

Title:**Civil Protection applications in a Grid supported environment****Context:**

Grid paradigm represents a technological and economic revolution in high performance distributed computing for what concerns the meaning and the availability of global information. Grid-based platforms allow the implementation of a widely distributed computing environment operated as a uniform service.

In 2003 the EU approved the EGEE (Enabling Grids for E-Science in Europe) project, which aimed at the integration of current national, regional and thematic Grid efforts, in order to create a seamless European Grid infrastructure to support the European research area. The EGEE computing Grid is now operating and constitutes the world's largest international scientific Grid, providing a powerful GRID platform to implement services for specific application Communities.

Such an occasion of progress for the whole European society has been leveraged by important and strategic sectors like GMES, a concept endorsed by the EU with the aim of "establishing by 2008 a European capacity for G(lobal M(onitoring of E(nvironment and S(ecurity", to gather and use all available data and information to promote sustainable development policies. In particular, the Emergency Response (ER) service aims to reinforce European capacity to predict and respond to crises and emergencies associated with natural and man-made disasters, whether deliberate or accidental, such as meteorological-driven hazards like storms, fires, floods; geophysical hazards; technological disasters like chemical accidents on industrial sites; humanitarian disasters generated by sudden natural, technological and weather driven disasters. In the long run, the proposed service will guarantee that Europe can provide adequate information system capabilities to support early warning, urgent assistance, relief operations, humanitarian aid, and reconstruction wherever and whenever they may be required around the world.

The European Civil Protection (CP), as one of the GMES service categories, can be viewed in the context of Grid computing as a typical example of a virtual organization whose requirements call for high performance distributed computing environment to share critical data and resources.

Thesis objectives:

The thesis proposed addresses the development of significant original work in the context of the grid-based platforms that support Civil Protection/GMES applications.

Valuable points to be addressed includes: 1) Integration & Interoperability with the current EGEE platform and 2) the definition of novel generic application frameworks, derived from specific use cases, to enhance and extend the current support to Civil Protection applications in Grid.

After evaluating the requirements of Civil Protection applications in a Grid computing infrastructure, the initial research shall identify the weaknesses of current Grid platform implementations in this domain, addressing topics such as (near) real-time support, spatial data infrastructures, security and data policies, sensor networks and acquisition systems control and knowledge-

based Grid services. The research shall then propose enhancements to the EGEE architecture and implementation in order to circumvent any identified limitations.

A probable future Grid for Civil Protection applications will affect Civil Protection infrastructure design and operation, so this proposal includes the definition of innovating strategies for Civil Protection systems porting in order to prepare the adoption of Grid-based platforms.

HP&G group

The High performance computing & Computer Graphics (HP&G) group, integrated in Universidade do Minho's CCTC, participates in the EU FP6 project **CYCLOPS**: CYber-Infrastructure for Civil protection Operative Procedures, which outlines the importance to develop and enabling e-infrastructures and virtual organisation services to serve specific GMES applications.

CYCLOPS brings together two important Communities: GMES and GRID, focusing on the operative sector and needs to implement services for the European Civil Protection. Another goal is to promote parallel and grid computing, through the development of techniques and tools to help computational scientists to build efficient simulation tools from complex and accurate mathematical models, and to use the results from this emergency case study to provide feedback to EC/EU initiatives and projects (GMES, INSPIRE, EGEE) to improve standards and protocols.

In the context of National Grid Initiative, HP&G group is leading another CP project, **CROSS-Fire**: Collaborative Resources Online to Support Simulations on Forest Fires, aimed at further research and develop the topics related to porting and exploiting an existing forest fire simulation application to the Grid and Integrate Geo-referenced Web Services for Real-Time Management.

In another hand HP&G participation in EU project **EELA-2**: (E-Infrastructure shared between Europe and Latin America will permit to extend the universe of applicability of CROSS-Fire approach to a transcontinental Grid Environment.

Supervisor:

António Pina: pina@di.uminho.pt has significant work in the area of Parallel and Distributed Computing, being an active member of HP&G CCTC team with special responsibilities in the EU CYCLOPS and EELA-2 projects, where he assumes the role of Principal Investigator of UMinho partnership.

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