Softeco Sismat

*Softeco Sismat, formed in 1979, is one of the leading companies in the Information and Communications Technology market of Italy.*

**About Softeco**

*Softeco Sismat* has been a leading company in the Italian Information and Communications Technology (ICT) market since 1979, providing specific application and technological competences to enable customers to exploit the potential offered by ICT, with a particular focus on business development and innovation. Ten percent of our resources and yearly turnover are invested in Research & Innovation with an experience of over 20 years of activity, proudly gained working with over 600 European partners in over 60 national and international research projects.

**ZK X GLIMS**

ZK has been adopted so far in several research projects:

1) the GLIMS project to develop a genomic laboratory information management system,
2) the SmartGen project to develop a power grid distribution management system (DMS),
3) the Illuminate project to develop a light consumption monitoring system for Solid State Lighting (SSL) and,
4) the MultiScaleHuman project to develop a web based medical imaging repository.
The 18-months-long national GLIMS research project, co-funded by the Lombardy Region aimed at implementing a simple, web based Genomic Laboratory Information Management System (GLIMS) to homogenize, formalize and integrate wet (sample management) and dry (data analysis) laboratory workflow processes, in order to

1) Improve research centre productivity and competitiveness,
2) Improve laboratory process workflows and,
3) Manage data provided by Next Generation Sequencing and Whole Genome Genotyping.

Three main objectives were identified as:

1) Workflow process formalization;
2) ICT workflow support implementation;
3) Assessment and validation of the valued added solutions developed.

The goal was to replace a very heavy manual process based on more than 15 spreadsheet models with a fully-fledged web based solution, able to track all main laboratory processes including administrative tasks, registration of material and samples, validation and quality check, and exchange of information with the customers. Furthermore, specific attention was dedicated to the implementation of an advanced UI able to render spreadsheet-based information in a visual form, replicating on the
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screen virtual sample plates / vials and including all related basic information plus processing history.

As a proof of concept for a small national research project, the architecture was rather simple, as we concentrated more on the value added services for the laboratory personnel than on technological optimization – we used the Tomcat Servlet Container Authentication & Authorization native system plus a relational database developed on PostgreSQL 8 (driven by plain JDBC classes) to store data about projects, samples, processes etc. We then fully adopted the MVC model supported by ZK's.

“ZK seamlessly replaced a heavy JSP+Servlet+custom JS framework giving the possibility to developers to concentrate more on models and processes rather than on obtaining a specific functional behaviour – in this sense, a quick tour in the ZK demo page resulted often truly inspiring!”

**Challenge**

One of the main challenges was the collection of functional requirements (since the context was rather new and complex) and how to translate them into visible proof-of-concepts during the design phase. Here ZK helped a lot, as it was very easy to set up functional mock-ups in hours, and it was even easier to modify them on-the-fly according to the feedback received by the end user. Since
we had to move from a spreadsheet-based approach to an advanced web UI with informative functionalities, we had to manage long lists of items (batches, sample plates, sample vials, biological samples etc.) and to visually render them on the screen as virtual items, with advanced interaction (popups, in-line editing etc.). Available components did solve the problem very well, even sometimes inspiring the solution itself.

Why ZK

Whilst evaluating Ajax frameworks for the project, we take into account the number and quality of available widgets, possibility for customization (skins/themes etc.), flexibility and scalability (performances etc.), bridges with other technologies and frameworks.

As we were moving from a plain old JEE approach (namely JSP/Servlet + custom integrated Javascript libraries), we definitively needed to minimize the learning curve when going for a Java-based RIA framework. Demos apart, one of the truly distinguishing features of ZK were the excellent documentation, well-articulated in several flavors (from quick start to fully fledged technical docs) and continuously updated.

The possibility to arrange components in any possible way was
really powerful and useful – with ZK was really easy to set up working mock-ups for customers and get a valuable feedback in minutes. Having to cope with several CRUD interfaces, we found native binding and wiring functionalities truly outstanding – form validation (with internationalized automatic popups!) without painful server-side elaboration and custom (often unstable!) scripts was really a plus.

The best of ZK

ZK has a clean, flexible and powerful MVC & MVVM model which actually fits a lot of applications, making development of web desktop-like applications really effective. The native component library is rich and the possibility to aggregate components into custom macro-components, as well as developing new components by plain extensions, made possibilities nearly endless. Templating and automatic list model management completed the offering.

Native binding and wiring functionalities, plus automatic form validation for several fields, definitively helped a lot – we were able to develop complex forms, including nested modal windows for mandatory hierarchical items and automatically rendered comboboxes and listboxes. Grid components also helped a lot in rendering spreadsheet based information in a visual way, replicating
on the screen large sample plates with informative contents.

The Result

The final GLIMS developed included the following functionalities:

1) management of macroprojects, projects, macrocustomers, customers, biological samples, plates, vials, batches, storages, consumables and study cohorts
2) tracking of biological sample management and processing
3) laboratory workflow support and tracking.

During the test and validation phase, end users stated that the prototype generally improved the management of the activities related to the joint or singular provision of the following services:

1) DNA extraction
2) DNA genotyping
3) DNA sequencing
4) gene expression

The functionalities included supported both project administrative
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management and project operative management, with a specific focus on the activities related to the wet laboratory workflows (biological sample validation, error tracking, document management, etc.) and to the dry laboratory processes (statistical analysis, data aggregation and modeling, etc.). The UI was appreciated, in particular for the rendered plate model which allowed several degrees of interaction, from plain information delivery on each sample according to its position in the plate to inline editing and annotation.

Special Acknowledgements: The realization of the GLIMS prototype has been possible thanks to the essential contribution of the IMS - Istituto di Management Sanitario (www.ist-ims.it) which provided the know-how for all the modelled processes.

About ZK

ZK is the leading enterprise Java Web framework with more than 1,500,000 downloads. ZK is deployed by a large number of Fortune Global 500 companies, including Barclays, Allianz, Swiss RE, Roche, Deutsche Bank, Sony, Sun Microsystems, and Toyota, providing them with the ability to rapidly create rich Ajax enterprise level applications.

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