

Softeco Sismat

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

About Softeco

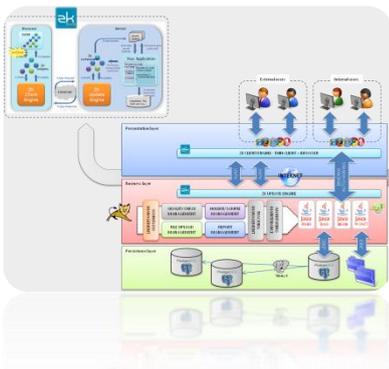
[Softeco Sismat](#) has been a leading company in the Italian Information and Communications Technology (ICT) market since 1979, providing specific application and technological competences to enable customers to exploit the potential offered by ICT, with a particular focus on business development and 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.

“Challenging tasks coupled with fuzzy requirements often characterize ICT research – the flexibility of ZK is a great plus when you have to adapt your web application to moving targets yet aiming at outstanding technical results.”

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.



Validity check Physical batch THF.2012-02-24.12

Plate	Size	Errors
0234	96	
0231	96	
0233	96	

Validity

Plate	1	2	3	4	5	6	7	8	9	10	11	12
A	●	○	●	●	●	●	●	●	●	●	●	●
B	●	●	●	●	●	●	●	●	●	●	●	●
C	●	●	●	●	●	●	●	●	●	●	●	●
D	●	●	●	●	●	●	●	●	●	●	●	●
E	●	●	●	●	●	●	●	●	●	●	●	●
F	●	●	●	●	●	●	●	●	●	●	●	●
G	●	●	●	●	●	●	●	●	●	●	●	●
H	●	●	●	●	●	●	●	●	●	●	●	●
I	●	●	●	●	●	●	●	●	●	●	●	●
J	●	●	●	●	●	●	●	●	●	●	●	●
K	●	●	●	●	●	●	●	●	●	●	●	●
L	●	●	●	●	●	●	●	●	●	●	●	●
M	●	●	●	●	●	●	●	●	●	●	●	●
N	●	●	●	●	●	●	●	●	●	●	●	●
O	●	●	●	●	●	●	●	●	●	●	●	●
P	●	●	●	●	●	●	●	●	●	●	●	●
Q	●	●	●	●	●	●	●	●	●	●	●	●
R	●	●	●	●	●	●	●	●	●	●	●	●
S	●	●	●	●	●	●	●	●	●	●	●	●
T	●	●	●	●	●	●	●	●	●	●	●	●
U	●	●	●	●	●	●	●	●	●	●	●	●
V	●	●	●	●	●	●	●	●	●	●	●	●
W	●	●	●	●	●	●	●	●	●	●	●	●
X	●	●	●	●	●	●	●	●	●	●	●	●
Y	●	●	●	●	●	●	●	●	●	●	●	●
Z	●	●	●	●	●	●	●	●	●	●	●	●

Plate 0233

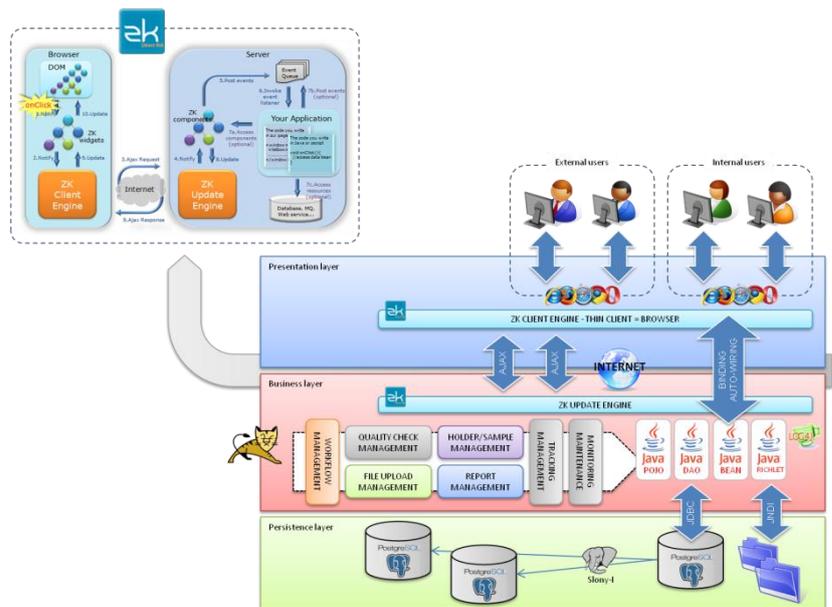
Sample ID	Gender	Status	Concentration	Volume	Emergency	Error
014_029	Male	Case	33 ng/ml	75 ul	Normal	Concentration
						Missing
						Missing info
						Missing sample
						Generic

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.

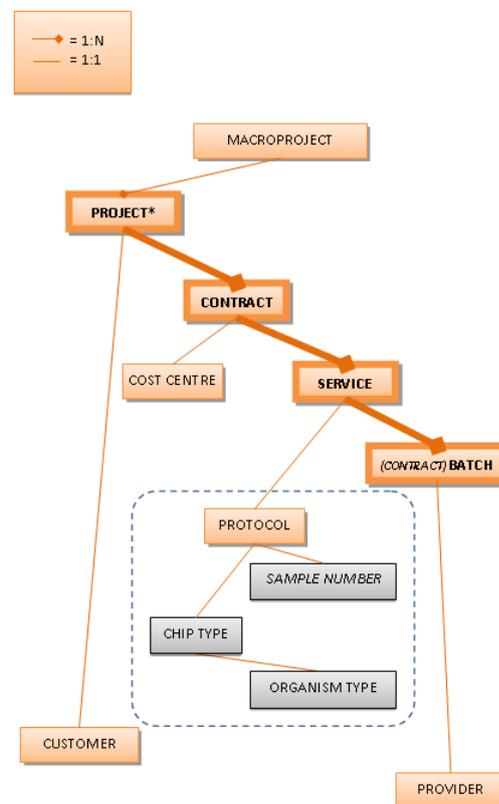


The goal was to replace a very heavy manual process based on more than 15 spreadsheet models with a fully-fledged web based solution, able to track all main laboratory processes including administrative tasks, registration of material and samples, validation and quality check, and exchange of information 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

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 ZK5.

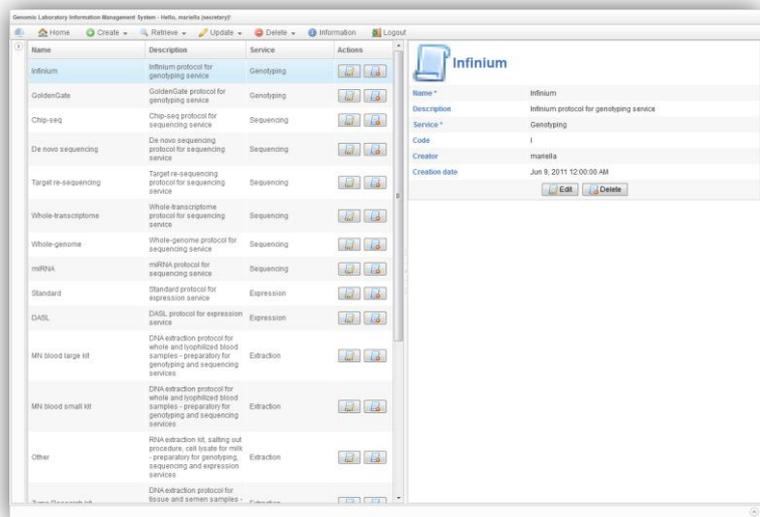
“ZK seamlessly replaced a heavy JSP+Servlet+custom JS framework giving the possibility to developers to concentrate more on models and processes rather than on obtaining a specific functional behaviour – in this sense, a quick tour in the ZK demo page resulted often truly inspiring!”



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.

“We evaluated several RIA frameworks before making our move – where ZK really rules was: demos (plenty of), documentation (fresh, differentiated, complete) and community (active & responsive)”

As we were moving from a plain old JEE approach (namely JSP/Servlet + custom integrated Javascript libraries), we definitely 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.

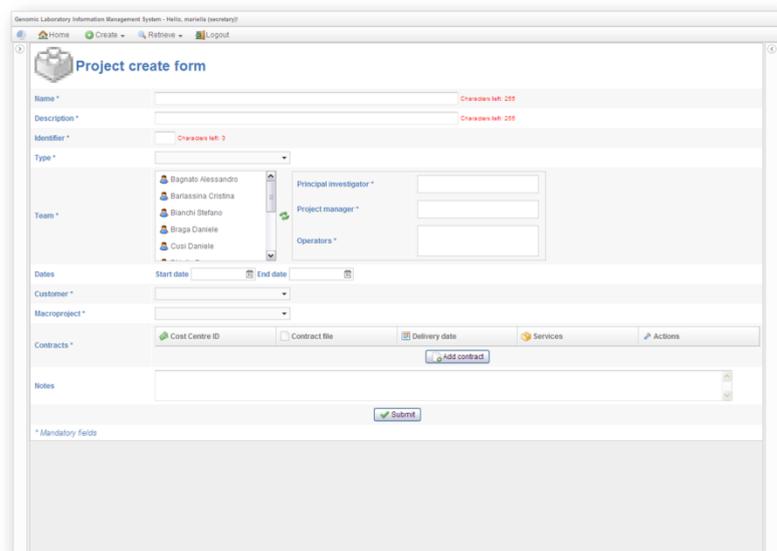
The possibility to arrange components in any possible way was

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.

“ZK is great from the beginning – functional requirements are easier to formalize when you have an effective, flexible tool to set-up (and modify, according to end users’ feedback) fully fledged functional mock-ups”

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.

The image shows a screenshot of a web browser displaying a 'Project create form'. The browser's address bar shows 'Generic Laboratory Information Management System - Hello, marcello (secretary)'. The form has several sections: 'Name *' with a red error message 'Character left: 255'; 'Description *' with a red error message 'Character left: 255'; 'Identifier *' with a red error message 'Character left: 3'; 'Type *' with a dropdown menu; 'Team *' with a list of names: 'Bagnato Alessandro', 'Barlassina Cristina', 'Bianchi Stefano', 'Braga Daniele', and 'Cusi Daniele'; 'Dates' with 'Start date' and 'End date' fields; 'Customer *' with a dropdown menu; 'Macroproject *' with a dropdown menu; 'Contracts *' with checkboxes for 'Cost Centre ID', 'Contract file', 'Delivery date', and 'Services', and an 'Add contract' button; and 'Notes' with a text area. At the bottom, there is a 'Submit' button and a note '* Mandatory fields'.

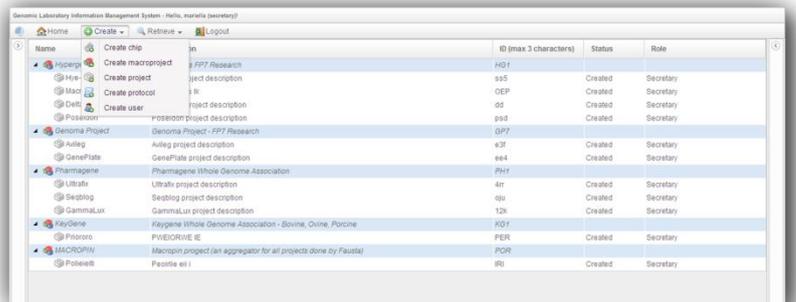
Native binding and wiring functionalities, plus automatic form validation for several fields, definitively helped a lot – we were able to develop complex forms, including nested modal windows for mandatory hierarchical items and automatically rendered comboboxes and listboxes. Grid components also helped 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:

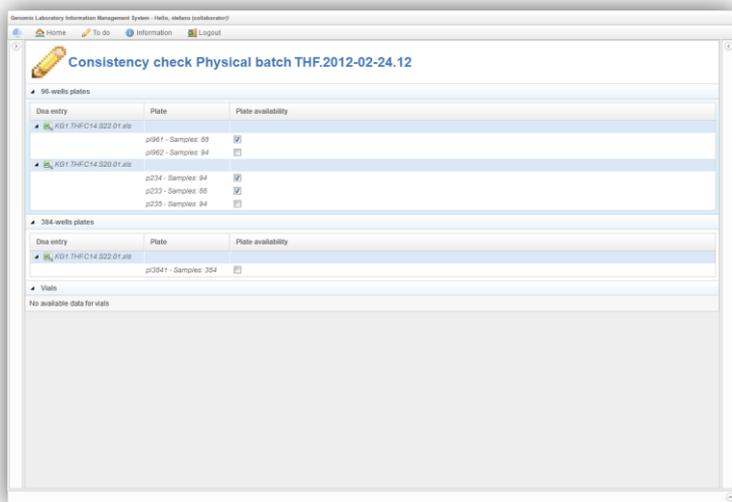
- 1) management of macroprojects, projects, macrocustomers, customers, biological samples, plates, vials, batches, storages, consumables and study cohorts
- 2) tracking of biological sample management and processing
- 3) laboratory workflow support and tracking.



Name	ID (max 3 characters)	Status	Role
FF7 Research	HD1		
Project description	ss5	Created	Secretary
Project description	DEP	Created	Secretary
Project description	ss	Created	Secretary
Project description	psd	Created	Secretary
Genomix Project - FF7 Research	GP7		
Avleg project description	e3f	Created	Secretary
GenePlate project description	ee4	Created	Secretary
Pharmagene Whole Genome Association	PHf		
Ultrath project description	4rr	Created	Secretary
Sleeping project description	98s	Created	Secretary
Gammalux project description	12s	Created	Secretary
KeyGene Whole Genome Association - Bovine, Ovine, Porcine	KGf		
PVEDORVE IE	PER	Created	Secretary
MACROPIN (an aggregator for all projects done by Fauts)	PCR		
People es i	IRI	Created	Secretary

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



Consistency check Physical batch THF.2012-02-24.12

Data entry	Plate	Plate availability
KG1 THFC14.S22.01.ats	p961 - Samples 09	<input checked="" type="checkbox"/>
	p962 - Samples 04	<input type="checkbox"/>
KG1 THFC14.S20.01.ats	p234 - Samples 04	<input checked="" type="checkbox"/>
	p232 - Samples 09	<input checked="" type="checkbox"/>
	p235 - Samples 04	<input type="checkbox"/>
KG1 THFC14.S22.01.ats	p3841 - Sample 384	<input type="checkbox"/>

No available data for vials

The functionalities included supported both project administrative

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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