFE

Collaborative Platforms Infrastructures



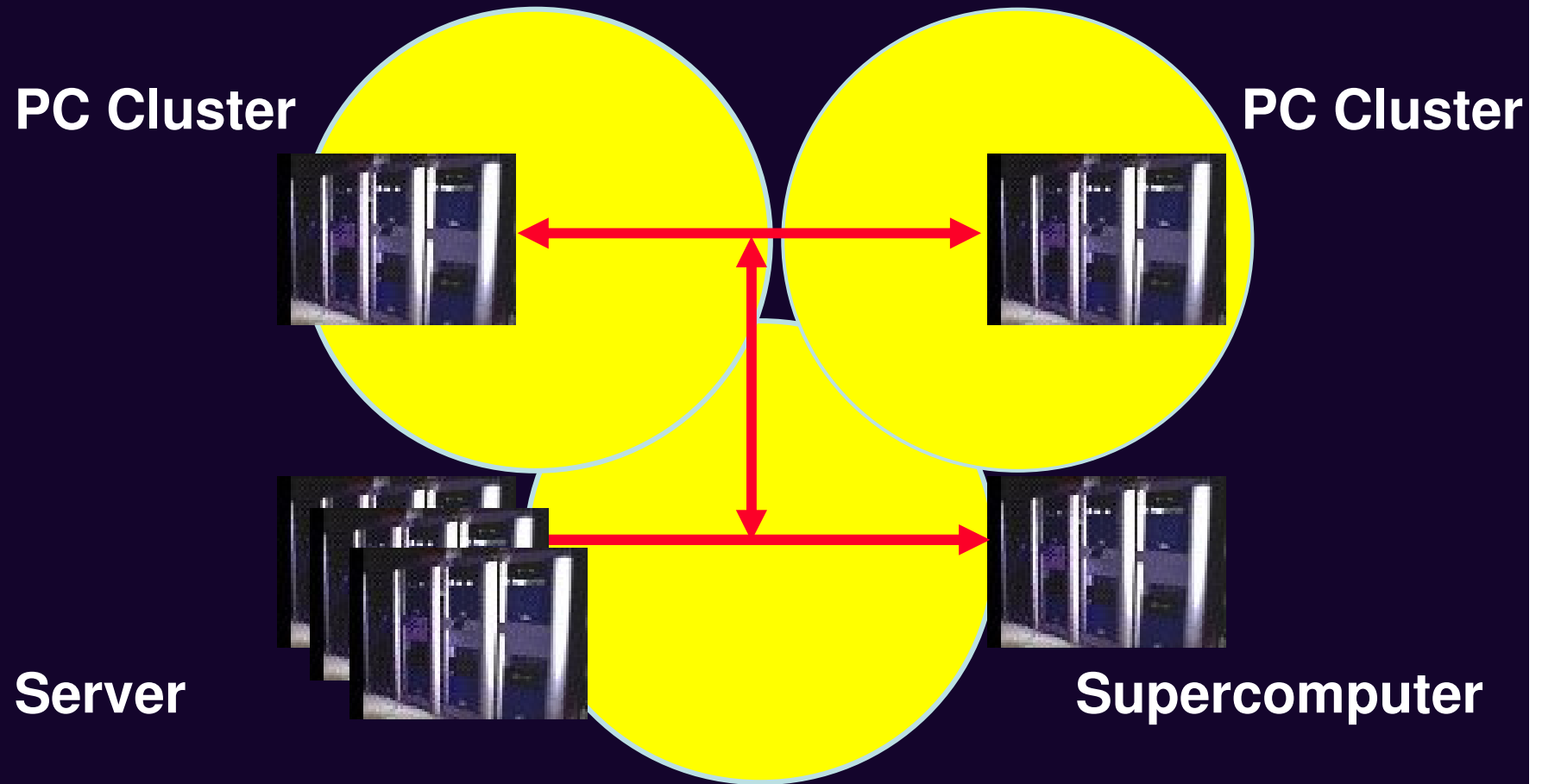
Application Deployment on Collaborative Platfor.

SEEN BY USERS AS A SINGLE COMPUTERISED ENVIRONMENT

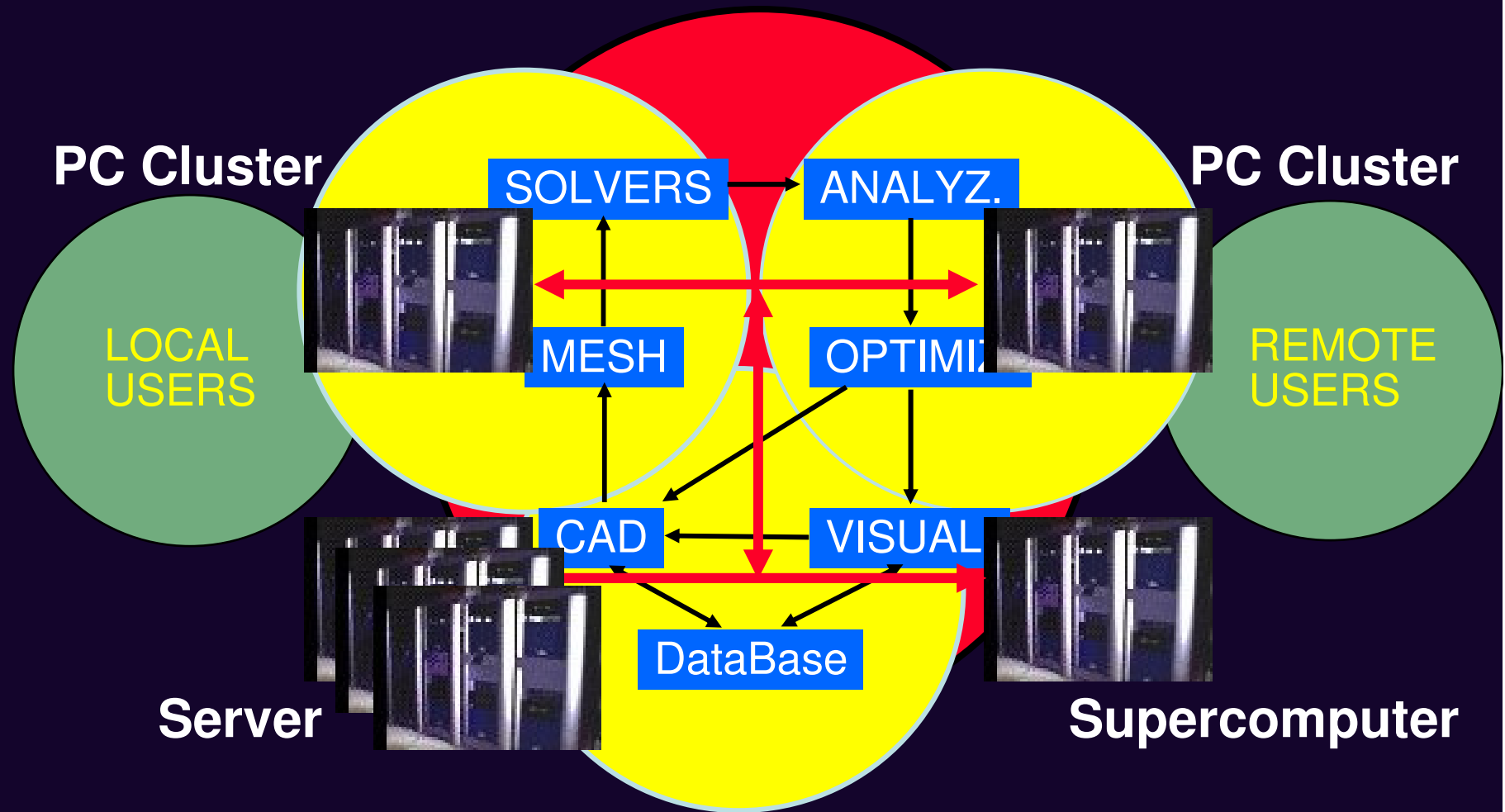


UNCHANGED WHATEVER THE UNDERLYING INFRASTRUCTURE AND USERS

Collaborative Platforms Infrastructures

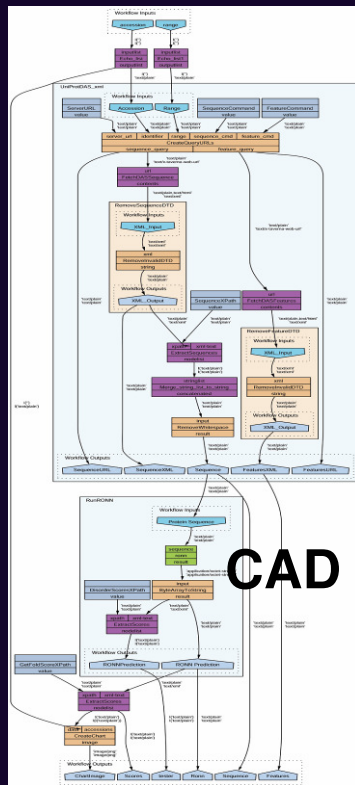


Collaborative Platforms: putting it all together

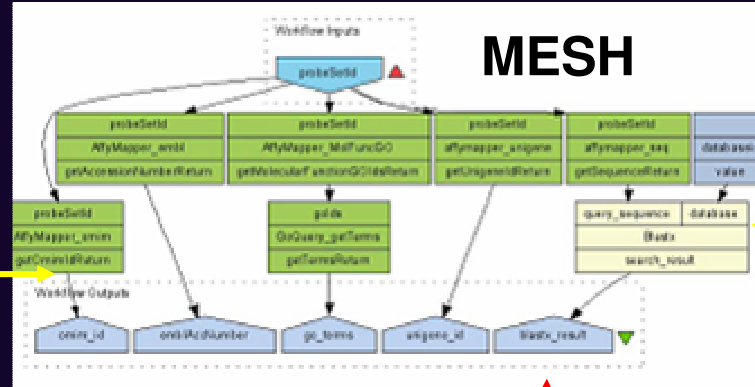


Workflow contributions to Multiphysics Design

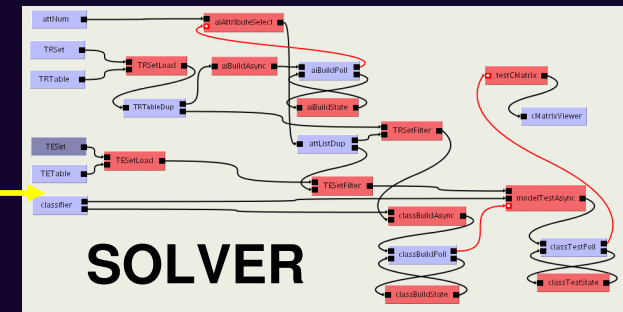
- MANY WORKFLOW candidates: Taverna, Kepler, Bonita...
- REUSABLE WORKFLOWS
- COMPOSITE WORKFLOWS
- SERVICE ORIENTED ARCHITECTURES
- GRID INFRASTRUCTURES
- WORKFLOWS PRODUCE CONTENT... so we need...
- in the future... WORKFLOW BUS



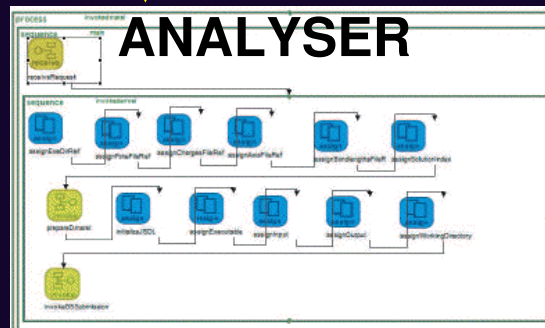
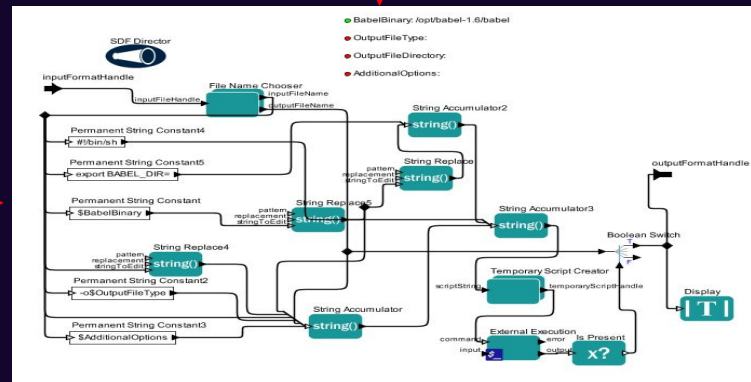
CAD



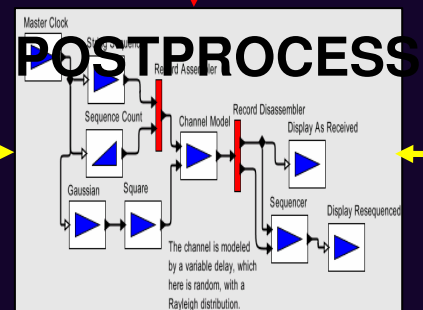
MESH



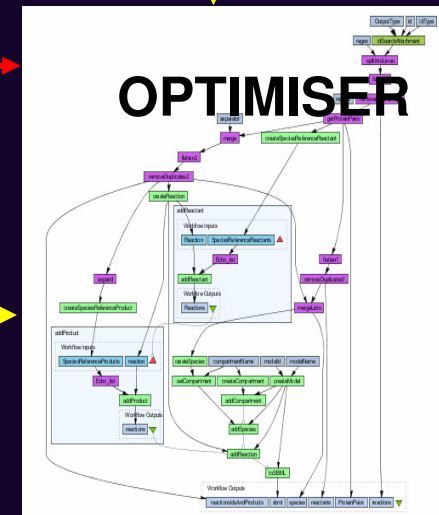
SOLVER



ANALYSER



POSTPROCESS



OPTIMISER

International & Industrial Cooperation

- European projects: PROMUVAL, AEROCHINA 1 & 2...
- Industrial cooperation: EADS, AIRBUS, DASSAULT, ALENIA
- Foreign cooperation: DLR, Chinese (AVIC1, CAE, NUAA...)
- Research institutes: CNES, CIMNE, JYU, ...
- Aeronautics & Air Transport Call FP7-AAT-2008-RTD-1

Obective 7.1.4 Improving cost efficiency: AAT.2008.4.4.1

« Integrated Approach to full Virtuality in Design & Product develpt within the Extended Enterprise concept »

References

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