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Monitoring SDI network services: The SDIGER project Use Case

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Spatial Data Infrastructures (SDIs) are not projects that are just built, deployed, and then kept unchanged for the rest of their lifetimes. Quite the opposite, SDIs offer a series of services that are evolving continuously according to the needs of their community of users. Once SDIs have been launched, it is necessary to supervise the day-to-day work of the systems in order to guarantee their correct operation, and as consequence their usefulness.

The text, recently approved, of the European directive for the establishment of an Infrastructure for Spatial Information in the European Community (INSPIRE) [OJ, 2007] has taken this aspect into account and establishes in its preamble:*(34). Preparatory work for decisions concerning the implementation of this Directive and for the future evolution of the infrastructure for spatial information in the Community requires continuous monitoring of the implementation of the Directive and regular reporting.* In addition, the article 21 indicates that member States shall monitor the implementation and use of their infrastructures for spatial information, and they shall make the results of this monitoring accessible to the Commission and to the public on a permanent basis. The main problem is to establish *what*, *when* and *how* must be monitored. In order to bridge this gap, INSPIRE establishes the necessity for the creation of a series of implementing rules that will be defined among the different stakeholders in the European Community. Currently, a *Monitoring and Reporting Drafting Team,* composed by a group of experts from different member states, is defining a first draft for these implementing rules.

This paper describes the experience in monitoring activities of the SDIGER project, a pilot project on the implementation of INSPIRE, which has been funded by the European Commission through the Statistical Office of the European Communities (Eurostat), contract “2004 742 00004" for the supply of informatics services in the various domains of the Community Statistical Programme (see [Latre et al. 2005; Zarazaga-Soria et al. 2007] for additional details of the project). It has aimed at demonstrating the feasibility and advantages of the solutions for sharing spatial data and services following INSPIRE principles, finding the problems and obstacles of implementing interoperability-based solutions on the basis of real cases. As application scenario SDIGER has developed an inter-administrative and cross-border SDI to support access to environmental resources (in particular, the geographic information resources concerned with the Water Framework Directive) in the River Basin Districts (RBD) of Adour-Garonne (France) and Ebro (Spain). The project has been divided in two years: the first one related to the system construction, and the second one related to

its maintenance. The main goal of this maintenance activity is the assurance of the services and applications functionality, ensuring that average up-time of all servers allows a correct use of the infrastructure. In order to fulfil this requirement, it has been necessary to plan security mechanisms and to design contingency plans.

Therefore, the tasks related to the maintenance of servers can be classified in five main areas:

- Monitoring of servers. This task consists in checking the status and availability of services and servers that belong to the SDI network. As the applications access multiple and remote services, some of them out of the control of the organisations directly involved in the SDI, a manual monitoring of the SDI seems not sufficient. That is to say, a manual checking of the availability of the Web portal and a random test of the applications may miss some of the services accessible through the SDI. Thus, a more systematic way must be applied by analyzing periodically the logs of servers and applications in the project. To do this, it is necessary to establish the procedure to compile the logs and how to process them in order to detect possible problems. These problems may trigger some of the actions included in the contingency plan.
- Version control in each node. The node version control inventories: the characteristics of the hardware that supports each node services (processor, memory, hard disks,…), operating system version, base software versions (database management system, web server, application server,…), application software versions and instances (web applications, portals, services) and data. Additionally, it is necessary to document dependencies between data, services and applications. The main objective of the node version control is to provide the information necessary to "clone" a node from the backups in case of an emergency event. Each RBD competent authority is responsible for the version control of the node contributing to SDIGER.
- Definition of backup procedures. This task establishes the procedures to perform regular backups of running software and data in each node of the infrastructure. The responsibility of establishing these procedures relies on the RBD authorities contributing to the infrastructure.
- Specification of a contingency plan. This contingency plan prioritizes the risks derived from the events and problems detected during the monitoring of servers. Depending on the type of event, the contingency plan foresees a series of actions to perform. The contingency plan maintains as well a master plan for the reinstallation of all the nodes in the infrastructure, having into account the particular contents in each node of the infrastructure.
- Establishment of a human resources plan to guarantee response time. This plan assigns human resources and responsibilities for the maintenance of servers in each node of the infrastructure.

Additionally, it must be remarked that the monitoring of servers and the study of their usage provide the necessary tools for planning the evolution of the system. The logs compiled from servers and applications are processed in order to identify the key aspects for the analysis of the current system configuration. This analysis is delivered on a monthly basis in terms of monthly reports, which are publicly accessible by all the organizations involved in the project.

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