SIMES - 961620
Système d'Information Multimédia
Pour l'Environnement Subsaharien

Exploitation report on the quality procedures

Deliverable number :D 25
NatureD
Contractual Date of Delivery: May 2001
Task WP3 : Integration

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ABSTRACT

The present document describes the principles and techniques used in the SIMES project development activities so as to ensure the appropriqte quality level for the resulting software and deliverable documents. Standardisation, genericity, openness, strict life cycle and systematic internal reviews are here the key elements.

Exploitation report on the quality procedures

Principles

From the beginning and relying on the experience of the different partners, we identified the difficulties the consortium was likely to encounter in terms of coordination, development of the community, development of a common base of understanding and development of common procedures.

These difficulties were enhanced by the partners geographical distribution, the cultural diversity, as well as the diversity of the domains of expertise.

This is why we tried to identify some basic principles which should govern our common work all along the project :

- To develop a common culture
- To rely on experiments and experience
- To specify the integration platform in the early stages of the project
- To rely on standards
- To develop an open platform
- To document all the project activities and results
- To follow a strict methodology for mastering the software life cycle
- To master the internal review process

After a short presentation of these principles we will try to evaluate the distance between the principles adopted and the reality.

To develop a common culture

Mutual education

As is usual in consortium projects this problem of cultural differences arises also in SIMES, but considerably augmented by the following factors :

- The members of the SIMES consortium included students, researchers, confirmed or beginners, and professionals in the different institutions,
- They were living in Europe and/or Africa, with very diverse life and work conditions,
- They worked in very different professional contexts (level of equipment, organisation efficiency, administration reactivity, etc..)
- Their field of expertise was heterogeneous, from software engineering to studies on fisheries, through image processing , cartography or botany.

One of the first decisions was to organise a two weeks workshop, mainly devoted to "young participants" but open to all, and followed by most of them, in order to present the foundations of the different disciplines involved, and to initiate discussions. Readings were recommended.

This aspect of knowledge exchange has been present in many presentations during all our plenary and technical meetings.

Groupware support

A web site has been created in order to serve as a common information repository and as a window on the project. Similarly, a tool to share files, mails, forum was made available. Distance, lack of habit, enormous connectivity difficulties made it very long for these tools to become used with efficiency.

Reception of african researchers in Northern laboratories

African post graduate students recruited for the project and african researchers were received in Oxford University, Nancy University, IRD Paris, the French National Museum of Natural History, and INRIA Paris for mixed training and work sessions. These sessions often involved specialists from environment and computer science disciplines working together. This revealed to be the most efficient way to progress rapidly in the common view building. Even if it is time consuming we can only recommend not to neglect this way of working, which appeared to be the best way of achieving an efficient technology and know-how transfer.

Giving personal objectives consistent with SIMES objectives

Some of the participants were young researchers preparing a thesis during the SIMES project. We tried as far as possible to identify possible thesis topics of interest for SIMES, of real scientific interest and compatible with the local interests and the local supervisory staff skills and experience. It has been very difficult, but less difficult than to maintain the energy and focus of the researchers all along the project if they had been kept isolated. Five theses will be defended in 2001 coming from SIMES. In spite of the numerous difficulties encountered, the result is globally encouraging, the theses being considered as good ones.

To rely on experiments and experience

The project leaders had obviously a great experience of research projects and especially of this kind of collaborative projects. But the context was here different from the context of usual european projects, even if the leaders were far from their first contacts with Africa, experiments were mandatory, from the technical point of view and especially from the local feasibility point of view. So the work was cut into small tasks so as to test the reactivity and the competencies in each local team. This led SIMES to a few dramatic co-decisions but it was unavoidable.

From a more general point of view, this need for experimentation is also why the project was organised with a large part for the two pilot projects.

To specify the integration platform in the early stages of the project

We identified since the beginning different kinds of tools to be supported by the SIMES platform : data acquisition tools, data processing tools, interface management tools, metadata management tools and coordination and general management tools. We analysed precisely their specific needs so as to design a platform relying on the notion of software bus (see D1.1 and D1.1 Complements). Such a platform encompasses :

- Data of various types accessible by the different tools (for example survey results provided by the fishing observatory, hydrological data, herbaria specimens information, or aerial images),
- Commercial tools (COTS) or governmental tools (GOTS) and their data.

The platform itself needs tools such as database management tools, and tools to support standards like HTML, SQL, ODBC, CORBA, Java, etc. As well as domain specific tools related for instance to cartography, survey results analysis, etc.

The last layer is support for Java applets, CGI, RMI and other access software.

To rely on standards

It is an important principle more and more respected in the development activities of large software projects. If a technology is a standard, there exists a community to maintain it and to evolve it, which is a warranty for a reasonably long life. Tools respecting standards are more used and, as a consequence contain less residual errors. Standards are also a warranty to ensure that the developed systems have a good capacity for future evolution.

The standards supported in SIMES are HTML, XML for mark-up languages, Java, C++ for programming languages, ODBC, SQL for data base access, HTTP and FTP for communiction protocols, Netscape and Explorer for browsers, CORBA and D.COM for distributed objects access, Apache for Web server. They are all public standards. The platform relies also on the Coldfusion technology which is a proprietary one but which is one of the de facto standards for dynamic web pages.

To develop an open platform

An open platform means that it is possible and it must be easy to extend it. It is easy to install new data warehouses under the form of files or databases as is described in D20.in the paragraph “User guideline for data integration”. It is also easy to add new tools to make them available to all users as can be seen in D21.

To document all the project activities and results

All phases of the project have been documented and especially the specification phases as can be seen in deliverables D1, D3 and D4, and in the comprehensive internal documentation.

Documents formats have been defined, not only for deliverables but also for internal documents. A specific web site offering groupware services such as forum and document sharing has been open at ERCIM http://www.ercim.org/SIMES.

To follow a strict methodology for mastering the software life cycle

Starting with pilot projects implementation to allow all participants to take the exact size and nature of the problems to solve, we followed a traditional spiral model of software life cycle especially well adapted to experimental projects. The first lap has been devoted to risk evaluation, developing small prototypes for the points estimated as the most difficult, or for technology acquisition by project members. The second lap has been concerned with tools development and platform specification. This specification has been done using abstract data types and tuned with members of the project concerned by the platform development, the user interface, the control integration and actors of the design of the documents sharing space. The main choices, HTML, Coldfusion, CORBA etc, were fixed at that time.

It was then possible to define all interfaces (between tools and between the tools and the platform).

To master the internal review process

Specifications and all technical choices led to the production of documents which have been reviewed by seniors of the project. It was part of the quality plan and part of the pedagogical action plan. Often reviews were collective. When the contribution had a non empty intersection with a thesis, this has been done several times. It is the case specifically for the user interface and the original browsing system.

The quality procedures and the reality

Honesty imposes to say that even with a beautiful quality plan important specific difficulties were encountered due to the difficult local conditions of working, and the difficulties of communication (for instance Bobo Dioulasso has been out of any mail connection during two months ; Yaounde connections to Internet are acceptable on the academic Yaounde I campus, but all the campus is connected to the rest of the world with a 64K link). Sometimes one has to wait the night to have a chance to see an e-mail effectively sent. As a consequence, all procedures have not been always respected . Specification before development has often be violated. Same for documentation during development and not after.

Also, due to the unlimited implication of very few developers, discrepancies appeared between the original tasks and budget sharing indicated in the Work Programme, and the really available human resources : thus the distribution of work effectively done doesn't always exactly reflect the organisation of the consortium. It was probably the price to pay to make everybody progress during the project.