



Towards an advanced e-Infrastructure for Civil Protection applications: Research Strategies and Innovation Guidelines

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In the context of the EU co-funded project CYCLOPS (<http://www.cyclops-project.eu>) the problem of designing an advanced e-Infrastructure for Civil Protection (CP) applications has been addressed.

As a preliminary step, some studies about European CP systems and operational applications were performed in order to define their specific system requirements. At a higher level it was verified that CP applications are usually conceived to map CP Business Processes involving different levels of processing including data access, data processing, and output visualization. At their core they usually run one or more Earth Science models for information extraction. The traditional approach based on the development of monolithic applications presents some limitations related to flexibility (e.g. the possibility of running the same models with different input data sources, or different models with the same data sources) and scalability (e.g. launching several runs for different scenarios, or implementing more accurate and computing-demanding models). Flexibility can be addressed adopting a modular design based on a SOA and standard services and models, such as OWS and ISO for geospatial services. Distributed computing and storage solutions could improve scalability. Basing on such considerations an architectural framework has been defined. It is made of a Web Service layer providing advanced services for CP applications (e.g. standard geospatial data sharing and processing services) working on the underlying Grid platform. This framework has been tested through the development of prototypes as proof-of-concept. These theoretical studies and proof-of-concept demonstrated that although Grid and geospatial technologies would be able to provide significant benefits to CP applications in terms of scalability and flexibility, current platforms are designed taking into account requirements different from CP. In particular CP applications have strict requirements in terms of: a) Real-Time capabilities, privileging time-of-response instead of accuracy, b) Security services to support complex data policies and trust relationships, c) Interoperability with existing or planned infrastructures (e.g. e-Government, INSPIRE compliant, etc.). Actually these requirements are the main reason why CP applications differ from Earth Science applications.

Therefore further research is required to design and implement an advanced e-Infrastructure satisfying those specific requirements. In particular five themes where further research is required were identified: Grid Infrastructure Enhancement, Advanced Middleware for CP Applications, Security and Data Policies, CP Applications Enablement, and Interoperability. For each theme several research topics were proposed and detailed. They are targeted to solve specific problems for the implementation of an effective operational European e-Infrastructure for CP applications.