Platform Design for the B2(B2B) Approach

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Abstract. Business-to-business or "B2B" is a term commonly used to describe the transaction of goods or services between businesses, enabled through a platform that allows for the interaction between customers and suppliers. Today, the new challenge is the integration of financial and logistics services into the business relationship without having to install thousands of peer-to-peer interfaces. The authors follow an approach that introduces a new level of business, that has been called B2(B2B). The purpose of this paper is to describe briefly the design of the FLUID-WIN project that targets this new approach, and to sketch the components to be developed in order to integrate the activities between significantly different business entities.

1 Introduction

The FLUID-WIN project aims to achieve a web platform for providing financial and logistic services to a manufacturing network that already uses a B2B platform for supply chain management [1].

This paper aims to present a particular aspect of this project, that is the design of the FLUID-WIN platform. From the point of view of technology the platform offers the management of an information flow connected to a material flow and the associated financial and logistic flows.

The single flow is related to a series of activities that without the support of a platform, such as that offered by FLUID-WIN, would require the installation of a series of one-to-one interfaces for a single report. Every member of the network would require as many interfaces as the number of partners in the network with which it relates to, and this level of costs is unacceptable.

The significant progress that FLUID-WIN implies, involves switching from a one-to-one network to a new model where the platform is the only channel of communication through which it will be possible to efficiently implement the exchange of information between the three main domains : manufacturing, logistics and finance.

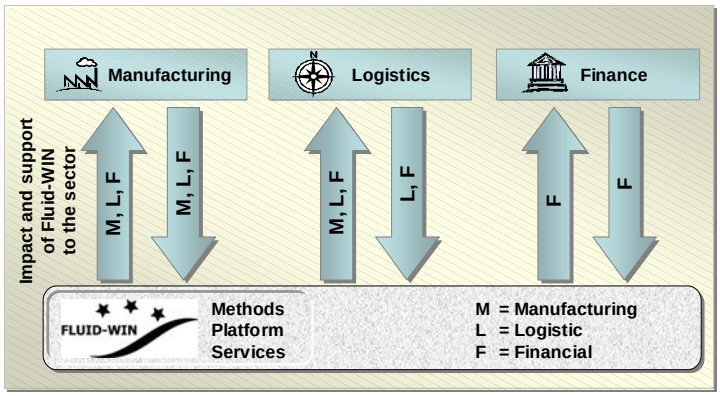

Fig. 1. Information categories exchanged between the platform and the sectors

Therefore, the main objective of FLUID-WIN is to interact on a single platform among manufacturing B2B network providers and logistical and financial service providers (fig. 1), applying the new B2(B2B) approach [2]. This paper has been prepared when the project has not been completed yet, and when the detailed platform design was still in process. Nevertheless, the software architecture has been defined, and the components that implement the platform are *Network Modeler, User Interface, Interdisciplinary Modeler,* and *Service Engine.* In the following, the architecture of the platform is described, the base technologies used are characterized, and the software components of the platform are explained.

2 Architecture Overview

A logical scheme of the platform is depicted in fig. 2. The general architecture is composed of the following modules:

- Network Modeler
- Interdisciplinary Modeler
- User Interface
- Service Engine

The first two components are designed to model the entities involved in the communication and the rules by which they interact. The User Interface and the Service Engine components are designed to manage certain documents and events within the network.

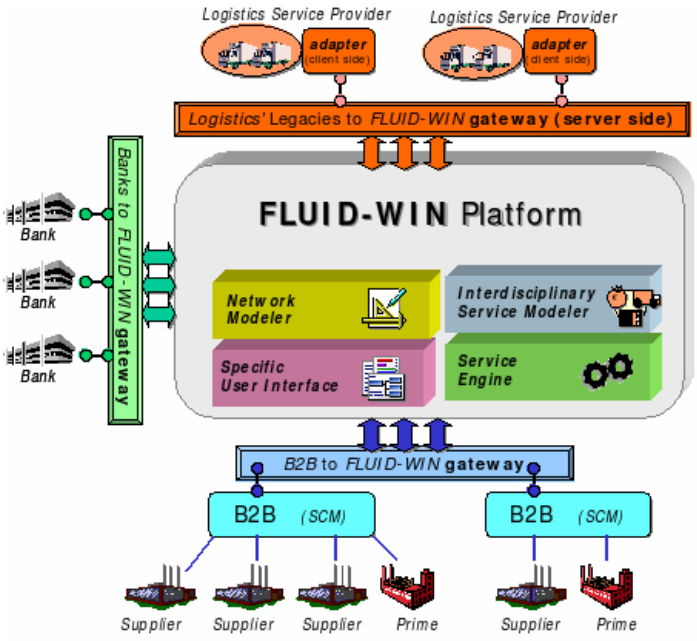

Fig. 2. The FLUID-WIN platform

In addition to the platform, another set of software components called "gateway" are part of the FLUID-WIN architecture. The gateways aim to implement domain-dependent communication. Thus, the three gateways relate to the FLUID-WIN domains manufacturing (B2B), Logistics and Finance. Gateways have to face and to solve the interoperability challenges of the FLUID-WIN approach. There are two major levels of interoperability:

- *Internal interoperability* concerns the communication among the FLUID-WIN modules (for instance communication between the FLUID-WIN platform and the logistic gateway).
- *External interoperability* concerns the communication between the different FLUID-WIN modules and the legacy systems of the FLUID-WIN users . The FLUID-WIN interoperability is realized by the implementation of gateways and adapters that work between the FLUID-WIN Platform and the external application domains.

3 Technologies for Development and Technologies for Design

The choice of technology for the platform development has a strong impact on interoperability. Especially for the internal interfaces, we must therefore consider:

- Abstracted: Service is abstracted from the implementation

- Published: Precise, published specification functionality of the service (not of the implementation of the service)
- Formal: Formal contract between endpoints places obligations on provider and consumer
- Relevant: Functionality presented at a granularity recognized by the user as a meaningful service

The modeling of these properties is possible through the use of technology offered by Web services. Thus, the platform itself was developed with the following instruments:

- Eclipse 3.2, with Web Tools Platform 1.5 development environment [3]
- J2EE 1.4, that fully supports the use of Web services [4]

For the deployment, the following tools have been selected:

- The FLUID-WIN Platform will be implemented in Java, Enterprise Edition 1.4.
- The J2EE Application Server will be BEA Web-Logic Server 9.2. [5]
- The application will run on a server with Linux or Sun Solaris as OS.
- The B2B gateway and the FLUID-WIN Platform have a DBMS layer (IBM Informix).

Thus, the platform is a WebService which exposes a number of methods available through gateways that are mandated to route messages to the outside world. In fig. 3, a conceptual scheme is reported of the protocols and tools used for communication among network entities:

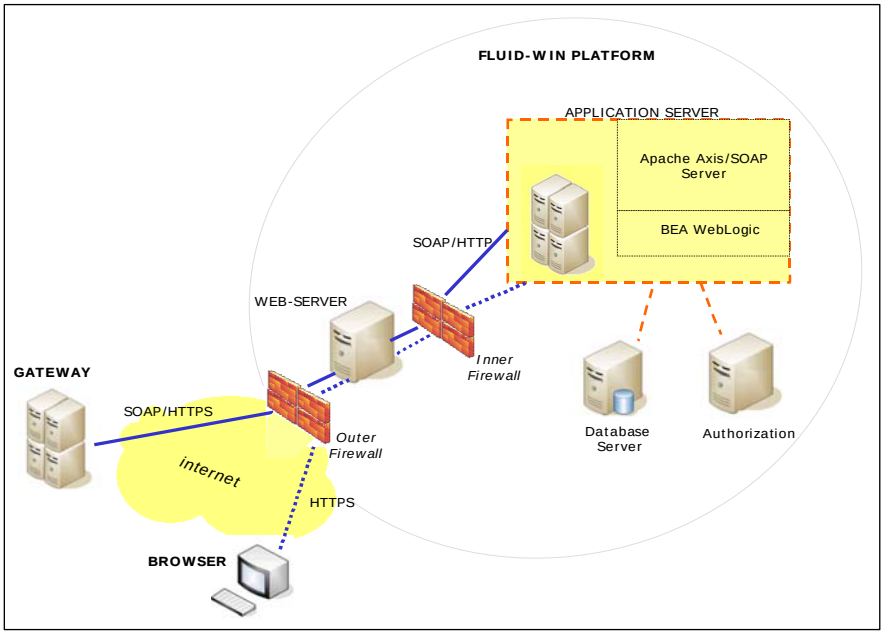

Fig. 3. Platform infrastructure

For the design tasks at the FLUID-WIN consortium partners, the Integrated Enterprise Modelling (IEM) method [6] was used to define and exchange the business processes. The Universal Modelling Language (UML) [7] is used to define and describe workflow protocols for the exchange of messages between the gateway, the platform and the outside world. The development environment for UML is Enterprise Architect, an advance software modeling tool for UML 2.1 [8].

4 Components for Modelling

The software components for modelling are the *Network Modeler* and the *Interdisciplinary Service Modeller*. These two components have the main objective to define the parties involved in the B2(B2B) network, the parties involved in specific workflows and the "rules of the game" applied when operating the platform's functionalities..

In particular, the *Network Modeler* is used to model the players in the B2(B2B) process, assigning roles and defining constrains that will drive the collaborative activities. The Network Modeler is expected to have structural similarities with the modelling engines of the SPIDER-WIN project, that facilitated the exchange of relevant manufacturing execution information along the supply chain [9, 10]. Therefore, partners expect that they can re-use the structural parts of the specification from the

SPIDER-WIN project, while the content parts will need to be specified newly, leading also to the development of a completely new modeller.

The *Interdisciplinary Service Modeller* has been conceived for the modelling of the domain concept to be handled in a given network context, where this context is defined through the Network Modeller. The Interdisciplinary Service Modeller will enable to define the interdisciplinary process activities and to map them to the process elements and events that trigger the actions managed by the Service Engine.

Another fundamental aspect to be considered is the modeling of processes through which certain documents can be obtained. This is possible through the so-called Workflow and Report Templates that are included within the Interdisciplinary Service Modeler.

The above mentioned processes are defined by a number of states and methods implemented in the platform, and used by workflows whose final output will be a document (e.g. logistic order, request for quotation, quality measurement document, etc.).

A *WorkFlow Template* is composed from a set of states, transitions, rights, outgoing and incoming events, functions, notifications, constraints and changes to the database. Through customizable external input it is possible to obtain a workflow as shown in fig. 4, which is an example of a Workflow Template on a Logistic Order, specifying the possible states and the transitions between these states.

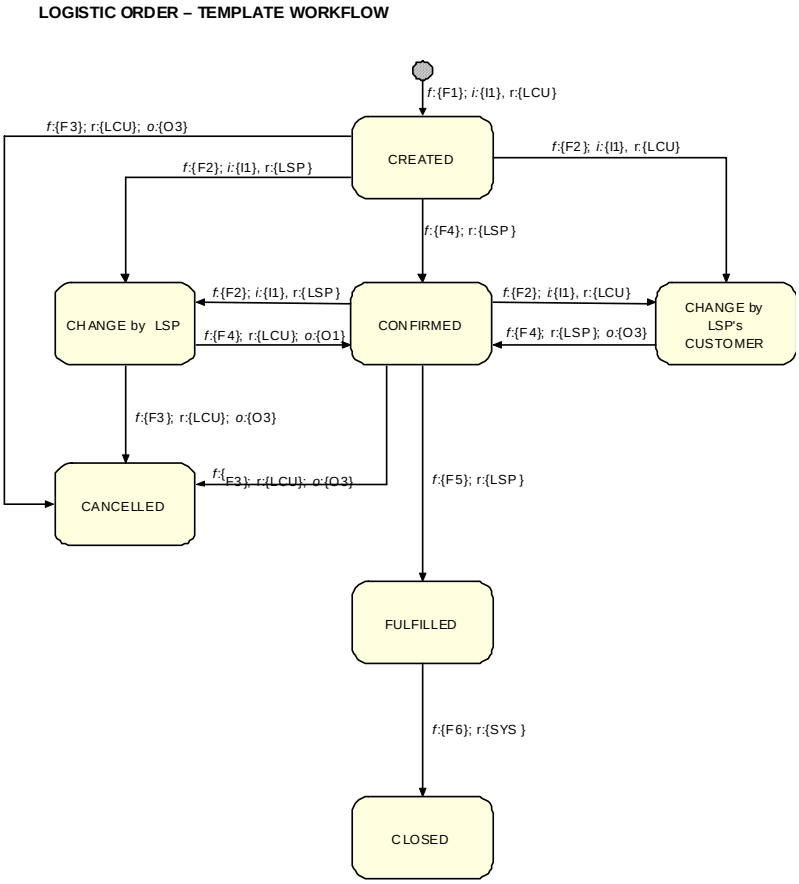

Fig. 4. Examplary workflow template (logistic order)

5 Components for Managing

The components for the management are *Service Engine* and *User Interface*. The main task of these components is the management of documents and events within the network. The Service Engine manages all messages that are exchanged with B2B and legacy applications, storing and updating the central repositories, fulfilling the required elaboration to propagate message data through the single-discipline domains, and towards interested network players.

Moreover, the Service Engine collaborates with software agents in charge of detecting events and transporting messages, and it defines the basic routing elements for control flow semantics, based on an XML/XSL.

The *User Interface* allows authorized users to interact through a series of actions granted to them by their partners. An example of the first draft User Interface is shown in fig. 5.

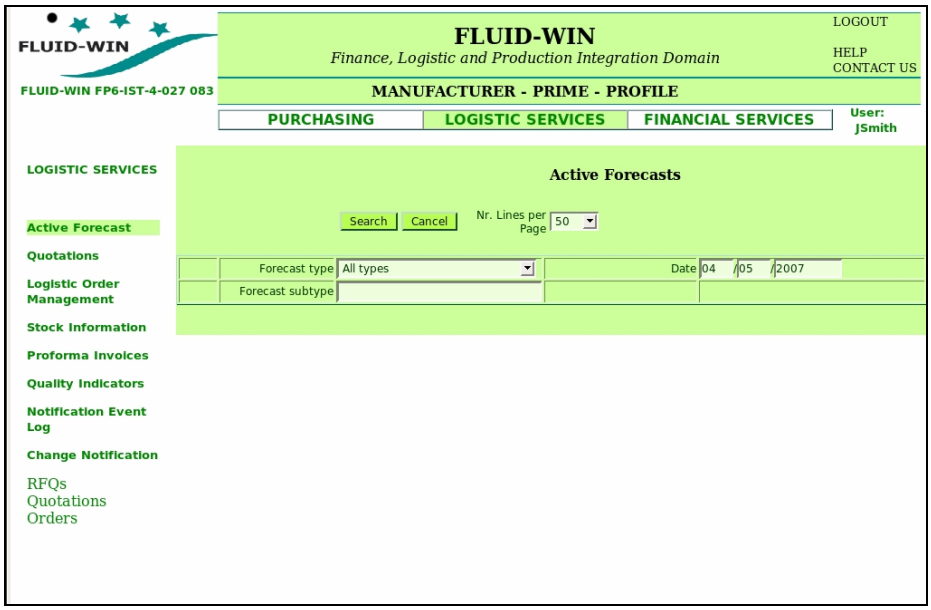

Fig. 5. Example User Interface

6 Summary

The step from the “classical” B2B approach to the new B2(B2B) concept requires the development of a platform that centralize services and therefore communications between various entities. Therefore, a technology is mandatory that offers a single language-independent development environment. The project has selected Web services for this purpose. The successful exploitation of the B2(B2B) concept requires

- a business process model of the B2(B2B) concept, that forms the base of the implementation and supports the customization in a concrete network,
- an Interdisciplinary Service Model that defines the Workflow Templates implementing the states and transitions on the platform,
- a Network Model that defines the players in a concrete platform,
- a Service Engine that operates the workflow,
- a B2B gateway that connects the platform to a B2B platform (which then connects to a multiplicity of manufacturers),
- finance and logistic gateways that allow for the attachment of specific IT systems from the service domains, and

- user interfaces to directly access the platform, taking into account that the majority of services will be used *without* direct access to the platform, as information is exchanged through the gateways and platforms among the existing legacy systems.

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