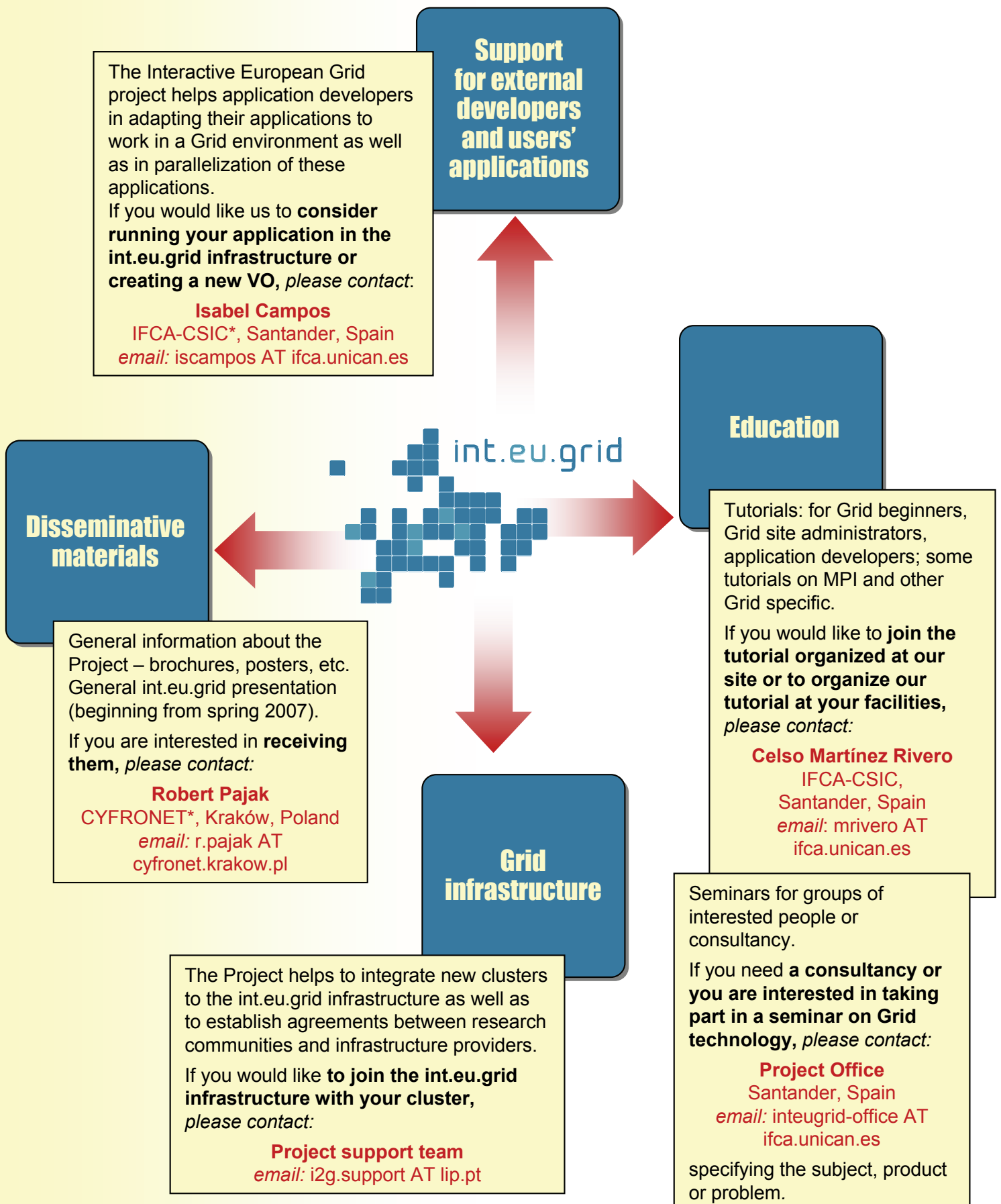


# The **Offer** of the Interactive European Grid Project



Int.eu.grid will initiate several pilot applications for validation and demonstration of successful scientific use.

If you are interested in joining the applications' VOs, please contact the VO manager.

## PHYSICS

**Visualization of Plasma in Fusion Reactors** is an application which visualizes the behaviour of plasma inside a Fusion Reactor. Runs are foreseen as a part of a so called *Fusion Virtual Session*. Plasma is analyzed as a many body system consisting of N particles which are distributed among a number of processors, which calculate the individual trajectories. For every particle, the position, velocity, etc. are stored in a binary file which is transmitted for visualization purposes.

- **Interactivity:** possibility of allocating more resources in runtime; changing the simulation physical parameters.
- **Visualization:** graphical interface to visualize the plasma trajectory in the reactor; possibility of simulation steering.
- **Grid added value** – gathering for short periods of time a large amount of resources.
- **Intended users** – scientists from BIFI\* and CIEMAT (Centro de Investigaciones Energeticas, Medioambientales y Tecnologicas, Spain), and others interested.

**VO established:** *ifusion*

**VO manager:**

**Isabel Campos**, IFCA-CSIC, Santander, Spain

*email:* [iscampos AT ifca.unican.es](mailto:iscampos AT ifca.unican.es)

**Analysis of Maps of Cosmic Microwave Background** is an application concerning the analysis of the measurements of the NASA Satellite WMAP.

- **Work Strategy:** input – values of 'Temperature' (radiation of the Cosmic Microwave Background) CMB Map; statistically the radiation values should be distributed like a Gaussian (Standard Model); if non Gaussianities are detected it constitutes a proof of the failure of the Standard Model.
- **Computing requirements:** from input values one constructs numerically about  $10^5$  statistically equivalent configurations of the sky: input is ~500MB;  $10^5$  simulations of 5 minutes each. The sky is then divided in arcs of  $10''$  (squares of  $1024 \times 1024$  pixels). On each square one calculates the autocorrelations measuring the gaussianity of the distribution: 800 simulations of 2-4 minutes each.

**VO established:** *iplanck*

**VO manager:**

**Isabel Campos**, IFCA-CSIC, Santander, Spain

*email:* [iscampos AT ifca.unican.es](mailto:iscampos AT ifca.unican.es)

## MEDICAL SCIENCES

**USCT – Ultrasound Computer Tomography** is a medical imaging application based on the reconstruction by numerical techniques of an image, using as input the data measured by an Ultrasounds Scanner. The data measured in the scanner (~ 20GB) are distributed for analysis over the Grid. Runs, which are in principle independent, are supposed to take about 30 min spanning over a large enough number of CPUs. At completion, the results (total ~ 4GB) are sent back to the server.

- **Interactivity** covers starting and stopping the simulations. Visualization is provided by *Matlab* graphical output. Grid added value is gathering a large amount of resources to solve a complex problem, which due to the nature of medical work, is severely time constrained.
- **Intended users:** hospital analysts.

**VO established:** *iusct*

**VO manager:**

**Marcus Hardt**, FZK\*, Germany

*email:* [marcus.hardt AT iwr.fzk.de](mailto:marcus.hardt AT iwr.fzk.de)

**Medical Applications on Brain Images** is an application which allows doctors to develop complex techniques for diagnostic on brain images. Its first prototype is oriented to be used in perfusion studies: 50 sequential images are obtained in a CT scan, and using as reference two structures defined by the doctor, three parameters are obtained for each voxel, and used to precisely define the brain zone affected. The application allows:

- **Visualization** and annotation of DICOM images, the three corresponding brain maps, and the final diagnostic map.
- **Interactive session** can be shared with another doctor or medical team. The main Grid added value: possibility to use large volumes of data to test new algorithms.
- **Intended users** are medical doctors (initially at Hospital Universitario Marques de Valdecilla, Santander, Spain).

**VO established:** *ibrain*

**Project Coordinator:**

**Jesus Marco**, IFCA-CSIC

*e-mail:* [marco AT ifca.unican.es](mailto:marco AT ifca.unican.es)

**VO manager:**

**David Rodriguez**

IFCA-CSIC, Santander, Spain

*email:* [drodrig AT ifca.unican.es](mailto:drodrig AT ifca.unican.es)

## ENVIRONMENTAL RESEARCH

**IMS Model Suite (Evolution of pollution clouds in the atmosphere)** is the application which models dispersion of the pollutant in the atmosphere as the movement of individual independent particles (Lagrangian model). The term particle denotes any air pollutant or substance (or multiple substances) in the volume of air located to the certain position of the space. The particles travel with the wind and the particle trajectory and particle composition reflects natural phenomena such as turbulent diffusion, dry deposition, wet deposition caused by the rain and radioactive decay. The N particles are distributed among a number of processors, which calculate the individual trajectories. For every particle the position is stored in a file which is used for visualization purposes. In addition, volume and surface concentrations are computed at specific 3D grid points.

- **Interactivity:** visualization of the partial model output; continuation of simulation from previous model run output; possibility of increasing number of particles by splitting in runtime.
- **Visualization:** graphical interface to setup model scenario; graphical interface to visualise model results: evolution of the pollution clouds, time series of volume/surface concentrations as a series of images; standard tools for the visualization and browsing of the data in FM-92 GRIB format can be used.
- **GRID added value** – allocation of computing power resources for the computation intensive model run.
- **Intended users** – civil protection/environmental impact analysis.

**VO established:** *ienvmod*

**Application responsible:**

**Martin Gazak**, MicroStep-MIS, Bratislava, Slovak Republic

*email:* [martin.gazak AT microstep-mis.com](mailto:martin.gazak AT microstep-mis.com)

If you need more info about the tools,  
please contact the responsible persons.

**The Migrating Desktop\*\*** is a framework, graphical user interface for application management, grid and job monitoring, data and metadata management. This Java-language based tool hides the details of most Grid services and allows for setting up and interactively controlling complex systems. This open environment can easily support new applications from different discipline of science.

**Person responsible:**

**Marcin Pióciennik**, PSNC\*, Poznan, Poland

*email:* marcinp AT man.poznan.pl

The **CrossBroker\*\*** offers a unified approach to running interactive distributed applications on the Grid through resource brokerage and job scheduling.

**Person responsible:**

**Enol Fernandez**, UAB\*, Barcelona, Spain

*email:* enol AT aomail.uab.es

**Complex visualization services\*\***

The development of visualization system will be based on an initial set of middleware components that are responsible for visualisation, which were originally produced in the CrossGrid project, namely **Glogin** and **Gvid**.

**Glogin** forms a key component since it provides an interactive connection to grid resources and therefore can be used for different applications like communication tunneling, transmission of visualization data, and administration of grid resources.

**Gvid** represents a novel approach for video streaming over the grid while offering interaction possibilities. The functionality is comparable to VNC, but Gvid has the advantage of being grid-aware, which enables seamless integration with the Project testbed.

**Person responsible:**

**Paul Heinzlreiter**, GUP\*, Linz, Austria

*email:* int.eu.grid AT gup.jku.at

**MPI Support**

The int.eu.grid infrastructure will have support for MPI parallel jobs. For MPI jobs limited to a single cluster the Project will use **Open MPI**. For MPI jobs across multiple clusters **PACX-MPI** in combination with **Open MPI** will be used. The Project will also develop a quite new abstraction layer between the MPI layer and the Resource Broker named **mpi-start**.

**Person responsible:**

**Sven Stork**, HLRS\*, Stuttgart, Germany

*email:* stork AT hlr.s.de

**Active Security Services**

The Active Security task proposes to consider security measures for an interactive framework, and subsequently to enhance interactive operation with active security tools. Distributed active security will be included in the architecture from the start, adding to the security mechanisms of the EGEE middleware. By active security we mean dynamic, rather than static, measures that track Grid interactions and respond to unwanted security events in an adaptive way.

**Person responsible:**

**Stuart Kenny**, TCD\*, Dublin, Ireland

*email:* stuart.kenny AT cs.tcd.ie

More info can be found  
on the Project web site:

[www.interactive-grid.eu](http://www.interactive-grid.eu)

\*) The project partners, \*\*) The tools have been created in the framework of the CrossGrid project and will be adapted to the int.eu.grid infrastructure.