

ASP-based Integration of Manufacturing, Logistic and Financial Processes

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Software for electronic business-to-business (B2B) operation has found wide application in the last decade, supporting the provision of both goods and services. The new B2(B2B) approach which is explained in this paper exploits the existence of a multiplicity of well-operating B2B networks, and offers to service providers from the logistic and finance sector the connection to B2B networks of manufacturing companies. This enables service providers to conduct the related business processes through one single gateway, reducing the customization task to a pure organizational effort. For the efficient use of the new B2(B2B) model, a Web-based platform implements the model and connects to the manufacturing, logistics and finance domains through gateways. A field study has demonstrated the potentials of this approach, and identified the most promising services to be offered in this framework. A new business model, that was developed on the base of this analysis, specifies the cross-enterprise processes as well as the related processes on the Web-based platform. The prototypical implementation of the platform is under development, and the first tests in real environment will start by November 2007.

Keywords: Supply Chains, Services for B2B, Web-based information exchange, ASP, Business Processes

1 Introduction: The B2B Market and new Business Potentials

In the past 15 years, European enterprises have increased the degree of outsourcing, steadily, leading to many more partners along the supply chain. In combination with smaller batch sizes and delivery requests on shorter notice, the coordination requirements are tremendous for all the companies involved. The number of processes to be synchronised has increased, significantly. Nevertheless, investigations demonstrate that up to 30% of the administrative effort can be saved by establishing electronic interchange mechanisms in the supply chain (VDI 2005). Companies aim at getting rid of coordination tasks, but at the

same time try to avoid investment in soft- and hardware.

In consequence, a new market has come up for software and services that address these aims. Gartner addresses this market as the "Multienterprise/B2B infrastructure market" and classifies it into two main sectors and five sub sectors:

1. Multienterprise B2B software
 - a. Multienterprise B2B gateway software
 - b. MFT Suite software
 - c. Stand-Alone EDI Translator software
2. Multienterprise B2B services
 - a. IaaS (Integration as a Service)
 - b. B2B project outsourcing

This market value has been estimated by Gartner as \$2 Billion in 2006, with still a high potential of growth (Lheureux et al. 2007). Sector 2a, that is addressed by this paper, is wide and heterogeneous itself. Nearly 100 integration service providers are rated by Gartner. For further investigation, it is helpful to divide this sector into sub-areas, where the two major ones are

- EDI VANs providers and
- B2B SCM CRM ASP based service providers.

Classical EDI approaches are well established, but offer limited functionalities, as EDI defines a transfer, only, but no intelligence within this transfer. ASP based solutions offer software in close conjunction with the data transfer, and can thus also provide an “intelligent” interface. But, still only few significant players are active in this field in Europe. One successful example is the MaNeM platform which is operated by Joinet Srl. in Bologna.

These ASP platforms manage large quantities of information for the B2B network, such as electronic transportation documents and electronic invoices. However, this information is not sufficiently exploited today, leaving significant resources lie idle. A very efficient additional use of this information could be achieved by connecting the B2B network with service providers. Obviously, financial services providers can offer services based on the electronic invoices circulating in the B2B network. Also, logistic services providers can provide services based on the electronic transportation documents available through the B2B network, taking into account current order information including announced or expected delays as well as forecast information.

2 The Authors' Background from Supply Chains and B2B Technology

Joinet Srl has been founded in July 2000. The company's core business is developing and pro-

viding Internet-based services. Joinet's target market consists of networks of manufacturing companies consisting of “prime contractors” (either OEMs or big suppliers) and their suppliers. The objective of their services is to enable the prime contractor and its suppliers to operate as an integrated network of companies. Joinet's reference markets (influenced by the geographical location) are the industrial districts of North-eastern Italy. The most significant branches served by Joinet are packaging machinery, metal-working machinery, vehicles (bicycles, motorbikes, earth moving machinery, but no car industry), ceramics, hydraulic, and pneumatic components as well as electrical and electronic equipment industry.

Currently, Joinet's unique product is the ASP platform MaNeM. This product, now at release 7.1, has been entirely designed and developed by Joinet. MaNeM takes care of the exchange of business documents within a manufacturing network. It allows to manage production orders, invoices, and non-conformity reports. Furthermore, the platform includes features to maintain the status of orders in a user-friendly way. MaNeM is provided in Application Service Provisioning (ASP) mode. The application is hosted on a cluster of servers owned by Joinet. The cluster has been designed with the maximum degree of fault tolerance and the best security technologies, and was located in the most advanced Italian server farm. MaNeM users can access the application via a web browser for single activities, or exchange files with MaNeM via FTP (typically, for ERP or MES data). The application is currently adopted by 15 OEMs and by about 500 related suppliers. In terms of business, both OEMs and suppliers are Joinet customers, and they pay a yearly fee for accessing the application. Most of the 500 suppliers are SMEs, and they appreciate very much the ASP modality, because this helps them to fulfil the integration demands of their customers without taking care of infrastructure matters, software installation and intense IT employee education.

The division Corporate Management of **Fraunhofer IPK** focuses on the development and implementation of innovative concepts for business processes, the planning and control of industrial

units and the development of methods and software tools to support corporate planning and control tasks. This division was involved in several workgroups within the ISO 184 development of standards on enterprise modelling, and the Integrated Enterprise Modelling (IEM) method developed by IPK is compliant with these standards.

Since several years, a specific research focus of IPK is on supply networks, covering both the strategic composition of networks and the support of network operation. Among the major developments there are a planning method to configure a supply network in an effective way supported by the Web-based tool VIENTO (Mertins and Schallock 2006) and a method for strategic and operative inventory planning in existing supply chains supported by the tool LIST (Mertins and Turba 2006), that enables to combine a high service level with low stocks along the supply chain, even if demand is changing dramatically. For the execution of existing supply chains, IPK led the development of a new methodological approach to smoothen operations in long cross-enterprise supply chains, especially for SMEs, which was implemented as ASP software (SPIDER-WIN) on the base of Joinet's platform MaNeM (Rabe et al. 2006; Rabe and Zanet 2007).

In the European project ATHENA on interoperability in co-design as well as in supply chains a research group (mainly INSEAD, St. Gallen University, SAP and IPK) did increasingly focus on effort that is linked to repeatedly changing supply chains. Therefore the transaction cost theory was used and the main terms of "Connectivity costs" and "Coordination costs" were defined including the subcriteria of these costs and the value that is created by easy connectivity (Lebreton and Legner 2007). Connectivity costs cover costs that occur when a company links into a supply chain and has to connect its business processes and ICT Systems and applications to the overall material control flow.

It appears clear that, even from different starting points, Joinet and IPK can be considered players of the B2B market and in particular of the Multienterprise B2B services area of this market. IPK has conducted several significant projects in the field, while for Joinet this is the core business.

3 The B2(B2B) Approach and the FLUID-WIN Intuition

In the year 2005, IPK and Joinet investigated the possibility of addressing the topic of the integration between companies belonging to a manufacturing network and connected to an ASP B2B platform and companies providing logistic services or financial services. Very soon, the authors came to the conclusions that there is a market for this topic, that R&D activities had been poor in this field, and that the major potentials of this idea are in manufacturing networks that are geographically distributed across state borders, where transportation duration is significant (days to weeks) and where cross border payment is far from being smooth.

Large European manufactures were (and are) outsourcing activities either in former East Europe (FEE) states or in Asia with a focus on China. Both regions have advantages and disadvantages, as specified in table 1 (cf. next page).

IPK and Joinet realised that this kind of approach could increase the competitiveness of FEE suppliers with respect to Asian ones by providing financial and logistic services faster, smoother, and on lower cost. This is fertilized by connecting these service providers to the B2B platform adopted by European manufacturers. The authors called this approach B2(B2B) approach, where the acronym means provision of business services (B) to (2) a network of companies connected via a B2B platform. This is in contrast to the "traditional" way of connecting each single company with the service provider. The effort saving through the new approach is significant, as interfaces with customers, suppliers, financial service providers and logistic service providers are replaced by one single interface to the B2B platform, which is then connected to the B2(B2B) platform (fig. 1, next page).

Being aware of the great potentials of such new B2(B2B) approach, Joinet and IPK formed a consortium together with nine further industrial and service partners, and submitted a proposal under the sixth European Framework Programme (FP6), which was accepted as the project named FLUID-WIN.

Table 1: Comparison between outsourcing to former East-European (FEE) suppliers and Far east suppliers (Rabe and Mussini 2007)

Aspect	FEE	China / Asia
Attitude in providing on-design parts	Good	Limited
Prices	Low	Very low
Time zone	Same, communication during standard work time	No overlap in working hours, hindering direct communication
Language	English communication possible, minor limitations	English communication often very limited, major hinders
High-tech Industry	Strong	Weak
Import export procedures	No major problems since May 1 st 2004	Still very complex
Transportation time	Days	Weeks/months; urgent delivery with extreme added cost
Financial aspects	Partial advanced payment, financial process not fluid	Very difficult financial processes, advance payments requested
Management aspects	Suppliers can be managed, directly	Direct supplier management is almost unfeasible except for very large quantities. Intermediate companies based in China are recommended

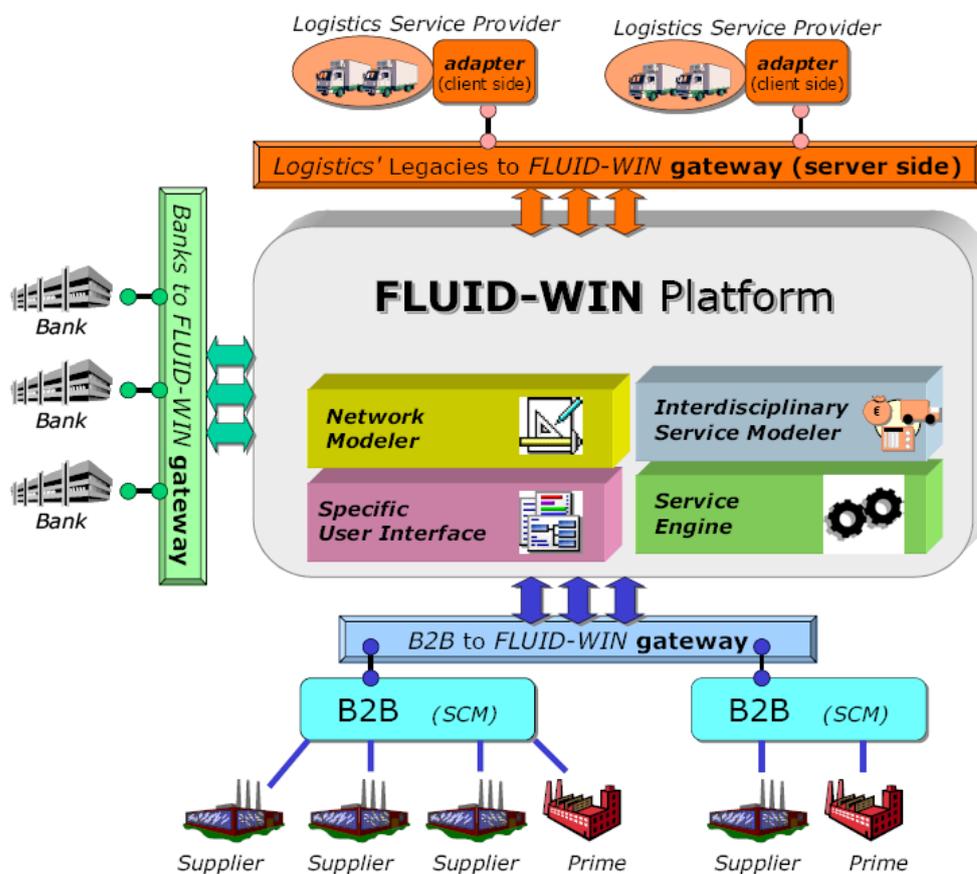


Fig. 1: The new B2(B2B) Platform Approach

4 The FLUID-WIN Project Objectives

The two major FLUID-WIN objectives are the development of this innovative B2(B2B) model and a prototype of the related e-commerce application. Today, efficient models for the supply chain management in terms of orders are available as B2B operation and others are under development (especially, for SMEs). The challenge is the integration of the logistics and financial services without installing thousands of peer-to-peer relationships. Therefore, the objective is to develop means for a B2(B2B) service, based on ASP, providing the possibility to adapt a service into a complete existing network instead of installing relations to the network members.

Enumerated, the project objectives are:

- The design of a very innovative, efficient and lean FLUID-WIN B2(B2B) interdisciplinary model. The model includes all four major players: prime contractors, strategic suppliers, cross border logistic service providers and financial service providers. The model supports the definition of relationships among service providers (logistic and finance) and manufacturing networks, enabling the creation of a new multi-business web-based application where service providers offer their services not to a company but to an entire network. The model also captures concepts, their relations and semantics, thereby defining a specific ontology.
- The design and development of a suite of web based tools (FLUID-WIN Platform) specifically designed to be provided on ASP basis, implementing the FLUID-WIN B2(B2B) interdisciplinary model: The Network Modeller, the Interdisciplinary Service modeller, the Services Engine, and the specific user interfaces.
- The design and development of a specific interoperability framework (FLUID-WIN Interoperability Framework) targeted to enable the electronic data interchange among all players based on the FLUID-WIN B2(B2B) interdisciplinary model.

- The evaluation on a relevant number of significant users of the project results through an ASP approach.

5 Services Offered by the Market

One of the first project activities has been the investigation of the state of the art in the field. This state of the art includes all aspects addressed by the project, including all aspects of technical infrastructure and interchange mechanisms. However, a major focus was put on investigations about related services offered on the market today.

5.1 B2B Services for Manufacturers

The FLUID-WIN partners made an intense research on approaches that are similar to the B2(B2B) approach proposed. The only (few) results found on this topic refer to the FLUID-WIN Model. Therefore, the B2(B2B) approach seems to be in fact very innovative. Thus, the state of the art was analyzed for B2B applications for manufacturers which are already adopted.

Two kinds of players have been investigated:

- Global players (world-wide operation): i2, Oracle, Manugistics and GXS.
- Local players (domestic operation) by example: Atomos, Tecnest, Tesi Group, TXT E-solutions, Joinet.
Many local players publish their offer only in the native language. Therefore, Joinet has selected Italian players under the assumption – that was shared by the consortium – that they are likely to be similar to local players of other European countries.

For all players listed above a quite detailed analysis has been carried out, and the conclusion has been that with the exception of Joinet

all these players do approach the market with a licence scheme, i.e. the B2B application is not provided as a service. Each installation of these applications manages data related to one single network, which fact limits the number of documents handled by the B2B application.

In contrast, ASP applications usually manage data related to several networks. This opens a connection path to much more companies. As an example, in the MaNeM solution the mean number of companies in a manufacturing network is about 30 and decreasing, as OEMs try to concentrate on strategic suppliers. But, the number of companies on the ASP is about 500, and growing steadily with the number of networks joining the platform. Therefore, attaching to an ASP B2B service is much more attractive for a third party service provider, given that this ASP platform has a substantial number of users. However, also B2B networks that are provided by OEMs can be quite interesting, especially if they support a very high number of suppliers, e.g. in the automotive industry.

Also, ASP-based approaches can be found that support the management of large supply networks. For example, the SPIDER-WIN Interlink Model enables to monitor a network and to generate early warnings if the network tends to run into a shortage of material or capacity (Rabe et al. 2006). However, this approach does not directly support any B2(B2B) approach, as the method only evaluates a number of B2B relationships based on mathematical approaches and the Interlink Model, but does not open the way to provide services to the network. Still, the SPIDER-WIN approach provides additional benefit to the manufacturing companies joining such ASP networks, and can therefore work as a fertilizer with respect to B2(B2B) approaches, also.

5.2 WEB based Logistical Services

The FLUID-WIN partner Régens, a logistics consultant located in Hungary, executed a survey of

e-logistic service providers (LSP) and B2B system vendors in the European and in the US market. They collected information about solutions, which can support the management of global logistic networks by increasing the visibility and the efficiency of supply chain processes. The e-logistic services of the explored platforms support the collaboration among the different players in global networks, including manufacturers, retailers, logistic service providers, carriers and different types of agencies (customs, tax, etc.).

Solutions in the US market are more complex, and implement the connectivity among a wide range of logistic players, supporting them with professional e-services in their cross-border activities. Different players of the supply chain are connected to these hubs, and communicate to each other on a common platform.

In the European market the leading solutions are owned by global software vendors. These solutions are customized for the premium customers' needs. Besides these we can find smaller B2B solutions, which can solve the collaboration problems on a particular field along the supply chain. The logistic service providers usually use e-marketplaces for selling their value-added logistic or transportation services or purchasing capacities (trucks) via Internet. Advanced tools and infrastructure for electronic data exchange are available to the market from different vendors, mainly focused on Web-EDI service provision.

In order to restrict the research to the approaches that are relevant for the field addressed, the following constraints have been applied:

- Web-based solution
- Business service oriented approach
- Electronic services for supporting logistic networks (number, type)
- Connectivity among different players along the supply chain
- Multilingual, database-independent solution
- Solution implemented at more than 50 users

As the major conclusion, this is a very mature market, with plenty of functionalities. But, the electronic integration between the customer of a logistic service and the logistic service provider is rare. As no significant standards emerged, the integration is an effort that is worth only for customers with a huge number of transactions.

Thus, it can be expected that the FLUID-WIN will induce a disruptive change, as it opens easy access to a multiplicity of potential customers for a service provider, and also simplifies the use of such electronic services by the customer, dramatically. This is especially important for small and medium-sized enterprises (SME), which can not afford high expense for software and IT personnel.

5.3 Financial Services

Banks and other financial providers are regulated by their local legislations, but in order to avoid being biased or negligent, they also adopt internationally recognised standards or conventions. Basel II represents recommendations by bank supervisors and central bankers to revise the international standards for measuring the adequacy of the bank's capital. It was created to promote greater consistency in the way banks and banking regulators approach risk management across national borders. Basel II uses a „three pillars“ concept - (1) minimum capital requirements; (2) supervisory review; and (3) market discipline, to promote greater stability in the financial system. The parts that concern FLUID-WIN are the first and third pillar – notably the credit risk, operational risk and the increased disclosure requirements that the bank has to make, and therefore requires from its clients.

The IT market of the financial sector in relation to the FLUID-WIN approach is difficult to catch. The FLUID-WIN partners investigated in deep a dozen of products that in some way are related to the FLUID-WIN topic (Giuliano et al. 2007). Most of them are very large players on this market and most banks are ready to receive documents in electronic format, but the adoption of this practise is rare, and in fact not used by SMEs.

5.4 State-of-the Art Conclusions

The three domains addressed by the FLUID-WIN project are really crowded of applications, but none one of them considers a joint management of the domains. In contrast, the daily processes of manufacturing companies affect these domains in parallel and interlinked, and in many cases a document concerns at least two domains.

6 The Potentials

The FLUID-WIN consortium investigated in detail what benefits companies can have from the new approach. Potentials have been classified per domain, leading to a list of more than 30 major potentials.

The logistic services that can be significantly empowered by the FLUID-WIN approach are:

- *Delivery service* (from suppliers to prime contractor, or from involved 3rd parties-LSP's to the prime contractor): All materials needed are picked up by LSPs in order to be delivered from suppliers to the prime contractor.
- *Warehousing of finished goods or components* (raw materials): LSPs manage the physical and administrative receiving of finished goods (or raw materials) incoming from the production (to the production) and storage in warehouse.
- *Distribution of finished goods*: LSPs manage the transportation of finished goods from prime contractors to the final customers.

The financial services that can be significantly empowered by the FLUID-WIN approach are

- *Factoring services*: offered by a factoring company that enables companies to sell their outstanding book debts for cash. Factoring is a financing technique in which a business sells invoiced receivables at a discount to a bank or a financing house or to an internal finance company.

- *Letters of credit*: A binding document that a buyer can request from his bank in order to guarantee that the payment for goods will be transferred to the seller. Basically, a letter of credit gives the seller reassurance that he will receive the payment for the goods. In order to let the payment occur, the seller has to present to the bank the necessary shipping documents confirming the delivery of goods within a given time frame. It is often used in international trade to eliminate risks such as unfamiliarity with the foreign country, customs, or political instability.
- *Prepayment service*: offered by a bank, that enables companies to sell to a bank their outstanding debts for cash.
- *Payment services*: Banks (as a subset of the FSPs) receive payments on behalf of their customers (both manufacturers, logistic suppliers, and others) directly via IBAN or SWIFT payments. Likewise, following the customer's instructions the banks processes outward payments. In both cases the customer is kept informed. Factoring providers receive payments on behalf of their customers in their bank accounts, and likewise make payments from their bank accounts to their customers.

As the conclusion, the FLUID-WIN approach is not promoting new logistic or financial services, but is promoting existing logistic and financial services with an innovative Web and interoperability support that allows both service users and service providers to get significant benefits that would otherwise not be accessible.

For all these services, software functionalities of the FLUID-WIN platform have been defined, in order to redesign these services if provided with the support of the FLUID-WIN platform. This activity has been done for all logistic and financial services, defining and describing more than 30 functionalities. The FLUID-WIN partners decided to concentrate on a subset of most promising functionalities in the first implementation, focusing on two logistic services (transportation and warehousing) and two financial services (factoring and pre-payment). Focused on these ser-

vices, the FLUID-WIN interdisciplinary model has been developed, in fact redesigning the multi-domain processes affected by these services.

7 The Multidisciplinary B2(B2B) Business Process Model

7.1 Challenges

The FLUID-WIN project targets business-to-business (B2B) manufacturing networks and their interactions with logistics and financial service providers. It aims to develop a platform which can seamlessly integrate and transfer data among all the various partners in order to enhance the competitiveness and to make the business processes as efficient as possible.

Of course these aims are reflected in the FLUID-WIN B2(B2B) Business Process Model as the project's framework for the method development. This results in specific challenges which have to be taken into account and covered by the model. The most crucial duty is the handling of the business-to-business-net approach in different implementation levels (figure 2).

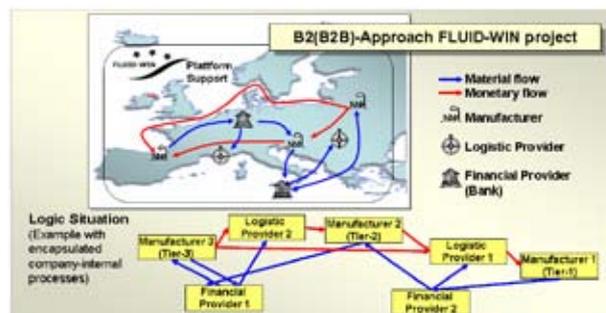


Fig. 2: B2(B2B) situation within FLUID-WIN

To explain this challenge, a framework for modelling cross-organisational business processes (CBP framework) from the ATHENA research project is used. The CBP framework was developed to provide modelling support for the business and technical level as well as for the transformation to executable models (Greiner et al. 2006). The CBP framework consists of two dimensions (figure 3):

1. Modelling level dimension: different models related to the CBP description business, technical and execution processes which each address different stakeholders
2. Abstraction layer dimension: target-specific aggregation and filtering of information which allows the selective hiding of company-internal information while offering to expose CBP relevant information to partners

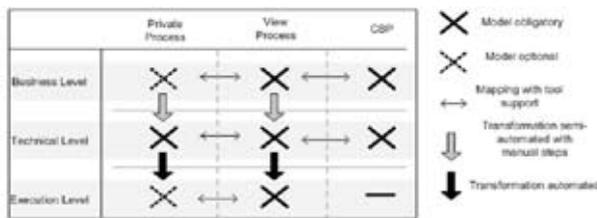


Fig. 3: Cross-organisational Business Process (CBP) Framework (Greiner and Jäkel 2007)

The modelling level dimension incorporates three modelling levels:

- The *Business level* represents the business view on the cooperation and describes the interaction of the partners in their cross-organizational business process. The CBPs modelled on this level allow the analysis of business aspects, like involved partners and their responsibilities. At this level, the FLUID-WIN B2(B2B) Business Process Model covers the processes of the
 - business-to-business collaboration within a supply chain (manufacturing)
 - business interaction with logistic service providers
 - business interaction with financial service providers
 - support and functionality of the new integrative services of the FLUID-WIN Platform and their relations among each other
- The *Technical level* provides a more detailed view. This level represents the complete CPB process control including the message

exchange. Thereby, different task types can be distinguished: those which are executable by IT systems and those that are executed, manually. However, the control flow and the message exchange are specified independently on a concrete execution platform.

- On the *Execution level* the CBP is modelled in the modelling language of a concrete business process engine, e.g. a model based on the Business Process Execution Language (BPEL). It is extended with platform-specific interaction information, e.g. the concrete message formats sent or received during CBP execution or the specification of particular data sources providing data during process execution.

The abstraction layer dimension is based on the concept of process views as an additional abstraction layer between the private processes and the CBP model as proposed by Schulz and Orłowska (2004). This has special relevance for the visibility of model information for different users. The different processes are strongly interlinked with each other and can be seen as different views on the same process, where the various stakeholders have different access rights.

- A *Cross-Organizational Business Process (CBP)* defines the interactions among two or more business entities, regardless if these entities are e.g. two manufacturers, a logistic provider and a manufacturer, or a logistic service provider and a financial service provider. These interactions can take place inside one company or can span multiple companies. An interaction is defined as a valid sequence of messages and/or other material input/output exchanges.
- A *Private Process (PP)* describes processes which are hidden from other partners, e.g. because of intellectual property rights or in order to save business secrets. Hence, PPs often cover company internal processes.
- A *View Process (VP)* abstracts one or more PPs to a process interface that a company provides in collaboration with its partner.

The combination of VP and PP enables companies to hide critical information from unauthorized partners. This has special relevance for the reusability of models. The FLUID-WIN B2(B2B) Business Process Model is a reference model which generally describes SCM- and service-provider-related business processes. Therefore, the model can be used to provide support during the implementation and introduction phase of the FLUID-WIN Platform at the end user companies. If during this period reengineering tasks are required, these companies have the possibility to use the model as a template and adapt it to their own needs. Thereby, the companies can be sure that their internal process structure remains confidential (and is not published).

- Supporting documentation for the FLUID-WIN Platform concepts and software
- Generation of classes for reference
- Orchestration of services (technical)
- Execution level
 - Platform execution support (e.g. help functionalities)
 - Integrate the concepts of the FLUID-WIN B2(B2B) Business Process and Platform Architecture
- Cross-level spanning
 - Base for further improvement of the platform functionalities in the future

7.2 Objectives and Constraints

Of course, the challenges are reflected within the objectives which have to be followed during the platform development. Generally, the FLUID-WIN B2(B2B) Business Process Model comprises the following major items and goals:

- Business level
 - General description of SCM- and service-related business processes
 - Framework to visualize and describe new communication methods in order to improve the communication quality (relations, dependencies) for consensus building
 - Orchestration of services (business process)
 - Supportive and template processes for the introduction of FLUID-WIN in supply networks (support of implementation, training, coaching, help functionalities)
- *Technical level*
 - Technical definition of services (IT oriented logistic and finance services)

7.3 Process Model for the B2(B2B) Platform

In order to achieve the different objectives and to reach the different purposes of the FLUID-WIN B2(B2B) Business Process Model, different sources are used. The SCOR scheme (Supply-Chain Council 2006) is mainly used for the definition of a common namespace. The structure of the as-is processes (business process models) are used from the results of a field study that was conducted at the beginning of the project (Rabe and Weinaug 2007). A further important source is the SPIDER-WIN SCM Model which mainly delivers the structure of manufacturers' processes and which is also based on SCOR (Rabe et al. 2006). However, SCOR is mainly focussed on manufacturing enterprises and less on logistical and financial services. Therefore, further sources are needed to define (1) logistical, financial, cross-domain services and (2) to describe the services and their relation to the daily workflow of the stakeholders. The last main source is the set of service, algorithms and functionalities which was defined for the FLUID-WIN B2(B2B) Platform.

All these sources have to be integrated into one efficient and effective FLUID-WIN B2(B2B) Busi-

ness Process Model. In figure 4 a first sketch of the highest level of the model is displayed. Five areas are highlighted by numbers. Number 1 relates to three symbolic enterprises with the roles of a tier-1 (customer), tier-2 (middle tier) and a combination of tier-2/3 (supplier) manufacturing company. Together they build an typical supply chain. The model aims to document the specifics of the different rules and the different kind of supporting and use of the FLUID-WIN Platform within these manufacturing companies' processes. The manufacturing supply chain is supported by a manufacturing B2B solution like e.g. MaNeM, I2, SAP APO etc. (number 3). Processes of the manufacturing area are mainly based on the SPIDER-WIN experience but will be enhanced by the visualization of the FLUID-WIN Platform services' support.

The manufacturing supply chain is enhanced by logistic as well as financial participants. Both provide specific services using their own techniques, software and methods. Hence, the model areas, marked by the numbers 2 and 4, contain the process description of the services from the view

point of the service providers.

Process number 5 explains the functionalities, their related information exchange, their configuration and dependencies in detail. This segment explains the FLUID-WIN methodological Business-to-Business-Net approach and thereby describes

1. the provided functionalities
2. their dependencies
3. the platform configuration and service orchestration
4. the method of addition of new functionalities
5. the software modules which support these processes and functionalities

Describing the processes is necessary but still easier than coupling banking processes to any external systems. Banks have developed own

FLUID-WIN B2(B2B) Model

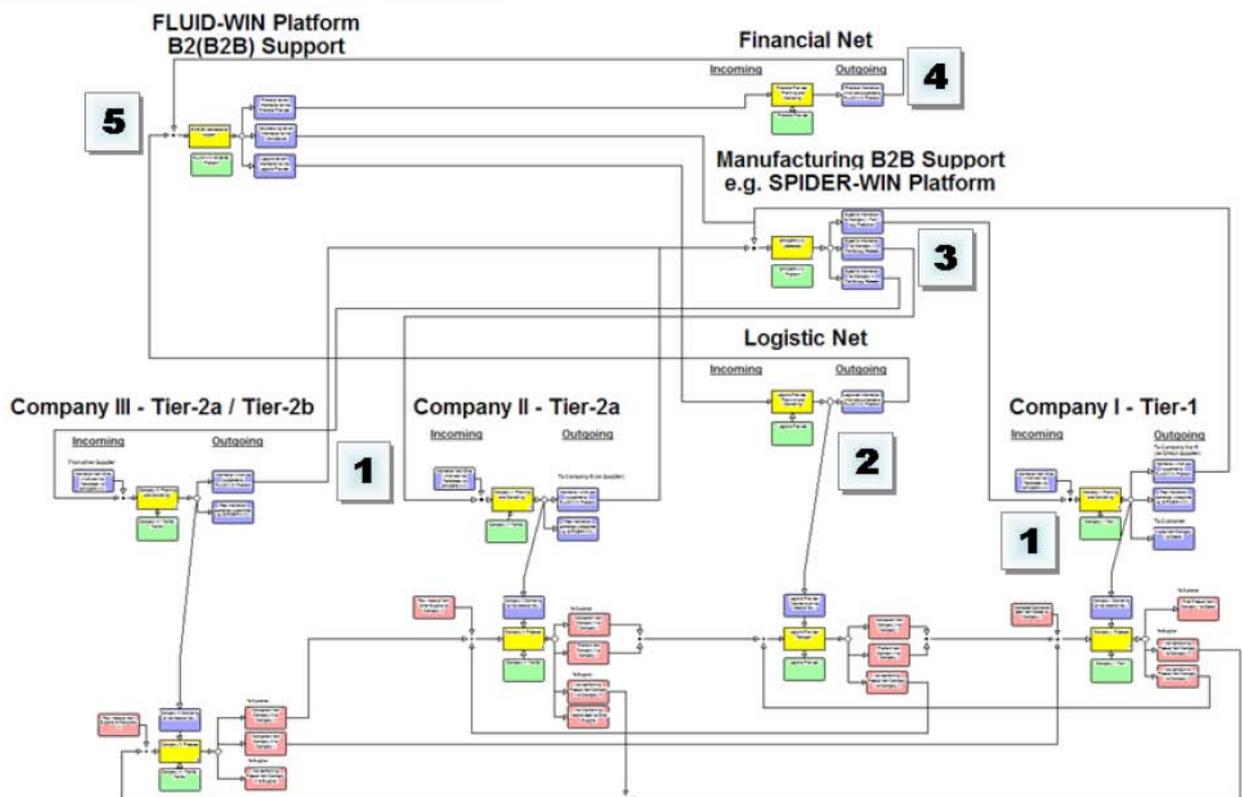


Fig. 4: Structure of the FLUID-WIN B2(B2B) Business Process Model (level 0)

data-transfer standards in the past and follow high-security rules. Therefore, they tend to accept only other banks as transaction partners. The new approach consists of a FLUID-WIN Platform with gateways and adapters (figure 1) using new protocols accepted by banks and financial service partners. Especially the financial gateway is important, as is channels all financially relevant communication through one service, which can have specific conditions with respect to security and trust, but without the need for the full platform to apply exactly the same security level.

8 Evaluation and Approach to the Market

Based on a survey conducted by the FLUID-WIN consortium related to market readiness, it seems to be clear, that in Europe as well as in the USA there is no solution available for B2(B2B) collaboration in similar multi-domain oriented networks as targeted by FLUID-WIN. In this context, the FLUID-WIN services and the platform itself are based on a unique and innovative concept. As a new technology, barriers have to be anticipated that could hinder the successful broad use of the new concept. Especially, the following aspects have to be taken into consideration:

- *Acceptance of using an IT solution as a service* (Application Service Provision). Sometimes the users are not aware that an IT solution can be used as a service, where the application and the database run and store the information far away from the company's location. They consider this to be not secure enough and that nobody can ensure that the database is protected from fraudulent use.
- *Availability of the services on a 24/7 base.* The users require that the platform has to run permanently, and that it provides frequently updated information. They have to know what will happen if the connection between their legacy system and the platform is malfunctioning, or if the services are not available for a certain time.

- *Ensuring that the information transfer services are approved* and that the system provides the necessary feedback about the status of successful or failed submission. The user has to be ensured that the submitted information to the platform is received and processed in the right way. Vice versa, if there is an error, the client has to get a feedback which is clear and manageable. This is especially evident, taking into account the severe impact of faulty or ignored financial transfers.
- *Optimisation of the necessary integration effort between the legacy system and the platform.* The FLW platform will reduce the real manual effort of providing and processing information. In order to provide information without manual data recording, the legacy systems have to be integrated into the platform. The user has to know the level of necessary integration, the cost for integration and how to measure the benefits.

Taking into account the barriers mentioned above, the FLUID-WIN consortium has prepared a preliminary exploitation plan, where the initially addressed target market is constituted by companies playing the role of the prime contractor (OEM, tier-1). Even if the benefits coming from the adoption of the FLUID-Win platform are expected to be significant for companies of any role (different tiers, logistic service providers, financial service providers), the FLUID-WIN partners intend to start the marketing activities by prime contractors because of their expected capability to involve all the other network members. This mechanism has already significantly fertilized the market penetration of MaNeM, and is expected to have the same advantage for B2(B2B) projects. In the year 2008 the FLUID-WIN partners will conduct a large and detailed experiment involving all the industrial partners of the consortium plus additional companies interested in an early adoption of this technology. The next intended step is to introduce the new approach at reference customers in various European countries. Due to a strong presence of Spanish, German, Hungarian and Italian partners, these 4 markets will be addressed first.

9 Conclusions

The FLUID-WIN consortium members are convinced that the project results are addressing key topics of the third millennium. The important industrial companies in the world are aware that globalisation implies a wider range of products and variants, and consequently the risk of margin reduction. Of course, the most sustainable means for margin recovery is product innovation (technological innovation, marketing innovation, brand innovation, etc.). But, globalisation also leads to shorter life times of innovation advantages. Furthermore, for many industrial sectors that are quite mature innovation is anyway limited and the competition is mostly based on prices. After years of business process reengineering projects, delocalisation projects, etc., the area addressed by FLUID-WIN is one of the areas where companies have still significant room for cost improvements. For instance, operation directors of companies in the FLUID-WIN target market have as a strategic objective for the year 2007 an overall product cost reduction of 1,5-2%. At the 5th or 6th consecutive year that they have a similar objective they can not just continue to address manufacturing processes (internal or external). FLUID-WIN offers a new – mostly untouched – area of intervention.

Although transport costs are still rather low, logistic processes and the related information processing represent a considerable and growing cost factor. Performance indicators of a supply chain should be extended beyond the traditional ones like availability of goods, low inventory, physical transportation cost and software and hardware investment. More emphasis should be given to low coordination cost and connectivity cost, reactivity to unpredicted changes, transparency of selective information while covering information from unauthorized partners at the same time.

The FLUID-WIN B2(B2B) model and the supporting ASP platform conduct a significant step forward to optimize the synchronisation of money flow and delivery. This will be a big relief for small suppliers. In addition, more transparency will occur for financial service providers. This can lead to less effort, better conditions with respect to the cost of financial services, and quicker proces-

ing of services like factoring. Thus, the new approach can significantly help to face the liquidity problem, which receives more and more importance especially in SMEs.

This paper highlights that supply chain control platforms are one good option for flexibility and cost reduction and the most efficient way to create such coordination service is the method of Business Process Modelling. Distributed modelling represents a further step forward when supply networks have to be modelled. Within modelling, SCOR compatibility is a prerequisite for widely accepted templates. Methods to combine models enable Europe-wide and even transcontinental collaboration while designing and optimizing supply chains.

The new B2(B2B) approach is an outstanding potential for service providers, especially from the logistics and finance domain, to offer and conduct electronically supported services to manufacturing networks and even sets of networks, with low IT effort on both provider and customer site, and cross-domain fertilization especially between the manufacturing and logistics domain.

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