# EUFORIA
# Brief Overview

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Chalmers University of Technology

EU Fusion for ITER Applications - EUFORIA

EU-US workshop on Software Technologies for Integrated Modelling for ITER

December 1-3, 2010 Gothenburg

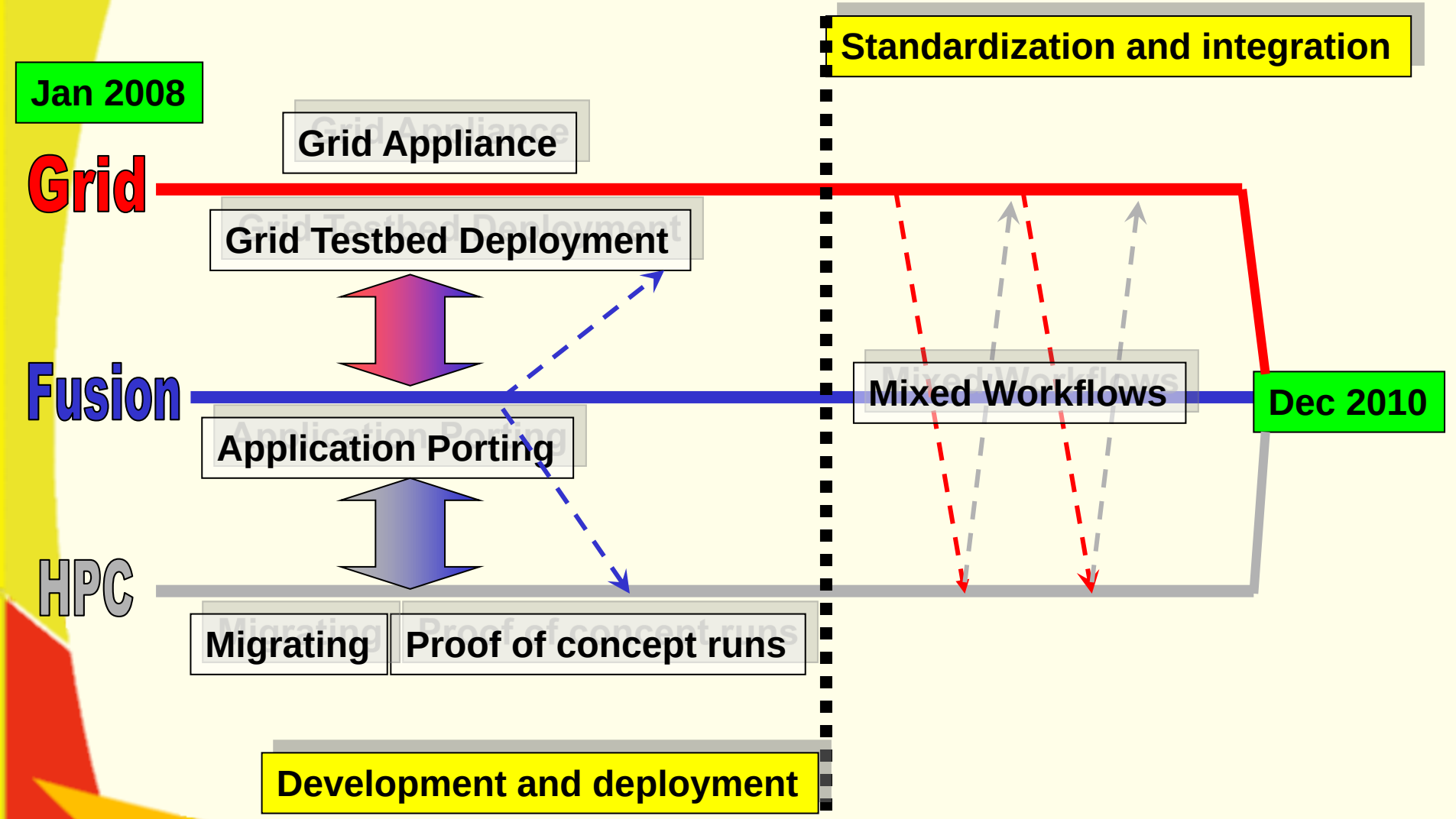
# EUFORIA

14 member Institutes

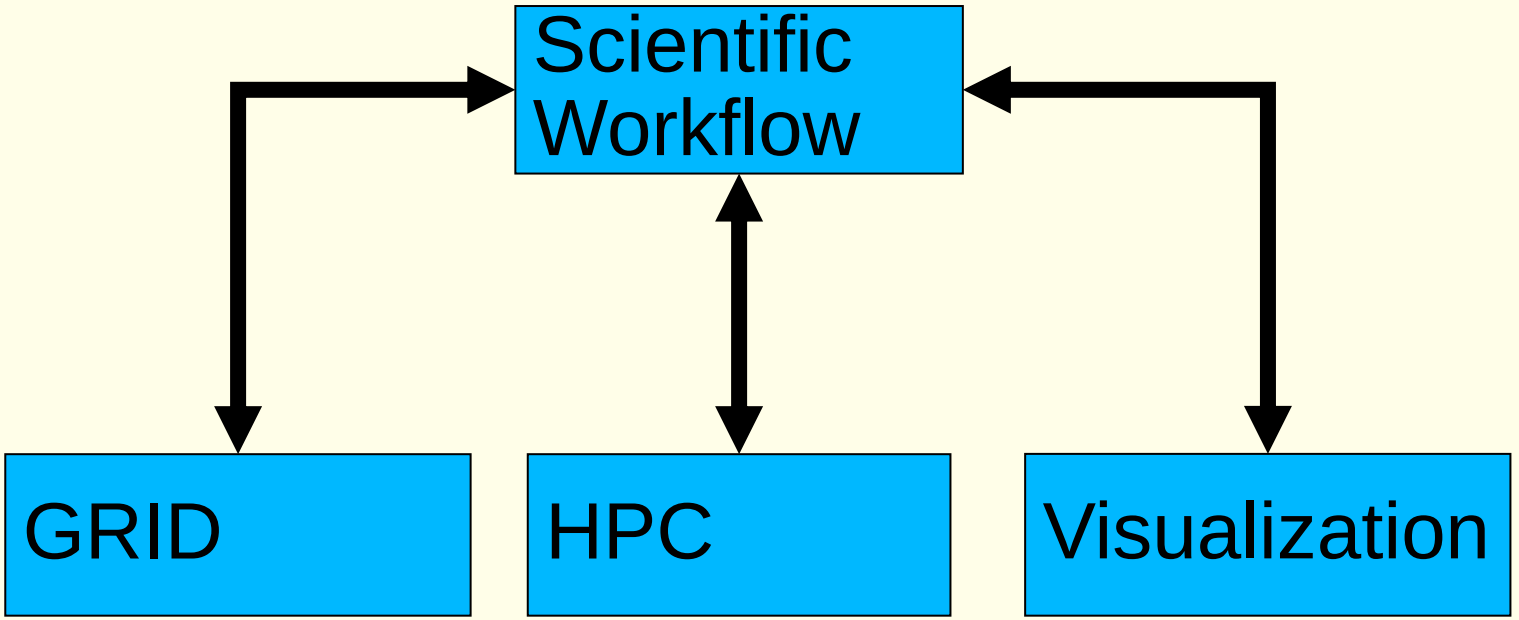
522pms covering
3.65M€ (4.4M€)

- Management
- Training
- Dissemination
- **Grid and HPC infra-structure & support**
- **Code adaptation & optimization**
-**Workflows**
-**Visualization**

# Work plan outline

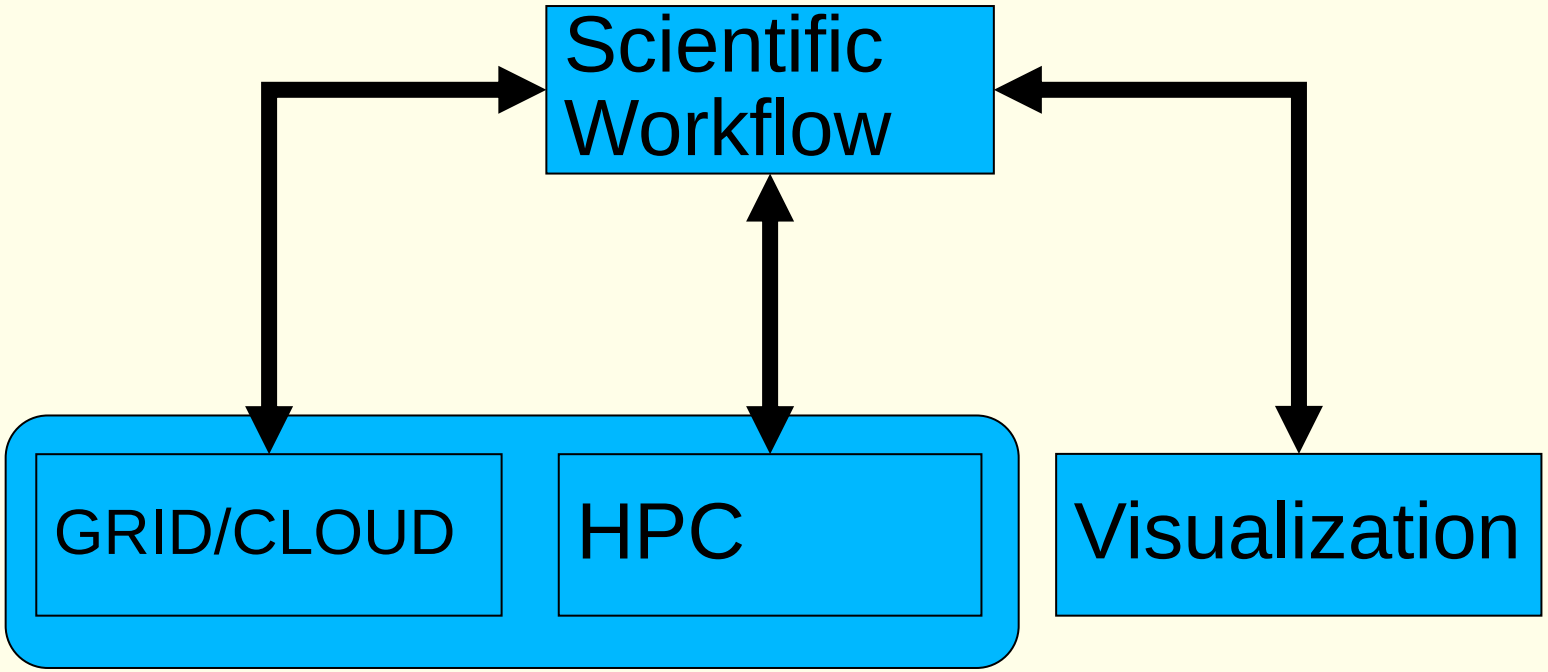


# Developing a new paradigm for fusion computing




- Building on e-infrastructure tools, middleware and installations
- Integrating tools and physics models together with a ”fusion simulation ontology”
- At least initially building on fusion de facto standards for data access and communication

# Developing a new paradigm for fusion computing

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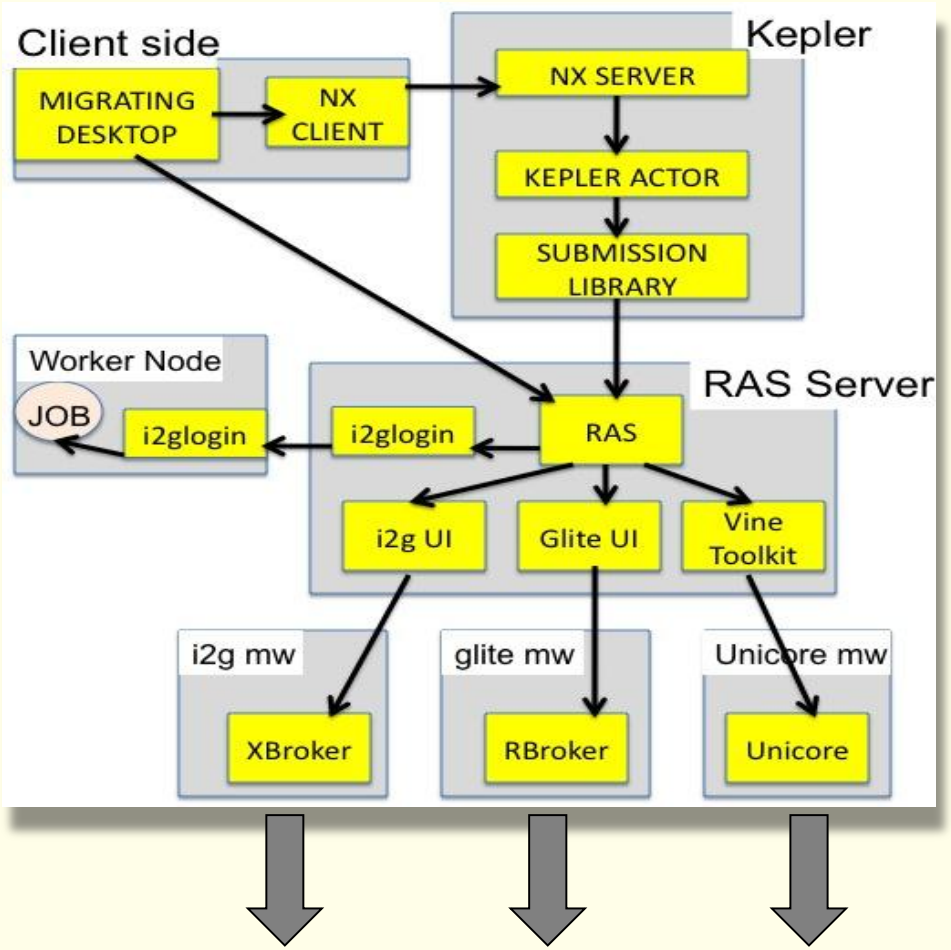
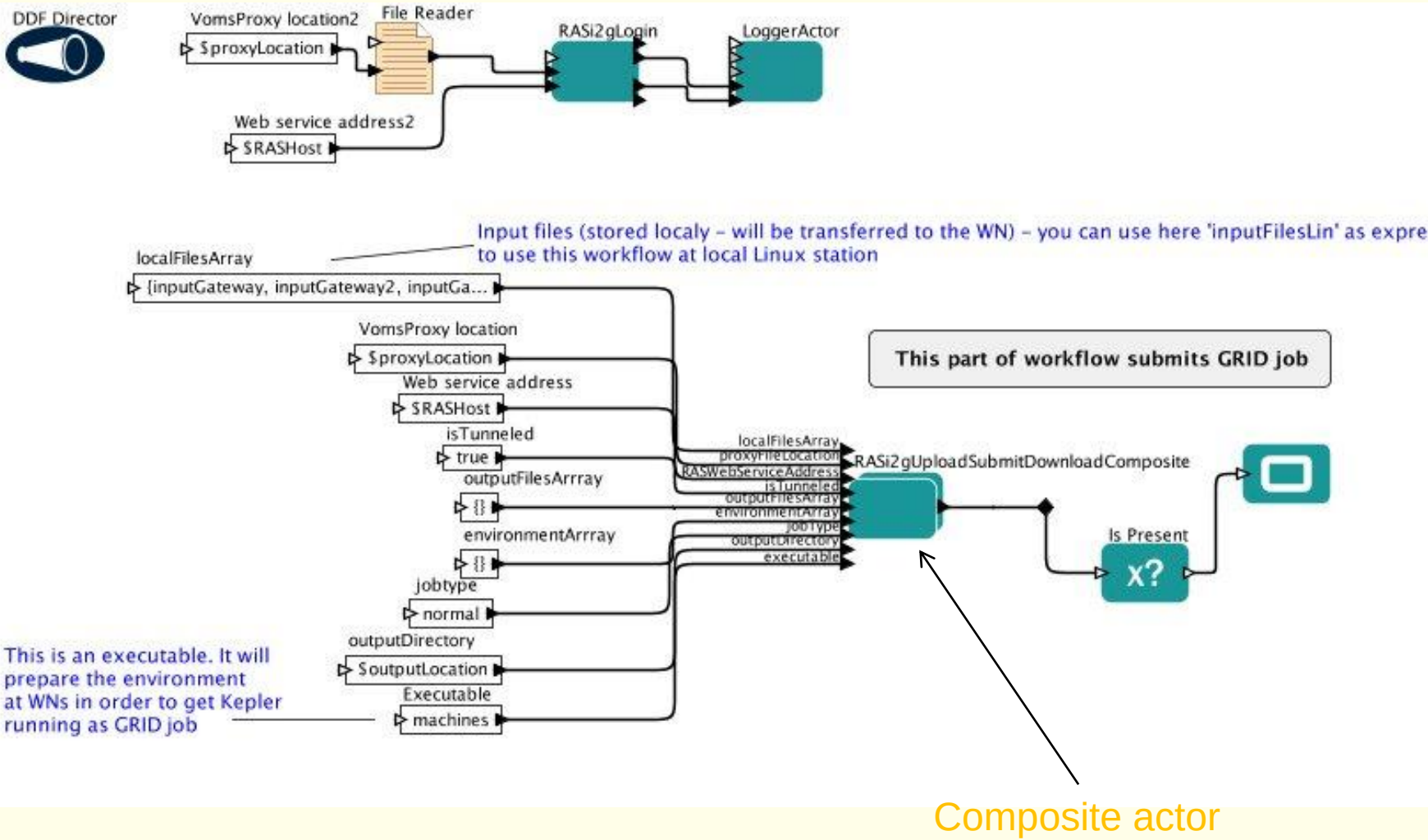
- Integrating tools and physics models together with a ”fusion simulation ontology”
- At least initially building on fusion de facto standards for data access and communication

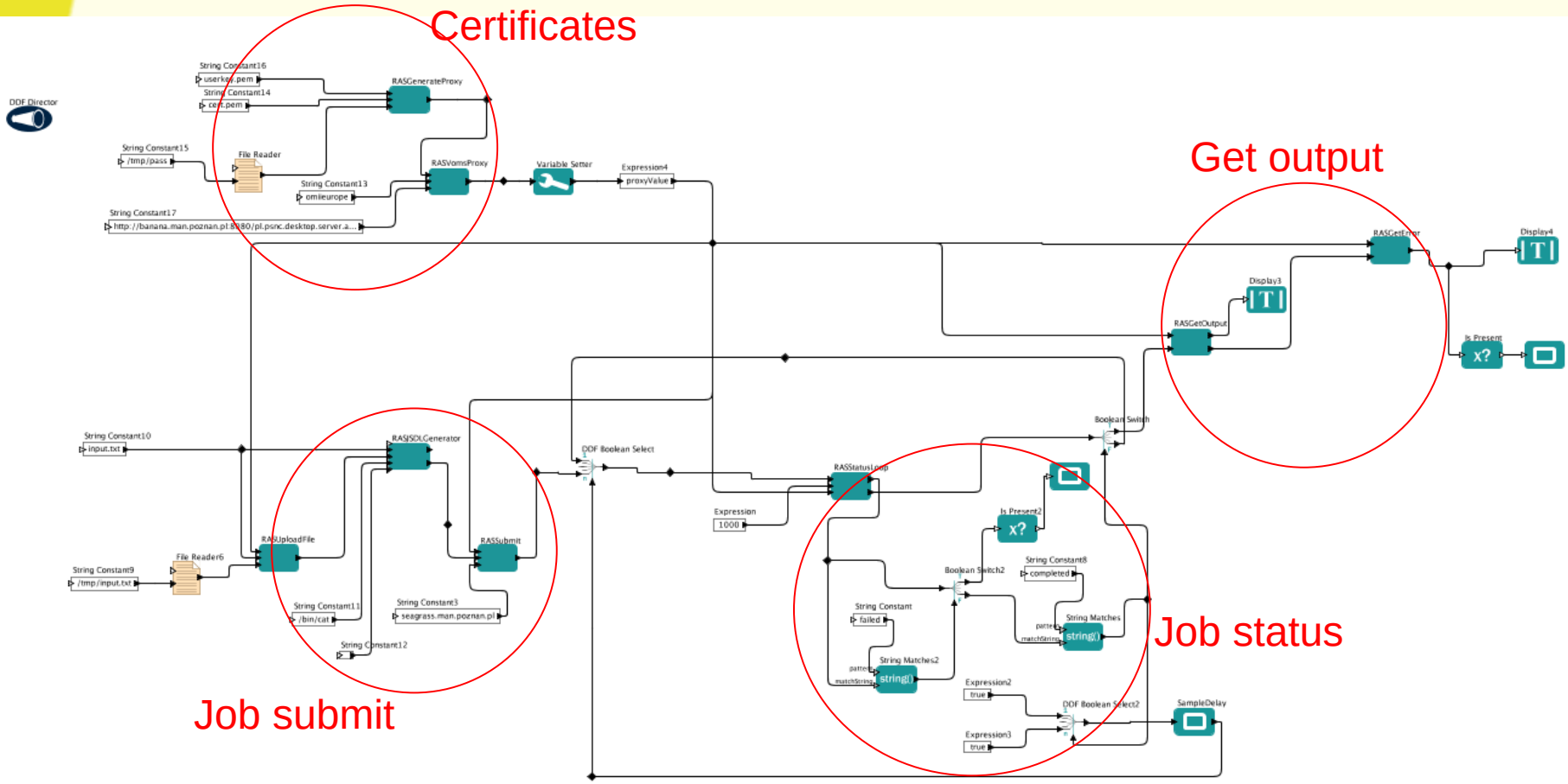
# The EUFORIA Services in the broader view



# Launching simple Grid jobs

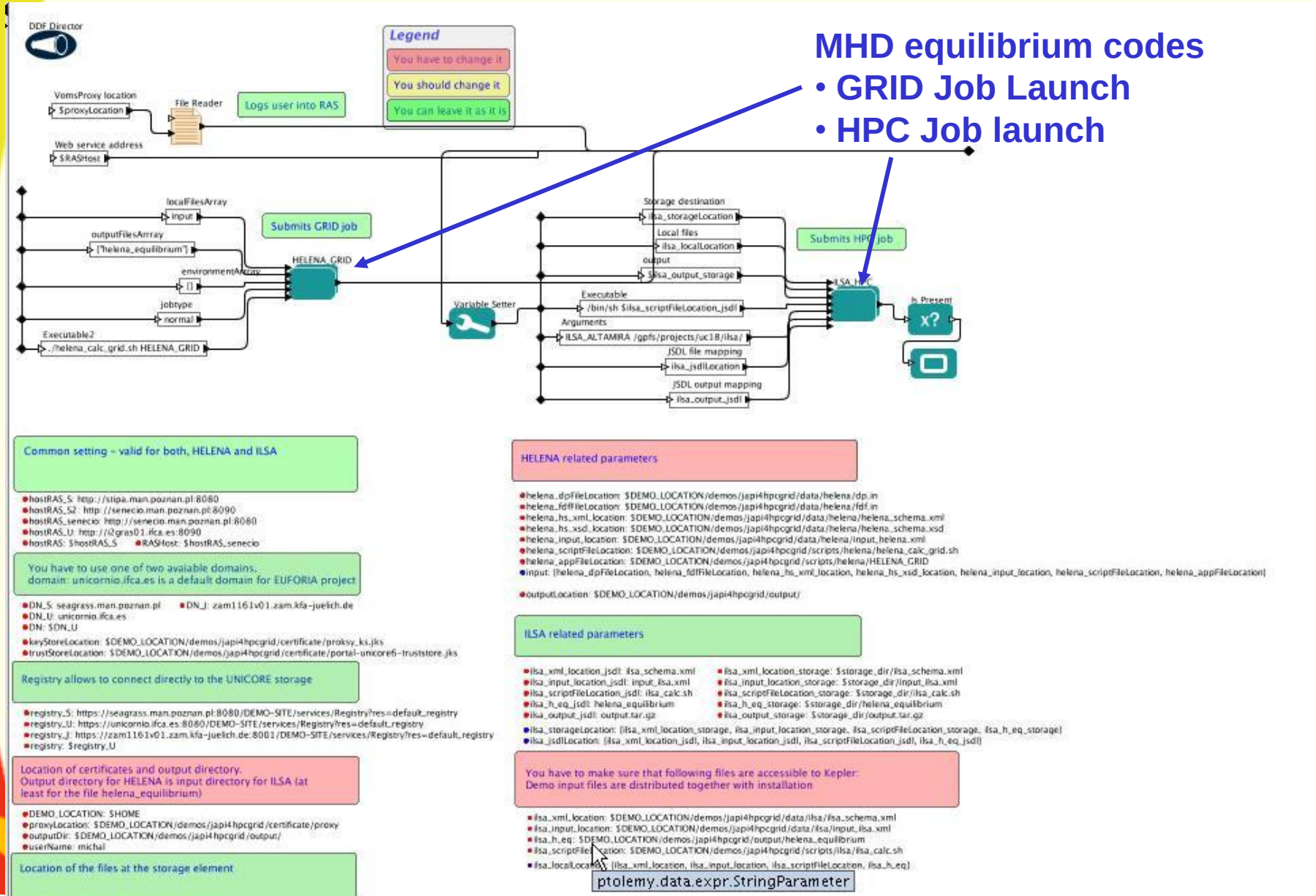


# Example of composite actor - details




Allows for arbitrary complex workflows to be built!

# Workflow + fusion codes on GRID and HPC

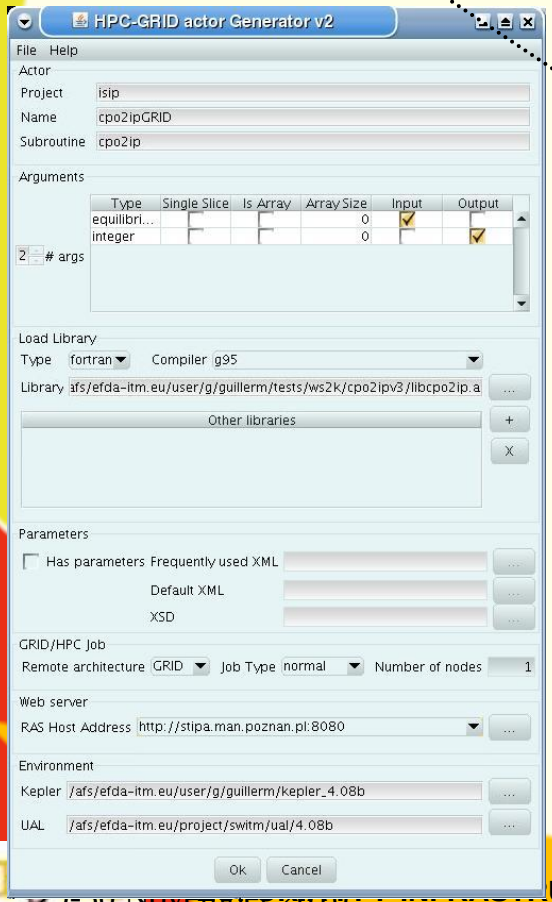


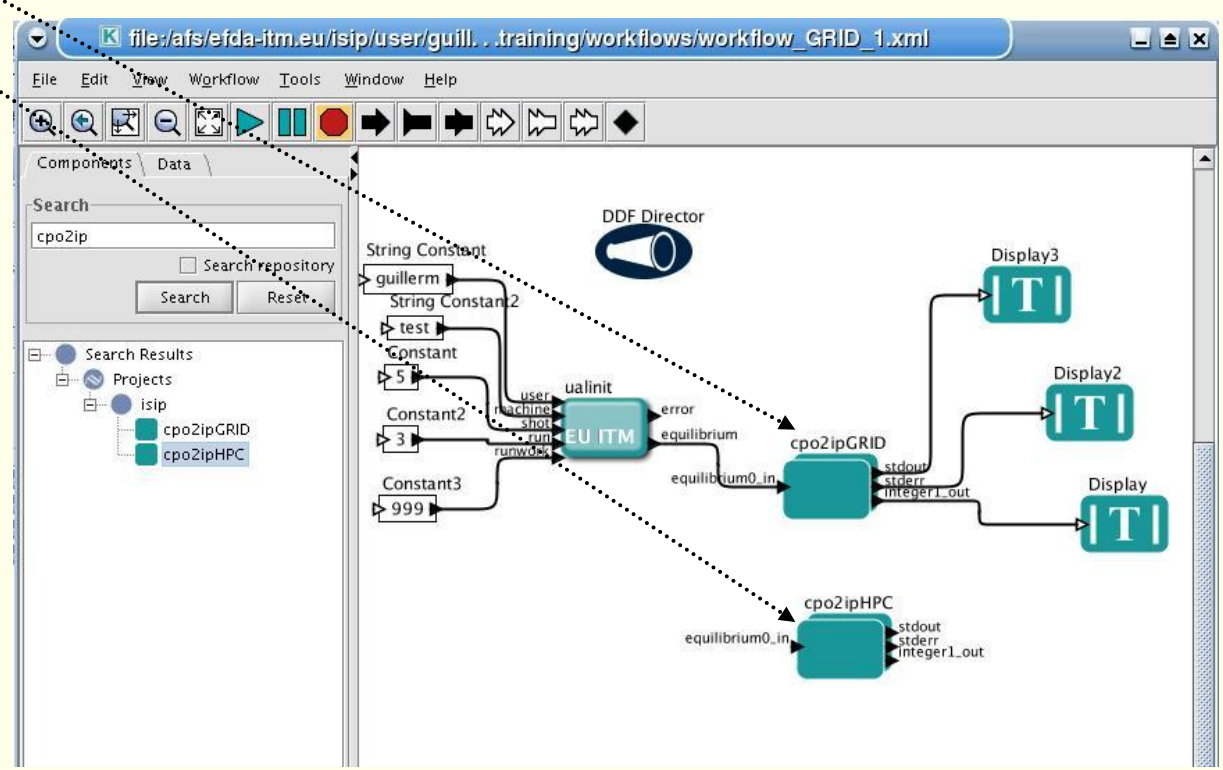
# Ease of use

- **Support for end users**
  - Correct the lack of reliability of some GRID infrastructures
- **Tools for C++ and Fortran codes**
  - Build automatically the files for GRID or HPC jobs
  - Add/wrap UAL data access “automagically”
  - Create the Kepler actor
  - ITM (1st version), EUFORIA (2nd version: new RAS actors)

# Ease of use - Integration with CPO

- **Examples of HPC2K**
  - **GRID**
  - **HPC**



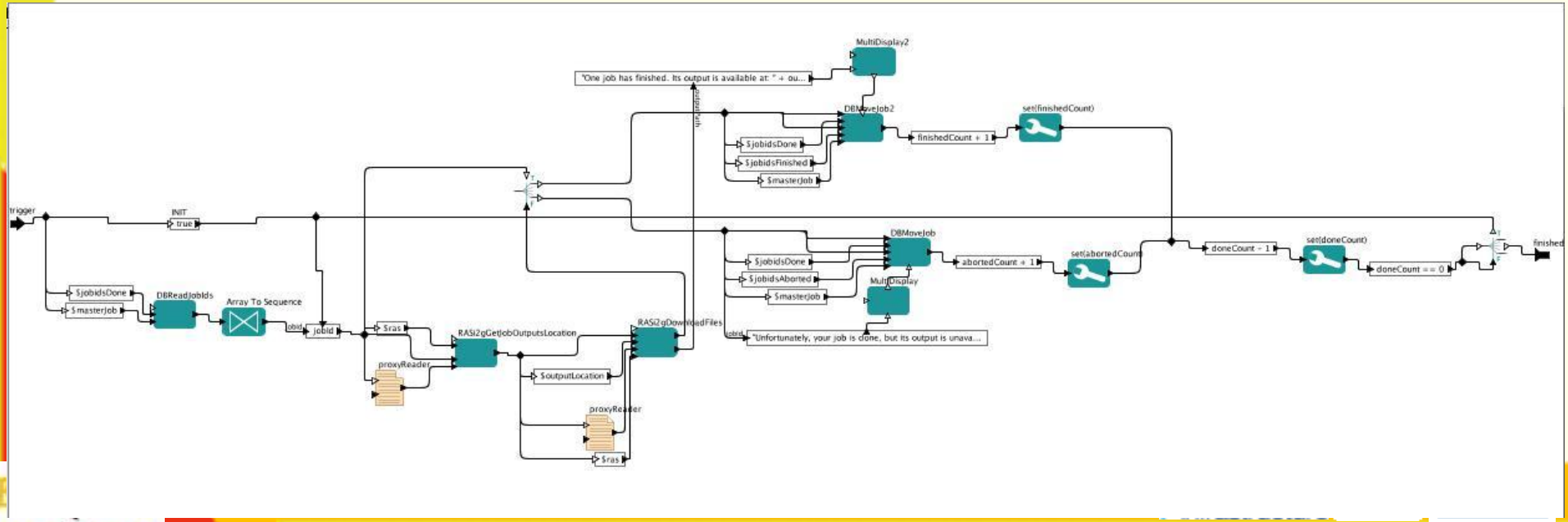



# New developments

- **Cloud:**
  - Transparent usage of Amazon EC2 and Open Nebula resources – moving out of the ”grid” realm
  - Mechanisms for jobs handling (submission, monitoring, obtaining results) developed
  - Kepler workflow incorporating all components prepared
- **Creating template workflows for different use cases**
- **Migration to Kepler 2.0**
- **Developments needed for workflows:**
  - **HELENA+JALPHA+ILSA**
  - **“CIEMAT/ORNL”: VMEC+Cobra+…+Visualisation during execution + Visualisation after with JRA4 results**
  - **---**
  - **….**

# Robust infrastructure

- **Handling the infrastructure errors**
  - **Development of composite actors and more sophisticated workflows: new release of RAS actors & RAS/Vine servers**
  - **Goal: Correct the lack of reliability of some GRID infrastructures**
  - **Updates**
    - **internal workflow (in the composite actors)**
    - **Error detection => job resubmission**
    - **Persistent Storage of job id => using a database**
    - **No major change at the user level**



# Meeting EUFORIA general objectives

- ✓ Deployment of a grid service – test access for clouds
- ✓ Deployment of an HPC infrastructure
- ✓ Development of a portal for general user access - ENEA Gateway, Migrating desktop, Kepler,
  - ✓ Proving mechanisms to support a user Community NOT equal to developers
- ⚠ Adaptation of a standard ontology for edge-core simulations - well underway with edge code providers
- ✓ Adaptation and optimization of fusion simulation tools and codes targeting
  - Serial grid applications
  - Parallel grid applications
  - High Performance Computing
- ⚠ Development of a framework or code platform tool providing - final integration in 2010 on EU e-infrastructure
  - Dynamic workflow orchestration - Kepler
  - High quality Visualization - Python, Matplotlib, Visit and actors
  - Data mining capabilities - python, workflow tools
- ✓ Middleware development needed for deployment of computational resources from framework tools
- ✓ In addition there are a number of outreach and dissemination activities planned to introduce the fusion community at large to the developed infrastructure and make contact with other infrastructure and research projects with similar or associated orientations

# Thanks

EGEE
DEISA

- Chalmers University of Technology (Coordinator) from Sweden
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- Centro de Investigaciones Energéticas, Medio Ambientales y Tecnológicas (CIEMAT) from Spain
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- Abo Akademi University (ABO) from Finland
- University of Edinburgh (UEDIN) from United Kingdom
- Barcelona Supercomputing Center (BSC) from Spain
- French Atomic Energy Commission (CEA) from France
- University of Strasbourg from France
- University of Ljubljana (UOL) from Slovenia

Poznan Supercomputing and Networking Center PSNC from Poland

Italian National Agency for New Technologies, Energy and the Environment (ENEA) from Italy

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