

THE INFOBUS PROJECT

A leading Italian mobile telephony operator entrusted Sytel Reply with the task of planning and developing an EAI solution able to integrate some best-of-breed technologies and constitute the IT application integration infrastructure.

The new infrastructure qualifying factors are:

- E2E Governance of integration processes
- Simplification of integration processes
- Alignment with the client's business processes
- Capability to operate in near real-time and transactional modality

The result is the development of a new solution named Infobus.

THE SCENARIO

At the end of 1999 the business structures of a leading Italian mobile telephony operator responsible of the management of information systems were facing an identical phenomenon (though at different degrees) of unorderly and heterogeneous growth of the applications making up the IT infrastructure.

This was quite a common and physiological phenomenon, resulting from the growth and evolution of the company's core business; applications were developed at different moments in time, according to specific business processes support requirements, and by different groups of developers.

To further enhance the scenario complexity, is the trend to adopt a *buy before build* model, on the basis of which many applications are bought from market producers (SAP, Siebel, ...) and then strongly customized and possibly integrated within the rest of the application.

The typical result of such progressive layering is the presence, within the information system, of:

- Terminal oriented "legacy" applications with character-based interfaces (3270, 5250, VTxxx), typically residing on IBM mainframes and/or on Unix systems;
- OTS (off-the-shelf) application packages (SAP, Siebel, ...)
- Client-server applications
- New applications developed according to innovative architecture paradigms (e.g. Network Computing, Componentware, etc.).

From a technical point of view, there was strong heterogeneity concerning the "standards" according to which applications were developed, in terms of operation system, DBMS, programming languages, communication protocols, TP monitor.

During the preliminary analysis, further problems came to the surface, namely:

- Redundancy of the data persistent representation among different applications (e.g. many versions of the same data among distinct information bases)
- Diversity with regards to the data model (its relating semantics) between distinct applications (e.g. the abstraction of a "client" is represented with distinct entities, attribution sets and relationships between distinct applications); this problem is further enhanced also in case of packages bought from third parties.

When choosing to implement an integration project aiming at containing and, if possible, eliminating the above mentioned phenomena, the client was led by clear business objectives:

- Integrate his application assets, rationalizing and eliminating redundancies, whenever possible, in order to quickly align the IT applications with the constantly changing business processes of the telecommunication market;
- Significantly reduce initial and maintenance costs, as well as costs relating to the development and integration of legacy systems and OTS-type packages;
- Increase the governance of business services, by intensifying the monitoring and E2E efficiency of the operational process.

The solution developed by Sytel Reply satisfies most of these objectives, enriching them with the on-going integration of new technologies and paradigms developed over the years.

THE SOLUTION

To bring an answer to the technical complexity and the multitude of medium and long-term objectives that the client had set, Sytel Reply proposed a development approach based on some key elements:

- Gradual and pluriennial project approach to the problem, with a progressive reduction of the application complexity, favouring, whenever possible, the business objectives;
- Planning and development of a 'make' solution, integrating market components though remaining 'agnostic' compared to a specific

- technology/product;
- Sytel Reply support over the whole cycle, from the planning up to the production operational support, in order to ensure maximum E2E efficiency.

On the basis of such elements, a project team was set up, operating on two different pathways: project (organizational) and technological.

PROJECT ORGANIZATION

For what concerns the project organization, it was decided to adopt an “iterative” project model with an E2E coverage of the production process, from design to production support. The project team is made up by a stable core team for design and planning and a team of specialized people, changing over the time according to the production processes being dealt with and the technologies used.

TECHNOLOGICAL CHOICES

After an analysis of the available market products, mediated by the analysis of the Client's application context, we reached the decision to plan a 'custom' solution, by integrating market technologies offering infrastructure transactional services (BEA Tuxedo). This choice constituted, at the time, the right compromise between the recurrent make/buy dilemma.

This initial choice enabled a gradual evolution of the Infobus solution, which contained and overcame the limits - in terms of investment sustainability and integration functionalities - expressed by the traditional EAI platforms:

- **Technical limitations**
 - Monolithical architecture: server-centric solution, integration process centralization, Hub-and-Spoke architecture
 - Proprietary APIs, close/non-standard formats
 - Far from being fully plug-and-play as advertised
 - Binds companies to specific products and non-standard proprietary solutions offered by EAI vendors
- **Unsustainable cost structure**
 - Integration projects have a long duration (20+ months)
 - Less than 35% of projects fall within the planned time and budget limits
 - 35% of budget allocated for maintenance is spent to maintain point-to-point links

The present Infobus version (R4) offers a solution implementing the ESB (Enterprise Service BUS) paradigm, and constitutes a new generation of integration technologies, intended as an evolution and simplification of traditional EAI.

Like EAI, ESB satisfy all requirements necessary to enable integration between heterogeneous systems, using different middleware technologies and transmission protocols, but adopting an efficient and flexible ***Service Oriented Architecture***, able to effectively satisfy the following requirements:

- Integrate more and more complex businesses and processes involving more systems having different technologies at different maturity levels;
- The IT shall play a new supporting and enablement role of the company's business, with cost and time containment in order to
 - reduce *time-to-market*;
 - simplify and speed-up the planning and delivery of new services;
 - improve *governance* of services, systems and business processes.

Infobus partly differs from the present market ESB platforms for the following reasons:

- With regards to the core software and data model, Infobus is fully planned on the business service concept. Other ESBs may develop 'services' by putting together component parts, but there is no direct relationship in terms of name and meaning of such components with the business service concept.
- Infobus offers monitoring, administration and statistics integrated tools, while other ESBs require accessory tools.
- The configuration of all components is centralized.
- The 'service' reload, after possible changes, is done immediately, with no need to restart the system.
- Transactional modality E2E or based on modal decoupling, managed by Infobus. In such case, the exactly once QoS semantics is ensured.
- The protocol (XA) is supported.
- The configuration is based on "human readable" XML model.
- It is available for two basic technologies: C++, Java (J2EE) with exactly the same architecture, functionalities and tools.
- Bug free.
- Years of production activity and millions of services delivered, made this solution highly efficient and stable. Many Market ESBs have a shorter production history.

THE INFOBUS ARCHITECTURE

The present Infobus version (R4) is planned and implemented to satisfy technological and organizational drivers like:

- Declarative approach rather than pragmatic approach.
The high configurability enables a simpler implementation of the business processes with reduced time-to-market;
- SOA oriented. The approach to SOA services favours business functionalities reuse policies at enterprise level;
- Technology extensibility. Infobus offers a consistent and well engineered framework, able to integrate new technologies and reduces the technological obsolescence which characterizes other solutions.

- Focus on integration problems. The ESB paradigm, separates and manages the technological and communication complexity of the application integration, favouring the re-focusing of application teams on business functions;
- standard based (J2EE, XML, Web Services, ESB).

The functionality classes offered by R4 Infobus are the following:

Core services

- data aggregation/data compression;
- statistical sub system for the production and presentation of the systems performance data;
- workflows scheduling functionalities, on a temporal basis, for the management of specific processing requirements;
- high configurability of the system and of the objects making up Infobus with graphic tools;
- component extensibility through the plug-in paradigm;
- monitoring and administration through JMX console;
- advanced internal tracing and logging featuring different detail classes.

Connectivity

- Tuxedo, RMI, JMS, JCA, SAP, JDBC, SOAP/HTTP(S)
- The applications use a whatever inbound supported technology for InfoBUS services invocation;
- The applications adopting IBC/IBJ may utilize the most suitable inbound technology for their platform, maintaining the same APIs;
- virtual middleware for outbound technology abstraction;

Web Services Support

- Definition of business services interfaces;
- WSDL automatic generation;
- Binding of services with InfoBUS workflows;
- WSDL available on-line for client applications;
- Registration of services on a UDDI registry external or internal to InfoBUS;
- Support for encrypted protocols;
- access control list for service access;
- WS Dynamic invocation techniques (DII) to limit as much as possible coded writing.

Administration and configuration

- Icon: editing and configuration management;
- Workbench: administration and tests;
- Infoweb: statistics viewing and report drafting;
- Access subject to authentication;
- Access control list.

The overall success of Infobus may be measured by the volume of business services (events) provided on a daily basis.

THE REPLY VALUE

Sytel Reply's support to his Client during these years marked by strong innovation and process changes, concretely shows the tight partnership established with the client.

Over the years, Sytel Reply significantly contributed to the project's success, by bringing added value in many fields:

- Project capability
- Development quality
- Strategic vision

Last but not least, is the capability to lead the client's operational structure during the cultural shifting from chaotic application models to the idea of a SOA organization of business services.

The key elements to attain these objectives were Sytel Reply's technical competences, the experience in the development of EAI solutions and Service Oriented Architectures, as well as the passion and professionalism of its staff.



Sytel Reply is the company of the Reply group specialized in the Telecommunication market. The Sytel Reply mission is to support clients during their technology and application innovation processes by planning, developing and managing systems for the BSS and OSS areas of Telecommunication operators.

Sytel Reply, thanks to its in-depth competence and experience, boasts a team of professionals, at clients' disposal, able to work on each phase of a system development: design, requirement analysis, development and release of the systems that are being created.