

e-Business Adviser Handbook

Version 2 – November 2002

A handbook for business advisers assisting small and medium sized enterprise entering or improving e-Business.

Issued by the USHER project. <http://www.usherproject.org.uk>

Section – 2.5 – Enterprise Modeling and Supply Chains

2.5. ENTERPRISE MODELING, ERP, SUPPLY CHAIN & INTEGRATION WITHIN e-BUSINESS

In this section issues concerning the modeling of e-business enterprises and how such enterprises should design their e-business processes prior to introduction of e-business will be presented. Also issues that concern the integration of the front office e-business applications with the back office applications (Enterprise Resource Planning - ERP and Supply Chain Management - SCM) will be discussed.

2.5.1. Modeling and Designing e-Business enterprises

Concerning the models of e-business enterprises, it seems that there are no standard models that cover all categories of e-business applications. The use of the Internet to support traditional business processes and to introduce new e-business activities seems to have no limits. Also the rapid development of technology (i.e. speed of telecommunications, new models of Web applications, new software development tools, etc.), is forcing businesses who must survive in the new electronic world to be prepared to adapt continuously in the changing environment. Besides this, new business opportunities and needs are appearing through the Web that point towards the development of new business activities that did not exist before.

So, even though the main categories of e-business applications can be recognized and reported (please see also section 2.1, 2.2, 2.3, 2.6 and 2.7 of this Handbook), it is impossible to describe exactly how these e-business applications are applied in all businesses that want to take advantage of the new Internet world. There are so many possible applications of e-business today (and many more are envisaged in the future) and for the several sectors and sub-sectors of the economy that it is not productive or possible to describe a business model for each e-business case.

So the following questions arise:

What should a Business Advisor know?

What should a Business Advisor and a SME do?

What steps should be followed so that an e-business model can be developed, implemented and controlled successfully?

How can the Business Advisor and the SME adapt themselves in the continuously changing environment of the future electronic world?

In the next paragraphs we shall answer the above questions and help business advisory practice to create e-business models and design, implement and control e-business processes.

Before we start this discussion the following statement illustrates the main concept of the e-business modeling methodology proposed here:

“e-Business models are not ready made costumes that an enterprise can use. Each enterprise should design its own e-business model using a systematic methodological approach”.

Some e-business models may have similarities, but at implementation they each should be treated individually, because enterprises have differences concerning goals, budgets, market shares, processes, human resources, products, services etc. even if they belong at the same sector of economy or they provide similar products or services. Very often, these differences

only appear after a detailed analysis of all the business processes, including e-processes has been conducted. This detailed analysis, as it described below, is the secret of successful introduction and maintenance of e-business.

For designing and implementing the appropriate e-business models the following steps should be applied, which constitute the basic stages of the Business Process Re-engineering (BPR) methodology for e-business:

1. Identification of the main categories of e-business processes, which are going to be applied (please see also sections 2.1, 2.2, 2.3, 2.6 and 2.7).
2. Identification of the specific business processes that will be transformed to e-processes or will be applied for the first time as e-processes.
3. Analysis of these processes using analysis standards, like the ASME (American Society of Mechanical Engineers) mapping standard and the IDEF0 process map with mapping of the inputs, outputs, tasks, constraints, etc. for each process.
4. Critical examination of each of these processes with regard to purpose, time, responsible staff, process tasks, means & technology needed, etc. During this critical examination-evaluation, alternative answers and solutions should be considered for all the above factors and improvements should be proposed. Also during this stage Total Quality methods and principles should be considered to help the improvement of the performance of the processes and of the overall e-business model.
5. Identification of the value that each e-process adds to the value chain of the enterprise and for which (e-process value) the customer is willing to pay.
6. Identification of the cost of each e-process, both standard and variable, for a certain time period (usually one year).
7. Cost-benefit analysis should be applied for each process, so that high cost processes should be identified, re-examined and re-designed if necessary.
8. Determination of the consequences that e-processes have on the rest of the processes of the enterprise. If the consequences seem to be significant, then re-design of existing processes or design of new processes is necessary according to the previous steps 2, 3, 4, 5 and 6.
9. Examination/evaluation of the degree of integration of the e-processes with the remaining processes of the enterprise. In case of low integration, reasons should be identified and examination of the overall e-business strategy should be considered.
10. A study concerning the advantages and disadvantages of outsourcing certain e-business and order fulfillment / logistics processes should be applied and the degree of outsourcing should be identified.

The outcomes of the above steps should be considered very carefully as the overall business plan of the enterprise is prepared for the introduction and implementation of e-business. Also during the operation of an e-business enterprise, BPR (Business Process Re-engineering) evaluation and design tasks should be applied for continuous maintenance and improvement of the e-business model, due to the continuous changes that are appearing in the e-business environment.

2.5.2. Integrating front office e-Business applications with ERP and Supply Chain

This section presents issues concerning the integration of the front office e-business applications with the rest ERP (Enterprise Resource Planning) and the Supply Chain. Also the impacts on ERP applications due to the Internet technologies will be discussed here.

ERP appeared in the 1970's as software modules that aimed to support business processes such as production, inventory control, purchasing, enterprise data management, finances and other internal processes. Several international Information Technology (IT) companies developed ERP software packages which shared common databases and included several modules of ERP tasks. Over the last 20 years, a significant number of companies all over the world started to apply ERP either in the form of simple small PC applications or in the form of integrated ERP software packages with several modules.

These ERP applications were not always a good return on their investment and they did not yield the expected results. First, in many cases, the cost for the acquisition- development, customization and maintenance of such software applications was high. Most of the time, the integration of the several software modules was small, since SMEs, especially the small ones, installed ERP modules partially aiming to cover the needs of a department in a specific time period. Also customization problems appeared, especially for the off-the-shelf ERP packages, because none of them were so generic that they would cover all the enterprise settings. Even ERP software packages developed by large IT companies, like the COPICS and MAPICS packages of IBM, MICROSS of KEWILL etc. needed significant customization efforts. Often enterprises had to re-design their work trying to adjust their processes to the software functionalities. Even in the 1990's when the ERP software was improved due to the new improved software (and hardware) tools, the results still were not the best. Studies in USA and Europe, using rather large samples of enterprises, showed that no more than 35% of the ERP installations were successful by returning back the money that were invested and also that ERP applications only supported a part of the enterprise processes efficiently.

Another significant reason for inefficient ERP utilization was the human factor – people were not always ready to accept computers in the workplace. Frequently a negative attitude was found as computers were completely changing the traditional and well-known working method.

Anyway despite the difficulties and the high cost of ERP implementations, a significant benefit appeared for companies, because many of them re-designed their processes while implementing ERP. Business Process Re-engineering (BPR) was applied especially in the 1990's that helped many enterprises to improve the performance of their processes.

Even today several ERP installations exist within companies though they are based mainly on the Information Technology that existed before the Internet world. Some of these installations are working efficiently and are well integrated while others are working less efficiently and with only a small degree of integration. As we shall see later in this sub-section, good ERP systems can help the enterprise to introduce e-business. On the other hand, the implementation of e-business can be a very good reason for ERP improvements and its extension towards e-business applications. Already several ERP software companies like SAP, Oracle, IBM and others are moving towards this direction by extending their ERP applications to e-business applications. Also new models of ERP services have started to appear mainly through Application Service Providers (ASPs)

So, for the SMEs and their Advisors some significant questions arise concerning ERP applications within the e-business environment. Such questions are:

- What must be done in the Internet era, concerning ERP applications?
- What is going to happen to all those legacy ERP systems?
- Is the existing ERP software going to survive?
- Is it going to be embodied / integrated in the new e-business environment, or is it going to be developed from the beginning?
- Are its functions going to change and new ones appear, or they will stay as they are?
- Do adjustments to ERP have to be made due to the new possibilities that technology offers and to the new needs of businesses?
- How can an e-business enterprise apply and take advantage of ERP?

The answers to the above questions are very important for a company introducing e-business and they will be discussed in the following paragraphs.

First it must be recognized that the business and process knowledge built into existing ERP packages is very deep, originating from several scientific fields like operations research, financial sciences and engineering sectors. Also ERP focused mainly on the support of internal processes of the enterprise while most of the new Internet applications for e-business (B2C, B2B, etc.) focus mainly on external transactions and communications through the Internet.

Therefore the scope of ERP does not conflict with the scope of e-business transactions, and in fact, as it can be seen in the following figure, ERP can stand between e-selling and e-buying processes, supporting the e-business effort of the enterprise and being part the whole value and supply chain.

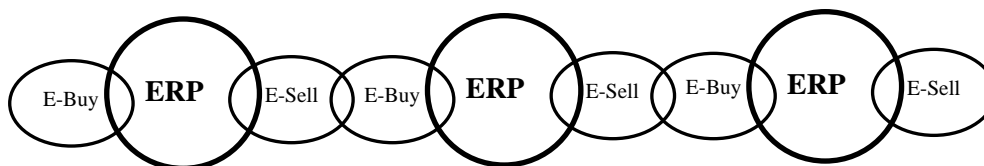


Figure 2.5.1. ERP and the Supply Chain

A short description of basic ERP application categories and modules, as they appear in existing ERP systems, follows:

A. Production

ERP applications for production were among the first that appeared and are based mainly on MRPII (Manufacturing Resource Planning) methodology. MRPII is a descendant of MRP (Material Requirements Planning) and was implemented through several modules concerning Master Production Scheduling (MPS), Capacity Requirements Planning (CRP), Production Order Release, Operations Scheduling, Shop Floor Control (SFC), Inventory Control, Purchasing, Production Data Management, etc.

Also in this category of ERP software, Computer Aided Design (CAD), Computer Aided Manufacturing (CAM) and Computer Integrated Manufacturing (CIM) applications are included.

Over the last 20 years, large IT companies, such as SAP, IBM, SIEMENS-NIXDORF, HONEYWELL BULL, KEWILL SYSTEMS and others, have developed and promoted for the international market integrated ERP packages that included most of the above modules. Hundreds of the above ERP software packages already exist across Europe.

Also smaller software houses have developed production ERP applications, usually with fewer modules and which are customized to the specific needs of their clients (smaller enterprises) or to the needs of a specific industrial sector. Such packages were less generic and parametric, with fewer installations, since it was hard to customize them for different types of SMEs.

B. Sales & Marketing

Sales ERP applications had software modules that aimed to support selling processes and transactions with customers usually through Local Area Networks (LANs) and for large enterprises through Wide Area Networks (WANs). The purpose of such applications was not only the invoice and receipt preparation but also the entire processing of the customer order, from the time that the order was placed by the customer until the shipment of the product and the invoice release.

On the other hand Marketing applications were trying to utilize and process customer data and other relevant information in an effort to support Marketers at their work. Such applications can be compared with today's CRM (Customer Relationship Management) and Data Mining e-Marketing applications, but they were less powerful, since less customer data was available particularly compared with the wealth of customer data gathered today through Internet transactions.

C. Finances

Financial ERP applications were one of the most important categories of ERP. Accounting and other financial applications (like payrolls and costing) were the first ERP applications that appeared when computers were first introduced in business. They support people in their calculations, work automation and provide storage for huge amounts of data. Today, financial applications are still among the most important ERP applications and an effort is made to ensure good cooperation and integration with the other ERP functions.

D. Logistics

Logistics ERP applications appeared more recently as separate applications, since initially the management of the inventories and the purchasing were considered part of the production ERP modules. But after the mid 1980's when the Japanese industries significantly reduced the cost of material handling by applying new methods like Just-In-Time (JIT) and increased their competitiveness, American and European industries started to concentrate more on the management and control of their logistics.

It is considered, that within the production processes alone, the handling (transportation and storage) of materials costs between 20% and 40% of the whole production cost and in some cases, like in job-shops, it can increase to 60%. If we consider the rest of material handling processes like procurement/purchasing, warehouses, deliveries/shipments etc. then the importance of the appropriate logistics management within an enterprise, either industrial or commercial, becomes obvious.

As a result ERP software applications appeared in the market to support logistics management. Such software applications concern purchasing, warehouse and inventory management, shipments/distributions, automatic and robotic systems for transportations within the production, lot sizing and palette packaging and handling according to shipment destinations, etc. Today almost all large ERP vendors have developed and are providing logistics software modules and as the e-business front office applications are being developed too, the Logistics modules seem to be the first ERP applications to cooperate and integrate. Already Oracle (<http://www.oracle.com>), IBM (<http://www.ibm.com>) and SAP (<http://www.sap.com>) have moved in this direction. Also other Software Companies, like i2 (<http://www.i2.com>) and Ariba (<http://www.ariba.com>), already provide Supply Chain

Management (SCM) software, and are moving towards provision of Web based applications and integration with front office e-business applications.

E. Human resources.

Initially Human Resources ERP applications were considered as part of Production Planning and Financial modules, where humans were considered as part of the processes and their data part of the enterprise database. Today, since the human factor in the companies is thought one of the most important factors of success in the business world, ERP software providers included modules for Human Resources management. These modules extended applications for human resources focusing on human improvement, satisfaction and cooperation. Principles of Total Quality are embodied in such applications helping both humans and enterprises to become more efficient, to be satisfied and to achieve goals.

A very good example concerning Human Resources ERP applications is the example of mySAP HR modules that SAP provides. For more information you can look at SAP's website <http://www.sap.com/solutions/hr>. As it is reported by SAP the mySAP HR applications process and support 32 million people for its 7,800 customers in more than 50 countries all over the world.

As the reader will realize ERP functionalities were in the past, are today and are going to be in the future very important to the business world, but only if the ERP functions match with the enterprise processes, which might have to be re-designed and improved to enhance the use of ERP.

So even in the new e-business world, ERP will be necessary for enterprises and should be embodied and integrated, together with the front office e-business applications in the enterprise value and supply chain.

Good and efficient ERP installations with updated versions of software modules can significantly help the introduction of e-business, since e-business needs structured data and linking with the rest supply chain of the enterprise. On the other hand, inefficient and non-integrated ERP installations should be improved and updated and an effort should be made for the integration where there are separate modules. Sometimes such inefficient installations can slow the introduction of e-business and enterprises with no ERP software find they have an advantage when introducing e-business.

Therefore during the introduction of e-business, the ERP status of the enterprise should be considered carefully using systematic approaches like the Business Process Re-engineering (BPR) methodology (see also sub-section 2.5.1). If necessary the old legacy and inefficient ERP systems can be substituted with new versions that work better and also cooperate more efficiently with the front office of e-business.

Large ERP vendors are already providing new ERP software that considers e-business applications as its extension. Such examples are:

- ☞ Oracle's E-Business suite (<http://www.oracle.com/applications/content.html>)
- ☞ IBM's ERP e-Business solutions (<http://www.ibm.com>)
- ☞ SAP's mySAP.com (<http://www.sap.com>)
- ☞ Microsoft Great Plains' e-Enterprise business solutions (<http://www.greatplains.com>)
- ☞ System Union's SUNSYSTEMS ERP (e.g. with its e-Business Gateway module) (<http://www.sunsystems.com>)
- ☞ Kewill's ERP and e-business applications (<http://www.kewill.com>)
- ☞ JDEdwards' ERP suite (<http://www.jdedwards.com>)
- ☞ SUN's ERP and e-Commerce solutions (<http://www.sun.com/solutions>)
- ☞ etc.

Also companies that were providing software for e-procurement and supply chain management solutions like Peoplesoft (<http://www.peoplesoft.com>), i2 (<http://www.i2.com>), and Ariba (<http://www.ariba.com>) are moving in this direction, by providing front office e-business modules.

Based on the above it seems that ERP and e-business applications are linked together in the new Internet world. In fact ERP and Supply Chain Management applications can be considered as the back office applications of e-business and their integration with the front office applications of B2C and B2B (like Web Selling, Web Marketing, CRM, etc.) is a significant factor in the success of the whole e-business. At this point it must also be mentioned that the open standards for hardware and software interoperability that the Internet technologies support, significantly enhance this integration effort of e-business enterprises and partnerships.

An approach that can help the integration of e-business and the best cooperation of the front with the back office and the rest supply chain can be summarized by the following rules:

1. Consider, analyze and design / re-design the internal processes of the enterprise, as well as the external ones (front office e-business processes).
2. Consider that your ERP software is extended with new modules concerning e-business applications and that ERP is part of the whole e-business system.
3. Try to achieve the best cooperation of your ERP / e-business software with your external partners (suppliers and buyers), especially in the case of B2B transactions.
4. Design and maintain all your processes using BPR methodology (see section 2.5.1).
5. Apply Total Quality principles when designing your processes (see also sections 2.2 and 2.3).
6. Consider carefully the functionalities of the candidate software packages that you plan to install when designing your processes.
7. Buy and install your software after you have designed your processes.

Another issue that should be considered at the supply chain integration within the e-business environment concerns the electronic collaboration between businesses that are involved in the same supply chain. Electronic collaboration could bring significant benefits to both suppliers and buyers like cost reduction, inventory reduction, information sharing and visibility, better tracking of orders through complex supply chains and better monitoring and measuring of supplier performance versus contracts. This extended integration of supply chains seems to be a promising and developing field for e-businesses in the future. As smaller SMEs are entering the e-business world and e-collaboration tools are appearing in the market such collaboration and integration are expected to be applied in a great extend, helping enterprises to perform better through the supply chain. An interesting example of a company that provides such e-collaboration solutions is the Verticalnet Software (www.verticalnet.com) and a very interesting article about e-collaboration can be found at: www.informationweek.com/836/collaborate.htm. Also the reader can access significant information concerning flexible collaborative working through the Internet at the IST project FlexWork (www.flexwork.org.uk) that provides significant information and support about collaborative working through Internet for both suppliers and buyers independently of distance and time barriers.

Before closing this section it must be mentioned that a new model of ERP services provision has also started to appear mainly through Application Service Providers (ASPs). IT companies have started to give their clients the chance to use ERP applications to support their processes through their portals. The clients do not have to buy the ERP software but they pay according to their usage of the portal and this way they outsource their ERP applications. Several ASPs have appeared in the market and also existing ERP vendors

have started to move in this direction of service provision. Some examples of such ASPs portals are the following:

- ☞ Oracle's Business Online (BOL) (<http://www.oracle.com>)
- ☞ SAP's mySAP.com (<http://www.sap.com>)
- ☞ Cezanne Software (<http://www.cezannesw.com>)
- ☞ The ActivEra portal of Siebel Systems (<http://www.siebel.com>), J.D. Edwards (<http://www.jdedwards.com>) and Andersen Consulting.
- ☞ BizTone.com

2.5.3. Conclusions

As it was discussed in section 2.5.1 no detailed and standard e-business models can be identified that can be applied to all types of enterprises, since often, enterprises even from the same sector of economy, have significant different characteristics concerning their size, budget, products, processes, market share, customer service, inventory policy, logistics infrastructure, etc. Of course general categories and functions of e-business applications as these were presented in sections 2.1, 2.2, 2.3, 2.6 and 2.7 of this Handbook can be considered, but the design and implementation of a more detailed enterprise model for e-business can be achieved only after a detailed and systematic analysis approach is applied. Business Process Re-engineering is a very good methodology that can be applied at the design and modeling stage and also used for the maintenance and improvement of the e-business system.

ERP applications should be considered as part of the whole e-business system of the enterprise and not as separate applications and functions that work independently. ERP supports internal processes but also is the link of the front office of e-business with the rest of the supply chain of the enterprise. If ERP is not efficient enough or not integrated with the other e-business applications, then the whole e-business system will be less efficient too. Already ERP developers have started to provide ERP software applications that are Web enabled and can be integrated with the rest e-business functions.

Finally we must say that there is a feeling in the e-Business and ERP world that e-Business applications and ERP are not separate any more. In fact it can be considered that: **“e-Business systems include ERP systems as part of them”**.

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