# Bassilichi

## Software Analysis and Design Improvement

## Overview

**F.LLI BASSILICHI** *is a Florence-based company involved in designing, implementing, and promoting solutions, systems, and technical innovations for processing, security and information exchange, increasing its added value.*

*The company is directing its software development toward O-O languages, based on client-server architecture which is badly adopted to traditional modelling instruments (DFD, E/R etc.)*

*The Improvement Project considered the application of UML (Unified Modelling Language, currently the state of the art in modelling based on O-O) in the software development cycle, in particular the analysis and design phase.*

*The objective of the project was to check if UML is applicable to the entire software development cycle and whether the introduction of reuse techniques allowed the reuse of around 20% of the subject matter. Both objectives were attained.*

## The Organisation and its Environment

The company history of F.LLI BASSILICHI S.p.A. is characterised by forty years of activity in the Banking, Public and Company Administration worlds, from the most traditional solutions for office automatization to the most innovative information technology applications.

Since 1957 the testing and consequent introduction of new technologies, even for day-to-day tasks, distinguishes the commitment of a professional team that today is present all over Italy, with around 250 employees and a business volume of 60 billion Lira (1997). Networking, document management and processing of monetary operations are some of the sectors to which F.LLI BASSILLICHI are currently applying their know-how, together with electronic publishing, document and picture archiving, and the development of new services for the citizen.

Added to this is the regular development of basic (supply of hardware and software) and advanced IT solutions, such as the Internet.

### The mission

To design, implement and promote solutions, systems, and technical innovations for processing, security and information exchange, increasing its added value. To move with the passage from the "computer society" to the "information society", i.e. to improve and optimise the quality of knowledge, cognition, and of the work of clients and their employees.

## The Starting Point

The company, from the start date of the improvement project, has used development methods and instruments with a traditional formulation (ER data modelling, DFD process modelling, coding and testing etc.)

The company investment in client-server architecture and intranets, together with the use of a technology oriented towards the new products, is badly suited to management by traditional methodological approaches.

Traditional approaches use different instruments for the each phase of the life cycle, leading to high working overheads due to the lack of integration.

During the initial phase of the project, an assessment of processes was carried out by interviewing the project head and the group of analysts that later participated in the improvement project.

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For this activity a BootCheck version 3.0[*] was used, derived from the Bootstrap methodology adapted for SPIRE. From an examination of responses the gaps that had to be bridged by the improvement process emerged. The weak points all derived from the lack of a methodology in analysis and design.

It was in this context that the present project was elaborated. The objective was to evaluate the introduction of **UML (Unified Modelling Language)**, representing the evolution of the first approaches for the analysis and design of objects. UML is the notation for modelling applications through usage, objects, classes and components.

The project was based on studies by Grady Brooch, Ivar Jacobson and Jim Rumbaugh with the Brooch, OO-SE and Object Modelling Technique methods.

The project was planned as follows:

1. Preparation of the environment for the development of the project and training of personnel in the use of UML notation and the tool that implements it.

2. Application during the pilot project of UML notation relating to the analysis and design phase.

3. Measuring and evaluation of results attained and dissemination.

The pilot project on which the experiment was based concerned the creation of a management procedure for library cataloguing. The analysis and development phases of the development cycle were selected for testing.

The company possessed a package for the complete management of the library as comparison data, which included library cataloguing, subscription management, and loans and purchases management.

The period and budget of the improvement project allowed for verification of the applicability of new visual modelling technologies and the introduction of a new methodology to a subset of software modules.

It was therefore decided to focus on the 'library cataloguing' module.

The project planning was formalised and communicated to the working team.

# The Improvement Project

### 1. Introduction of UML notation

During the first two months, UML training courses were followed, and the working team prepared the hardware and software environment for the use of the new instruments. Different tools were compared, and Paradigm Plus was chosen for the experiment. The tool was not purchased, but an evaluation copy of the tool was used.

Subsequent training was directed to 'on the job' training during the phase of application of the notation to the pilot project.
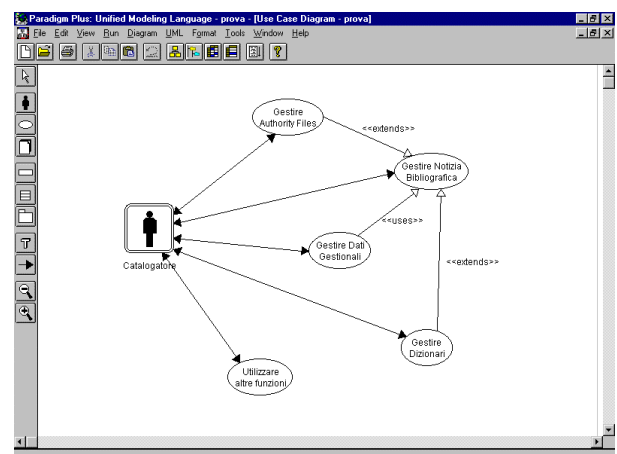


**An example of UML**

### 2. Application of UML notation to the analysis and design phases of the pilot project.

The group of analysts possessed an analysis document written using traditional instruments (Needs Analysis, diagrams of data, DFD etc.) The greater part of the information was explained in textual form.

The collection of User Requirements (UR) had already been carried out, and consequently a phase of interviews with clients was not conducted.

On the basis of the User Requirements noted, the UML notation document was produced, and subsequently the use cases diagram, class diagram, activity diagram, scenario and state diagram.

Particular attention was paid to the compilation of the first three diagrams.

Furthermore the actors and process phases of library cataloguing were singled out in a precise and complete way, noticeably reducing the ambiguities expressed in the UR document.

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[*] BootCheck is a product of the Bootstrap Institute.

The client, called on to validate the analysis, although not knowing the notation, easily understood and enthusiastically received the presentation.

The analysts and designers who had written the documentation, although encountering practical difficulties when testing the software instruments, managed to produce high quality material within a shorter net period than that necessary with traditional methods.

The instrument used (Paradigm Plus) showed, as hypothesised, some limits and for this reason it was decided not to proceed with its purchase, in order to evaluate other tools that have appeared on the market.

During this phase quality assurance techniques were also tested, and a Project Quality Plan was written. The activity was carried out within two months.

**3. Preparation of material for circulation within the company.**

The internal dissemination of material was planned and the contents defined both in time and content.

Training was provided for computer personnel who were not initially involved in the project, but are involved in the production of software.

The intention is to extend the concepts of UML notation to personnel operating in sectors other than development.

The company objective is to use UML for process modelling. In fact, our company is also employing its resources in the analysis of high added value services (for example the management of a Help-Desk in a vast Call Centre).

The circulation of internal company material took place in the last month of the improvement project.

## *The Results*

The principal objectives of the improvement project were attained, although the limited time did not allow testing on other projects of diverse complexity and nature. Further testing would undoubtedly have made a larger amount of comparative data available. Nevertheless, there will be further testing shortly.

On completion of the improvement project the assessment of processes was repeated, allowing confirmation of the improvements achieved in terms of the "capacity" of processes.

From the company's point of view however, the great success was in learning new modelling techniques.

The personnel involved in this activity rapidly applied UML to the analysis of the pilot project. This is very comforting from the company's point of view, also in the light of the objective to use UML for modelling of processes.

In particular:

- The possibility of applying UML notation to the entire software development cycle has been confirmed, thereby homogenising the instruments available to developers. Applicability to the detailed design and coding phase was confirmed by estimating the integration of the functionalities of OO-CASE instruments with more widespread programming languages.

- With respect to the reusability percentage, the project has attained the expected objectives although some considerations must be taken into account:

  - In order to concretely measure reusability it is necessary to evaluate the quantity of objects (class, use cases, and activities diagram etc.) that are reused in new development projects.

  - The improvement initiative has only been applied to one project (and limited to the analysis and design phases). Therefore the rate of reusability can only be calculated by applying a deductive method; in practice one evaluation of the quality of the reusable product in other similar products has been carried out. Accepting this fact the project has shown a rate of reuse of around 40%, well above the minimum threshold established as an objective of the product.

- The impact of the methodology on the company is estimated in two separate aspects:

  - The personnel's capacity to master the methodology in order to generate the expected economic and productive benefits.

  - As a return on the investment. Considering the rate of reuse hypothesised above and the improvement of the communicative process that would be attained from the application of the modelling, whether within the company or to clients, there could be a return on the investment even after only the realisation of five or six projects.

- The project provided an opportunity to introduce and test planning and management practices through the preparation of the project's quality plan.

## Lessons Learned

The following has emerged from the experience:

- The aid of an external consultant in the role of mentor offers better guarantees in the testing of improvement initiatives.

- Carrying out an assessment at the beginning and end of the project allows for clear measurement of the results obtained.

- If sufficiently involved in the improvement project, the enthusiasm of personnel can be the determining factor in the success of the project.

## Plans for the Future

The company is in the process of certification of the Quality System to regulation ISO/9001 in the services sector, and its extension to the software development sector is probable. Within 12-18 months the software production process will be reorganised, with the introduction and consolidation of a development method specifically orientated to the client/server environment, and based on UML.

### SPIRE Partner contacts:

**Centre for Software Engineering**,
Tel:- +353 1 704 5750
Fax:- +353 1 704 5605

**Etnoteam**
Tel :- +39  02 2616 21
Fax :- +39  02 2611 0755

**IVF**
Tel :- +46 31 706 6000
Fax :- +46 31 276 130

**Austrian Research Centers - Seibersdorf**
Tel :- +43 2254 780 3117
Fax :- +43 2254 721 33

**Software Industry Federation**,
Tel :- +44 1232 333 939
Fax :- +44 1232 333 454