ESA e-Collaboration Initiatives for the Earth Science Community

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The Earth science community accounts for thousands of users distributed across the world analyzing data taken in the atmosphere, the oceans and the land, to guard the delicate balance between ecosystems and to monitor environmental changes on a global, regional and local scale. To do so, this community deals with enormous amounts of satellite and from other sources available data (e.g., Envisat only, launched early 2002, already produces some 500 Terabytes per year). Given the number of distributed users that need to work together as well as the always-increasing amounts of data sources and volumes, the Earth science community has an urgent need for a more efficient way of working together.

An adequate infrastructure supported by emerging technologies and tools that allow for the exploration of the distributed EO catalogues and archives, the elaboration of data, and for distributed actors to work together in a straight-forward manner by means of user-friendly interfaces and the hiding of the underlying infrastructural complexity is something from which the Earth science community would benefit.

The paper describes different related initiatives at ESA ESRIN. In particular, it provides details of the use of grid on-demand, e-collaboration and digital libraries concepts and technologies to demonstrate their applicability, benefits and a way forward to improve collaboration for the Earth science community.

Grid on-Demand: The use of Grid and Web-services is becoming more common in a number of science fields both in the US and across Europe. The ESA Grid on-Demand web-portal is the demonstration of a generic, flexible, secure, re-usable, distributed component architecture using Grid & Web-services to manage distributed data and

computing resources. It supports different types of applications including end-to-end processing of large datasets, on-demand processing & retrieval of web-mapping data, and data products validation. In particular, it uses a ubiquitous web interface, allowing applications to access to the ESA catalogue (MUIS) and storage (AMS), enabling the definition of new range of earth observation services. The underlying Grid infrastructure coordinates all the necessary steps to retrieve, process and display requested images, selected from a vast catalogue of Remote Sensing data products. Further, the integration of Web mapping and EO data services using a new generation of distributed Web applications and the OPENGIS specification provides a powerful new capability to request and display Earth Observation data products in a given time range and geographic coverage area (http://eogrid.esrin.esa.int).

e-Collaboration: The need for coordinated e-collaboration within the Earth Science community has been clearly confirmed in the ESA GSP project The Voice (http://www.esa-thevoice.org). Detailed needs have been confronted with outcomes of a survey of current e-collaboration technologies including Grid & Web-services, workflow management technology and Semantic Web to provide a basis for the implementation of a series of prototypes. A service-oriented architecture has been adapted as a basis of a, for the prototypes, generic collaboration platform offering a certain number of essential and additional services. Web-services have proven to be the most flexible and powerful instrument to build such architecture. Completed with other technologies and the use of selected standards such platform will ease the interaction between the different actors involved.

Digital Libraries: Digital Libraries (DLs) are seen as an essential element for communication and collaboration among scientists and represent the meeting point of a large number of disciplines and fields including data management, information retrieval, library sciences, document management, information systems, the web, image processing, artificial intelligence, human-computer interaction etc.

ESA-ESRIN is involved is the EC project Diligent (http://www.diligentproject.org) that focuses on integrating Grid and DL technologies towards building a powerful infrastructure that allows groups of researchers spread remotely worldwide to access shared knowledge and collaborate in a secure, coordinated dynamic and cost-effective manner. A test-bed is planned that will be demonstrated by two complementary real-life application scenarios of which one from the environmental Earth science domain led by ESA.