



## 1 Publishable summary

In the Lisbon strategy, the 2005 European Council identified knowledge and innovation as the engines of sustainable growth and stated that it is essential to build a fully inclusive information society. In parallel, the World Conference on Disaster Reduction (Hyogo, 2005), defined among its thematic priorities the improvement of international cooperation in hydrometeorology research activities. This was confirmed at the Joint Press Conference of the Center for Research on Epidemiology of Disasters (CRED) with the United Nations International Strategy for Disaster Reduction (UNISDR) Secretariat (2009), where it was noted that that flood and storm events are among the natural disasters that most impact human life.

Hydrometeorological science has made strong progress over the last decade at the European and worldwide level: new modelling tools, post processing methodologies and observational data are available.

Recent European efforts in developing a platform for e-science provide an ideal basis for the sharing of complex hydrometeorological data sets and tools. Despite these early initiatives, however, the awareness of the potential of the Grid technology as a catalyst for future hydrometeorological research (HMR) is still low and both the adoption and the exploitation have astonishingly been slow, not only within individual EC member states, but also on a European scale.

The main goals of DRIHMS are:

- Cross fertilization between HMR and ICT communities;
- To boost European research excellence and competitiveness in hydrometeorological research and Grid research by bridging the gaps between these two communities.

The key element of the DRIHMS project is the organization of a set of networking activities (including web based questionnaires, restricted consultation meetings and open conferences), involving both hydrometeorology scientists and Grid scientists and designed to overcome current limitations in the sharing of tools and knowledge in the European HMR community, in the creating of common knowledge of what is available and, possibly, also in the production of new knowledge.



DRIHMS identifies the hydrometeorological hot research areas that require a network-based and distributed approach, in terms of hydrometeorological data and software sharing.

Consequently, DRIHMS collects analyses and communicates the requirements for porting and deployment of state-of-the-art hydrometeorological research applications and tools over heterogeneous Grid middleware.

The DRIHMS project is proposed by a consortium of hydrometeorology and ICT (LMU and IMATI) research centres that integrate multidisciplinary and complementary know-how enabling to uptake the use of Grid-related technologies in the hydrometeorological science area.

The consortium understands itself as a catalyst for other European research centres. The DRIHMS audience will be represented by HMR and ICT institutions contributing to projects and initiatives at the regional, national and international level, that are strongly related with this project (e.g. HyMex, MEDEX, DEISA, EGEE).

*The DRIHMS project will address international cooperations through a system of different activities.*

DRIHMS will enable an effective collaboration and cross-fertilization between the HMR and the Grid sciences through the involvement of key experts belonging to these two communities in the consultation and networking processes. Furthermore, DRIHMS results will be presented at major international conferences and published in relevant peer-reviewed journals.

*Description of the work performed since the beginning of the project*

Since the beginning of the project many important results have been achieved.

After the HMR consultation meeting, held on 1-3 February 2010 in Munich, Germany, the HMR questionnaire has been published online and received about 200 answers from HMR scientists.

The second meeting, held on 17-19 May 2010 in Garching near Munich, Germany, started from the analysis of HMR community needs as deduced from the HMR questionnaire and led to the formulation of the ICT questionnaire. This second questionnaire has been conceived to ask to ICT scientist about Grid and HPC technology state-of-the-art to solve the main HMR problems: the questionnaire has been published online and collected about 100 answers from ICT scientists.



The analyses of the two sets of questionnaires was undertaken to define priorities regarding the use of Grid and HPC technologies to help in solving HMR open issues.

On the HMR side, the attention was focus on topics as: precipitation downscaling, probabilistic forecasting, model verification metrics, data merging – fusion.

On the ICT side, topics included: high performance computing provisioning, workflow management and specification, Virtual Organization Management, portal and user interfaces, data visualization, computational aspects.

The results of the questionnaires analyses were presented during the Open Meeting Consultation, held on 14 October 2010 in Genoa, at IMATI-CNR headquarters: the goal of the open consultation meeting was to provide a forum to share necessities and possibilities for the design of a future European Hydro-Meteorology Research e-Infrastructure.

*Expected final results and their potential impact and use*

Based on the survey results, complemented by the Open Meeting Consultation and targeted interviews to well-recognized HMR and ICT experts, a rationale for an HMR e-Science environment was formulated which can then be mapped to an HMR e-Science architecture. The e-Science environment consists of resources, simulation models, methods and tools to be provided by various institutions over European e-Infrastructures like EGI, PRACE and the national NGIs. On the other hand, however, the HMR e-Science environment will also have specific HMR requirements not yet or only partly addressed within the actual existing e-Infrastructures.

Thus the DRIHMS networking activities have found their synthesis in the formulation of a White Paper, main outcome of the project, regarding the use of Grid technologies for basic and applied research in the hydrometeorology science area. The document identifies existing gaps (issues such as lack of funding, missing technologies, and limiting factors such as missing communication among different scientific communities) and possible strategies to fill them, thus providing to the EC a valuable support for a policy development aimed at strengthening the international cooperation based on e-infrastructure suited for hydrometeorological research and at boosting European HMR potential and its exploitation. In particular, closing the identified gaps between both communities requires a respective long-term roadmap with short-term and mid-term objectives to achieve as synchronization points. The roadmap as layered out in the DRIHMS White Paper proposes to first address the issues of community



building, then to remove the blocking factors for deploying HMR applications onto European e-Infrastructures, and finally to really exploit the infrastructure.

The DRIHMS White Paper has been presented and disseminated during the DRIHMS Final Conference, organized within the EGU (European Geophysical Union) Annual Assembly held in Vienna from April 3 to April 8, 2011.

The project has setup a web-site which can be accessed through [http:// www.drihms.eu](http://www.drihms.eu) to have access to all project results.