Concepts, methods, standards and technologies to promote e-business interoperability in a large enterprise

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Abstract

We discuss how strategy, vision, technology, development approach, current trends over the Internet, and customer specifications were balanced together to achieve the e-business solution implemented in a large, European-oriented enterprise. First, we discuss the key discriminators for the future of a distribution and supply chain over the Internet. Accordingly, we describe corporate e-business concepts as the initial proposal for interoperability of the company’s and customers’ resources. It draws up specifications, boundaries and directives that must be obeyed to achieve comprehensive integration of the enterprise with its business partners in all countries. We propose an incremental development approach, which consists of a number of phases (sub-projects) conforming to the enterprise structure, as well as the lifecycle of each sub-project with respect to the organization of e-business development team and roles of analysts, architects, and developers. Moreover, typical e-business infrastructure based on SAP R/3 Internet Transaction Server is shown as well as its integration into the corporate IT infrastructure. We also describe B2B interoperability standards, such as BMEcat and OpenTrans, and their adoption in automated interoperability between customers’ and enterprise’s ERP systems. In conclusion, we show an example of e-business ordering process from the enterprise and customer point of view, and the essential back-office activities within the process. Keywords: SAP R/3, OpenTrans, BMEcat, e-business concepts, e-business process, e-business infrastructure.
1 Why do we need e-business?

With the head office in Germany and manufacturing in Denmark, Germany, Austria, the Czech Republic, Poland and China, nkt cables is the European market-orientated energy and data cable enterprise. Its activity is to develop and manufacture voltage, communication and data cables as well as cables accessories. Among the others, nkt cables intends to extend its selling and procurement activities by opening new channels for its business partners over the Internet. Initial concepts have been identified to form up nkt cables e-Business vision, and answer questions that come into everybody’s mind when we only start thinking about such innovation.

Almost everybody today acknowledges that the Internet, being an open and fast medium, will lead us to an open economy where information like pricing strategies, product specifications, delivery performances, creditworthiness of a customer, customers purchase history, supplier and customer satisfaction scores will be available at a mouse-click distance for anybody and anywhere. We also see that the original role models for businesses in the distribution and supply chain will change because of the Internet. In this new economy, businesses can only exist if they can clearly show how and where they are adding value to the final product or service and that service, information and availability are the key discriminators for all customers.

Major drivers pushing every company towards this new economy deal with customer convenience requiring comfortable, easier and cheaper way to gather, choose, order, pay and ship products to their doorsteps. In addition, new trends over the Internet are becoming more and more important, such as interoperability of business partners (B2B), growing number of e-business services (e.g. e-commerce, web ordering services) or on-line competing suppliers (i.e. e-marketplace). All such new activities are nowadays supported by modern technology platforms and standards being the essential and stable e-business background for both, customers as well as enterprises (e.g. ERP interoperability platforms, interchange message standards – BMEcat, OpenTrans, etc.).

2 Corporate e-business concepts

Corporate e-business concepts are the essential part of enterprise information strategy, and are initial proposals for interoperability of company’s and customers’ resources. Several concepts have been identified forming the e-business vision, such as development approach, structure of development team, and e-business infrastructure with respect to existing electronic services trends over the Internet, modern technology platforms and standards, and domains of company’s selling activities. Accordingly, proposed e-business solution exploits SAP R/3 technology, BMEcat and OpenTrans standards, supports interoperability strategies such as web ordering as well as Business to Business, and acts as a comprehensive, corporate and transparent e-business solution as a part of e-European cables market and industry. Following picture shows global e-business architecture as it is proposed in e-business concepts.
2.1 Development approach

Essential part of e-business concepts relates to the development approach. Its major idea is to divide the complex project into phases each representing one increment moving the system forward towards the vision. Within each phase, improved e-business solution is delivered in all countries promoting experience together with core implementations gathered from prior phases. All phases are represented by pilot solution development and delivery in the first, most appropriate country, which is then followed by solution roll-outs in subsequent countries. Moreover, standard project lifecycle procedures as well as other enterprise standards and policies are respected.

Phase I – Local Web Ordering solution has been introduced as a preliminary phase in order to achieve corporate e-business solution successively. This phase is focused on the Web Ordering System which delivers underlying e-business infrastructure of SAP R/3 Internet Transaction Server in each country. Customers, who access e-Business services over the Internet using the web browser, are allowed to submit orders from both, ordinary as well as consignment stocks, check products availability on stocks, check orders statuses and their transaction information.

Phase II – Corporate Web Ordering System obeys the enterprise “One Company Approach” and accordingly promotes local e-business sites to one, compact and comprehensive solution at group level. Particular tasks deal with the integration of all locally implemented solutions so that customers are served and treated within one transparent European enterprise.

Phase III is focused on Business to Business solution at both, local and corporate levels. Customers exploit e-Business services on-line over direct interconnection of ERP systems. In addition, enterprise services and products appear on electronic market places in order to compete with others and clearly show their added value.

The following picture depicts incremental development approach, its phases as they were proposed by the IT organization.
Following scope of methodology stages has been identified as methodology for all phases of e-business project. In particular, the methodology stages can be amended according to a phase requirements.

1. State of the Art and Requirements Analysis – business process and concepts, software, hardware, functions, and organizational aspects,
2. Design – design of function and process architectures as well as software and hardware architectures,
3. Customization/Modification – customization and/or modification of standard SAP components according to the design,
4. Implementation – installation and configuration of system components, testing functionality,

2.2 Structure of development team

Following is the typical e-business team structure for a phase of the project.

![Development team structure](image)
Another important part of e-business concepts deals with a structure of a development team. It has been approved, analytical and design project tasks will be in charge of internal IT professionals and business people who are aware of business processes and technical infrastructure of the company. Consequently, development team is composed of all, IT professionals as well as business people from particular country of interest, and a selected external vendor. Internal team members are responsible for requirements analysis and conceptual design proposals to be used by a vendor to process further tasks on development, implementation and maintenance.

Steering committee members approve outcomes, deliverables and financial proposals to ensure e-business consistency with other activities, visions, and approaches of the enterprise. It consists of members such as IT Director and responsible board of management representative.

Project manager coordinates the project in order to achieve vision concepts, meet deadlines and financial boundaries. He or she respects directives from Steering Committee and ensures its adoption to underlying development issues.

Analysis and design team involves IT and business analyst professionals, sales, delivery and procurement representatives as well as logistic people. IT analysts gather requirements from business professionals and build integrated design proposals. In order to meet particular customers’ requirements, selected key customers are also asked to participate in the project to submit feedbacks and acknowledgements.

Technology and development team members are responsible for technical issues of the project regarding e-business platform, its security, seamless integration into the existing IT infrastructure and continuity with ERP system maintenance and development.

Implementation team members perform tasks concerning e-business system secure connectivity to the Internet, configuration of operating systems and further activities such as administration, monitoring and maintenance.

2.3 E-business infrastructure

Typical e-business infrastructure is depicted in Figure 4: at the enterprise side, it is built on the SAP R/3 technology, such as the Internet Transaction Server (ITS) and Internet Application Components (IAC). ITS is a key-component of SAP R/3 e-business infrastructure which enhances SAP accessibility towards the Internet. ITS uses already implemented application logic in the SAP system and acts only as a component building the client-side content using the Internet web-compliant technologies.

ITS consists of two major building blocks, so-called WGate and AGate components. WGate component is integrated into the web server using its standard API interface. It captures requests from web-clients and passes them over to the AGate server. Subsequently, AGate server executes these requests by calling IAC components and builds web pages using HTML Business Templates. Both, WGate and AGate servers can reside on the same machine as well as on different machines running different operating systems, such as Linux or Windows. Since a big amount of data is being transmitted between WGate and
AGate servers, it is suggested that both machines are connected via a line of a higher capacity (100Mbps is a minimum). To increase the security, a firewall can be placed between the WGate and AGate machines as well as secure connection over SSL is always established for internet users to access the site.

Figure 4: Typical e-business infrastructure.

Internet Application Components (IAC) are standard SAP components built in ABAP which implement e-Business functionality. Such components are IAC On-line Shop, IAC Product Catalogue, IAC Order Creation etc. Moreover, IAC components can be customized to fulfill particular e-Business requirements.

Customer who accesses the e-business site has a choice. He or she can connect to the web server using a web browser and submit requests manually. In this case, the customer provides his or her user identification and a password when logging on to the system. If ERP systems are directly interconnected, all transactions between customers and target ERP system are automatically triggered on submitting ordinary customers’ requests in their home systems (e.g. standard order, consignment fill-up and issue orders, pay orders etc.).

2.4 E-business interoperability standards

One of the most discussed e-business requirements is Business to Business direct interoperability between customer’s and company’s ERP systems. A customer may operate on any kind of ERP system which may have nothing common with the company IT strategy involving SAP R/3 system. Thus, common interface for
communication between both systems should be proposed independently on underlying technology. Since major e-business activities deal with sales and procurement transactions, standards of OpenTrans and BMEcat specifications were chosen for such purposes. We briefly introduce both standards and its adoption in our e-business solution.

2.4.1 BMEcat
BMEcat is a standard for data transfer of electronic product catalogues involving a number of companies in its development, namely Alcatel, Audi, BMW, American Express etc. It has an extensive coverage of multi-media product data and catalogue structures, and it is designed for use of standardised product classification systems.

So that we could adopt BMEcat specifications in our e-business solution, company product catalogue structures must be amended to obey mandatory BMEcat fields and data types. Consequently, mediator system is designed, providing conversion between internal product catalogue and standard BMEcat structures. As a result, any part of company’s product catalogue can be exported and provided for use of a customer. If a customer provides his or her product catalogue in BMEcat format, it is imported into the SAP system so that customer materials numbers are available for sales and procurement people.

2.4.2 OpenTrans
OpenTrans initiative defines standards for business transactions and documents, and is managed by German and international enterprises under the direction of Fraunhofer IAO. OpenTrans is XML-based standard defining a number of transaction formats such as Quotation, Order, Invoice, Dispatch Notification etc. Moreover, it is compatible with BMEcat specifications.

Business analysts in cooperation with IT analysts perform an analysis of selected OpenTrans transactions structures in contrast with existing business processes implemented in e-business solution. As a result, documentation is created describing in detail an interface to e-business system captured in OpenTrans format. Such documentation is then provided to a customer, who is interested in building of automated B2B communication on the level of ERP systems. Certain functions are also created in e-business system to process OpenTrans requests and generate OpenTrans replies on result. Such functions operate on existing underlying SAP R/3 structures and processes.

3 Example of e-business ordering process

Implemented e-business solution allows customers to process their requests over the Internet with a minimal involvement of company’s back-office activities. E-business is an additional mechanism to existing methods, such as ordering products or enquiring information over the phone, fax or by e-mail. However, certain constraints exist which allows particular processes to be controlled or monitored. In cables industry, when a customer orders a cable, he or she also specifies a length of the cable as well as packaging units. Existing cables on a
stock might be cut into pieces which in turn could cause disorder in sales people daily work. We show an example of ordering process implemented in e-business solution including essential back-office activities in order to avoid inconsistency in stock and sales people effort. Following is the description of a typical sales ordering process implemented in e-business solution over the Web.

1. Customer is required to provide his/her username and password in order to login to the system. If authentication fails, customer is not allowed to process any further actions.
2. If customer is authenticated, he/she selects a stock in a form of a product catalogue assigned to this customer in underlying SAP system.
3. Customer is allowed to search and browse products in the product catalogue according to a name as well as both, internal product/material id or a customer product/material id.
4. For each product that the customer adds to basket, he/she is allowed to select from available packaging units of the product as well as specify individual length for that product. Customer also specifies number of packages.
5. Customer processes quotation on all products in the basket and specifies required delivery date, that he/she wants products to be delivered. Customer receives quotation result showing the expected delivery date and expected price for each product in the basket. Such delivery date may differ from requested delivery date specified by the customer.
6. If quotation results are satisfactory for the customer, he/she submits the order and receives the order confirmation. Customer is also allowed to specify an extra delivery address at this stage. By default, standard delivery address from customer master record in SAP system is used.
7. Order check is performed on each submitted order according to the following rules:
   a. If product is on the stock and requested length matches the length of the product on the stock within the tolerance of $-0+3\%$, standard order processing is allowed automatically, thus subsequent functions of SAP system are performed. In this case, product is dispatched and delivered at suggested delivery date.
   b. If product is not on the stock, or product is on the stock, however requested length requires this product to be cut (requested length doesn’t match any length of a product on the stock within the tolerance of $-0+3\%$), such order receives frozen status. Responsible sales person is aware of such order and performs further actions.
      i. If requirements are satisfactory, sales person allows its further standard processing, thus subsequent functions of SAP system are performed. In this case, production/purchasing/cutting order is created, and consequent actions follow in SAP system.
      ii. If requirements are not satisfactory, sales person contacts the customer and negotiates further conditions with him/her. In this case, sales person can submit the order manually to the SAP system, after conditions are understood by both sides.
Figure 5: E-business ordering process example.

4 Conclusion

E-business concepts were created to cover fundamental issues of e-business to be implemented in a large, European-oriented enterprise. Some of applied e-business concepts have been shown on a typical example of ordering process over the Web. We sincerely hope that above offers give you some ideas and building blocks to improve and enhance your e-business development practice.
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References