

# CONVERTING BUSINESS STRATEGY INTO A USER REQUIREMENTS DEFINITION FOR AN E-BUSINESS IMPLEMENTATION IN A SMALL MEDIUM ENTERPRISE

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## **Abstract**

The recent e-phenomenon has led to new ways of viewing business. It has created new opportunities and threats, which force many companies to review their strategies and put in place mechanisms to implement these strategies. To fully implement a strategy it must firstly be understood in operational terms through the generation of correct user requirements. The authors recognise the lack of relevant studies in the area of converting e-business strategies into user requirement definitions. The purpose of this paper is to propose a solution to this problem through the application of a structured methodology. The subject of business strategy is examined with particular emphasis on electronic business strategies. The role of Small Medium Enterprises (SMEs) in the worldwide economy is presented along with some of the common issues that they encounter with regard to implementing strategic initiatives. The authors then present the framework used to generate the components of requirements based on business objectives. The methodology includes an examination of the concepts of enterprise engineering and recent technological innovations before presenting a step-by-step guide as to how a user requirements definition process can be enhanced through the

application of these ideas. A case study is presented which illustrates how the methodology was used and demonstrates its validity.

### **Keywords**

e-business strategy, SME, user requirements definition, enterprise engineering, value chain

## **INTRODUCTION**

Using digital media to transact business has become normal practice for many business enterprises in recent years. Some of these enterprises have had a well-planned strategy to enable them carry out their business using the latest developments in technology. Others have adopted a less planned approach. Kalakota defines e-business to include “all the applications and processes enabling a company to service a business transaction” (Kalakota, 2001). He maintains that it is about redefining old business models, taking into account new technology, so that profits and customer value are maximised. It is the opinion of the authors that implementing a successful strategy involving e-business requires a number of well-planned steps. The strategy must be translated into a requirement definition, followed by the design of the system, followed by the implementation and operation of the system.

The translation of the enterprise strategy into user requirements is a critical part in this process as it influences the rest of the implementation process. This paper will focus on the process of user requirements gathering. Section 2 of this paper presents a review of business strategies in terms of their timeframe, detail and measurements. This section also reviews how business strategies have changed in recent years with a particular focus on e-business issues. The importance of performance metrics in relation to the strategy implementation is also reviewed.

In many cases an enterprise may need to be re-engineered as part of the transition to transacting business electronically. Small to medium sized enterprises (SMEs) are defined by the European Commission as having less than 250 employees, not more than €40M turnover and €27M Balance sheet total (Definition SME, 2002). SMEs face particular challenges when evolving to e-business because of their limited financial and human resources. Typically they need to focus on the business areas that can contribute the largest positive impact in the shortest space of time while complying with their overall business strategy. This paper presents some of the key challenges that are faced by SMEs in relation to e-business strategy implementation.

This paper also presents the methodology developed by the authors to bring strategic plans to the stage of tangible user requirement definitions. Strategic plans are normally created at a high level of abstraction and need to be concrete in order to be implemented. This is followed by a description of a case study based on actual research work carried out through a pan-European e-business project. The paper concludes with a review of the results achieved and some recommendations for future work.

## BUSINESS STRATEGY

In the context of business, the term ‘strategy’ has been given a number of definitions over the past few decades. Some earlier definitions viewed an organisation’s strategy as the determination of their long-term goals and adoption of courses of action to achieve these goals. This view of strategy sees an organisation as a rational entity that can predetermine its strategy and plan its actions. Mintzberg (Mintzberg, 1998) presented the idea of two types of strategy; the intended or planned and the emergent or unplanned. Planned strategies may involve the future management of company resources whereas an emergent strategy may be the result of a competitor’s action or a change in the economic climate. The strategies of most organisations are a combination of the planned and the emergent.

Planned business strategies normally evolve from the organisation’s mission statement. The mission statement of an organisation typically reflects its identity, values, customers, behaviour and direction. In general the mission statement does not contain many details but rather concentrates on less tangible aspirations. The timeframe of strategic plans has in general been over a three to ten year period, although this timeframe has become shorter in recent years. The goals of an organisation are a formal expression of the shareholders expectations expressed in financial terms. They are shorter term than the strategy and are more tangible. The objectives relate to the individual units of an organisation, can be expressed in terms of units and are short term or operational. The hierarchy of these concepts can be seen in Figure 1.

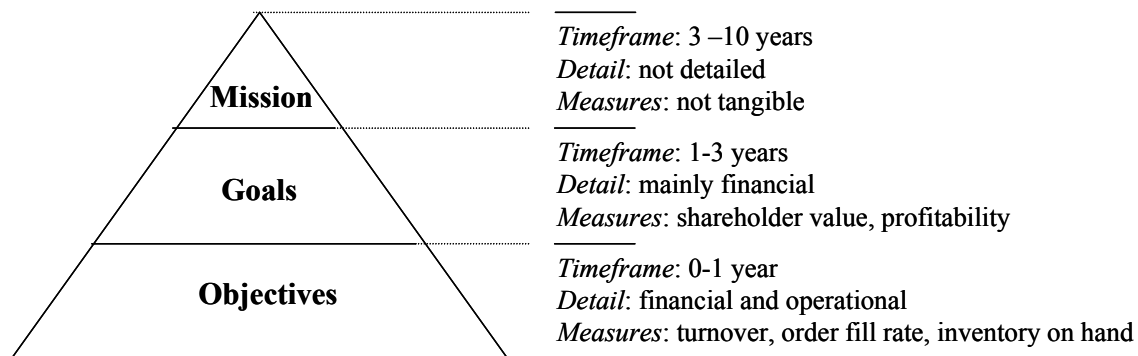


Figure 1. The relationship between Mission, Goals and Objectives (adapted from McMahan, 1993)

Data and information needs to be interchangeable between each of the layers in this hierarchy. There is a high level of abstraction at the mission level, which makes it more difficult to measure tangible detail. The level of abstraction decreases at the goal level and at the objectives level there is very little abstract information and a good deal of concrete data. The importance of tangible numerical information grows as one proceeds from the higher to the lower level (McMahan, 1993). However, strategic visibility from mission to objectives ensures a better overall chance of success of strategy implementation.

Burges (Burges, 2001) has identified a taxonomy of strategies and their strategic components. The strategic components vary in focus and in some cases cause a conflict with regard to what they will achieve in the enterprise. For example, from an operational perspective, an enterprise that has just implemented strategic outsourcing of manufacturing would most likely find it redundant to implement a strategy involving the installation of

intelligent production and cellular manufacturing. The enterprise must decide the strategy that they want to approach. It is not possible for an enterprise to be all things to all people so it should limit itself to a number of strategic components.

An organisation will not benefit from having a well thought out strategy unless they can convert this strategy into an operational reality. Many companies find it difficult to make this conversion. In the next sections, the authors investigate how the choice of strategy has become even more complex due to the emergence and growth of the e-Business phenomenon.

## **E-BUSINESS STRATEGY**

During the 1990's many enterprises began to focus less time and effort in the preparation of strategic plans. The argument was that a long-term strategy caused an enterprise to be less flexible with regard to taking up much of the new technology that was becoming available to the market. There was the notion that in a world that was changing rapidly, an enterprise should not really have a strategy (Hammonds, 2001). There was also the notion that technology advances should be implemented in an enterprise without examining the business rationale for using them. In other words, the technology was driving the business strategy instead of acting as an enabler. According to Hammonds, the underlying principles of strategy are enduring, regardless of technology or the pace of change (Hammonds, 2001). The implementation of an e-business initiative is a business decision and not a technology decision. However in many enterprises today, particularly those that are trading with other enterprises, a business strategy is not complete unless it looks at how the enterprise will adapt to ways of doing business digitally.

Formulating an e-business strategy requires a company to be aware of its own abilities and limitations (Kalakota, 2001) In many cases, by introducing digital means of transacting business, an enterprise will add technical complexity to their business. Customer relationship management (CRM) and Supply Chain Management (SCM) are business strategies that can be enhanced using information technology. For example, Timmers suggests that existing market access with services should be exploited and reinforced based on information gathered from the customer interaction through digital means (Timmers, 1999). There are many potential strategies that can be pursued. There are also many choices of technology to use and there is complexity associated with the choice and implementation. Because of this complexity, the translation of e-business strategy into e-business reality has to involve a disciplined approach aimed at understanding the business needs and the technical enablers. The first step in this approach is the conversion of an intangible business strategy into a tangible set of user requirements. The next section presents a general review on how these strategic components can be engineered into the enterprise.

## **ENGINEERING THE ENTERPRISE FOR E-BUSINESS**

### **Enterprise Engineering**

Vernadat (Vernadat, 1996) defines enterprise engineering as “the art of understanding, defining, specifying, analysing and implementing business processes for the entire enterprise life-cycle, so that the enterprise can achieve its objectives, be cost-effective and be more

competitive in its market” In the context of this research, the authors review enterprise engineering from three perspectives. Firstly there is a brief view on “understanding, defining, specifying and analysing business processes” using various modelling methods. Secondly, the authors examine the issues involved in the “implementation” of new business processes – re-engineering key processes. Thirdly, there is a review of some of the technology that has enabled organisations to concentrate on key processes rather than on the organisation as a whole.

### Modelling Methods

Models facilitate the understanding, definition, specification and analysis of an enterprise. A common understanding of the enterprise, by both developer and end user, is required and the selection of methods and tools reflect this. There are a number of modelling methodologies that provide a standard graphical means of documenting end user requirements. For the purpose of this research, the modelling methods IDEF0 (ICOM DEFinition Language), IDEF3 and DFD (Data Flow Diagrams) were chosen because of their clarity, ease of use and worldwide acceptance. The authors found that these three modelling methods were suitable for system analysis and preliminary design while other methods UML, ERM could be used at later stage (Shen, 2003). These models provide an uncomplicated graphical representation of the processes that take place in an organisation. It is important that both the end-users and the developers have a common understanding of what these models and diagrams mean, as both parties will need to accept the same set of user requirement specifications. There is no room for ambiguity or misinterpretation when signing off acceptance of these models.

The authors concur with Vernadat’s view that these tools are suitable when starting business process re-engineering projects at the strategic management level but that they have limitations when it comes to detailed design and validation at an engineering level (Vernadat, 1996). They are suitable for the purpose of converting business strategy into a user requirements definition. After a detailed and comprehensive set of user requirements has been defined the developers of the system create a design specification and eventually implement the appropriate solutions. The process is depicted in figure 2.

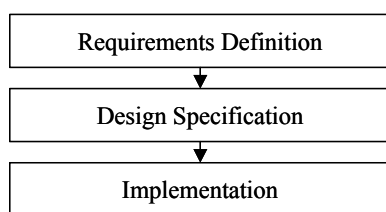


Figure 2. The process of derivation of models

### Re-engineering key processes

At the beginning of the 1990s Hammer (Hammer, 1993) put forward the idea of business process re-engineering (BPR) as “the fundamental rethinking and radical redesign of business processes to bring about dramatic improvements in performance”. He maintained that it was not just about improving what was already there but throwing it away and starting with a “clean slate”. Many proponents of BPR propose a “clean-slate” approach to rebuild

the company's information architecture. The scale of change is one of the aspects of BPR that has been debated over the past decade; does it involve radical or incremental change?

The approach taken during this research favours the notion of incremental change and the reasons are partially explained by the recent advances in technology. The more recent developments of e-business architectures based on software components – self contained packages of functionality that can be snapped together to create complete business applications – seems to hold some promise for alleviating the problem related to the adaptability and flexibility of information interfaces and flows (Malhotra, 2000).

This applies to business processes within the enterprise (intra-enterprise) and to processes that communicate with other enterprises (inter-enterprise). The Aberdeen Group (Aberdeen, 2001) identified a trade-off between the two extremes of business process functionality. On the one hand, an enterprise may want to have the best-in-class application functionality from multiple vendors. Until recently this involved high integration costs. On the other hand they may want to standardise on a single vendor's applications suite and settle for process functionality that lags the market. The advances in integration technology are making the former option more cost effective and enterprise solutions can be assembled using components.

The fact that new business components can be added more easily to an enterprise means that an enterprise can focus on certain strategic business areas. This means that companies do not have to engage in the radical level of change or the "clean slate" approach required in a pure BPR initiative. The next section looks at some of the developments in technology that facilitate re-engineering key processes instead of the whole enterprise.

### **Technology Developments – application integration**

As more companies buy components from different vendors to build their own systems, they need to adopt some form of integration middleware to perform integration services. Integration applies to intra-enterprise and to inter-enterprise applications.

Schulte (Schulte, 2001) indicates some differences between external and internal application integration. External communication is more likely to run over the public Internet; it may involve additional security measures; and transfers are more likely to leverage XML data formats today than are intra-enterprise transfers.

Although XML (Extensible Markup Language) is used more for external communication, it is believed that it will dominate intra-enterprise transfers in the next few years. Web services, based on SOAP (Simple Object Access Protocol) (SOAP, 2000) were originally designed as an external communication protocol. However, in practice, the protocol is used mainly for inter-enterprise integration, for reengineering internal processes. It is generally believed that in the next few years Web Services and SOAP protocol will be used more extensively for supply chain integration (intra-enterprise) improvements.

These technologies and others that are currently under development enable systems to be assembled provided underlying common standards are used. On this basis it is possible to concentrate on the business processes that maximise the enterprise engineering effort.

In sections 2 and 3 the authors presented a general overview of the areas of business strategy and enterprise engineering. In section 4, based on the theory presented in the previous two sections, the authors present a methodology that shows how business objectives are transformed into specific strategic components for SMEs and how the success of the implementation of these components can be measured.

## **A METHODOLOGY FOR E-BUSINESS STRATEGY IMPLEMENTATION AT SMES**

### **Small Medium Enterprises and eBusiness**

SMEs comprise a very large part of the global economy. Their ability to choose suitable business strategies and to implement them in the context of digital business is key to the overall success of economies worldwide. SMEs face special problems when choosing their business strategies. Typically an SME will have limited access to resources – financial and human expertise. This means that it is not always possible for an SME to go through the rigours of a full business process re-engineering exercise. Any changes that are made to the business processes of an SME usually have to be incremental and benefits need to be achieved in the short-term as well as the long term.

A recent survey by the Institute for Manufacturing in Cambridge, England has shown that SMEs, in the main, only undertake a strategy review when forced to as the result of some major event (Frizelle, 2001). This was described in an earlier section as an emergent strategy. In recent years, SMEs have been given the opportunity to capitalise on developments in network infrastructures. This trend can be seen as both an opportunity and as a threat in that competitors have been given the opportunity to increase their profitability at the expense of their rivals. The increase in use of digital means of doing business is clearly a major event and it has forced many SMEs to undertake a review of their overall business strategy.

There have been advances made in technology for software component integration in recent years, as outlined earlier, and this has meant that SMEs can take a more piecemeal approach to the implementation of an e-business strategy. Many Enterprise Resource Planning (ERP) systems contain modules that are not needed by SMEs. These systems are proprietary and require a large investment that a majority of SMEs cannot afford. In the case of limited financial, technical and human resources, an SME can identify the areas will result in the largest payback for the minimum amount of effort. The issue of affordability has been identified as a key concern to SMEs.

The research described in this paper is part of a project that aims to develop an affordable, integrated set of web tools to take advantage of doing business in the digital age. The project team is comprised of six developer partners and five end user partners. The end users are SMEs from various industry sectors such as food processing and distribution, decorating supplies and mechanical manufacturing. In the next sections the authors present a methodology for e-Business strategy implementation and demonstrate, using a case study, how this methodology was implemented.

### Methodology for e-Business strategy implementation

In this section the methodology for converting business objectives into user requirements is described. In section 2, the authors described the relationships between mission, goals and objectives and put forward the argument that many companies find it difficult to establish a means of converting high-level goals and objectives into actions that strengthen the competitiveness of the company. The uncertainty brought about by e-Business has contributed to this difficulty. Figure 3 illustrates how creating a mission can be directly related to its implementation using a combination of figures 1 and 2 and shows the area of focus of the proposed methodology. The methodology is based loosely on the application of some of the principles of the quality function deployment (QFD) approach. This approach was originally used to correlate customers' requirements against product or service features (QFD, 2002). Higgins et. al (Higgins, 1996) applied the principles of QFD to assist the manufacturing planning process, ensuring that customer focus in this area. In this paper the authors apply some aspects of the approach to the generation of modular user requirements from business objectives.

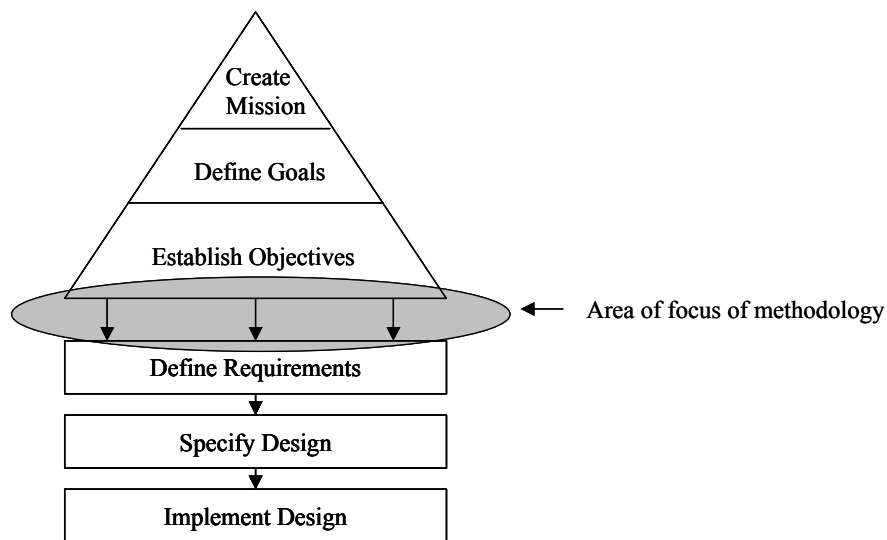


Figure 3. Mission to Implementation: focus of

### Establish business objectives

Business objectives are a description of what the enterprise needs to achieve in the short and long term to remain competitive. They derive from the goals and should be specific, measurable, realistic and time-bound. Porter (Porter, 1985) provides a widely accepted basis for analysing a value chain in terms of inbound logistics, operations, outbound logistics, sales & marketing and service. The authors propose to categorise generic business objectives under these headings. When planning an e-business implementation it may be the case that objectives from all five categories will need to be achieved to varying degrees. Objectives in one category may complement or conflict with the objectives in another category. For example, an operational initiative, such as the introduction of JIT, may bring about direct benefits to the operations of an enterprise affecting the operational objective of inventory reduction. It may also have a positive indirect effect on the sales and marketing activities meeting the objective of quicker product launches. When examining the pros and cons of choosing one e-business strategic component over another, the effects on the business as a

whole should be calculated. Table 1 presents a sample list of business objectives under the headings of Porter's value chain model.

Table 1. - Business objectives based on Porter's value chain

<b>Inbound Logistics</b>	<b>Operations</b>	<b>Outbound Logistics</b>	<b>Sales and Marketing</b>	<b>Service</b>
<ul style="list-style-type: none"> <li>- Reduce procurement costs</li> <li>- Optimise supplier base</li> <li>- Increase service level to manufacturing</li> <li>- Reduce raw material levels</li> <li>- Reduce the level of customer returns</li> <li>- Reduce the cost of dealing with returns</li> <li>- Reduce contract initiation time</li> </ul>	<ul style="list-style-type: none"> <li>- Reduce finished goods inventory</li> <li>- Reduce forecast error</li> <li>- Increase inventory turns</li> <li>- Reduce overall operating costs</li> <li>- Reduce WIP inventory</li> <li>- Improve first pass quality</li> <li>- Increase productivity</li> <li>- Increase speed of prototyping</li> <li>- Reduce waste/excess losses</li> <li>- Reduce production lead time</li> </ul>	<ul style="list-style-type: none"> <li>- Increase customer service levels</li> <li>- Increase delivery efficiency</li> <li>- Reduce delivery costs</li> <li>- Reduce delivery breakages</li> <li>- Reduce level of delivery or installation queries</li> <li>- Increase accuracy of delivery information to the customer</li> <li>- Increase the accuracy of shipment tracking</li> </ul>	<ul style="list-style-type: none"> <li>- Increase sales of specific products to specific markets</li> <li>- Reduce costs of sales</li> <li>- Reduce cycle times for new product introduction</li> <li>- Maintain level of market share</li> <li>- Reduce marketing costs</li> <li>- Increase average value of sale transaction</li> <li>- Reduce the cost of order placement</li> <li>- Increase the level of product awareness among potential customers</li> <li>- Increase the level of market knowledge</li> <li>- Reduce debtor days</li> </ul>	<ul style="list-style-type: none"> <li>- Reduce the number of product queries</li> <li>- Reduce the number of complaints</li> <li>- Reduce the cost of handling complaints</li> <li>- Increase level of after sales service</li> <li>- Reduce overall service costs</li> <li>- Increase customer response time and accuracy in dealing with invoice queries</li> </ul>

An enterprise, particularly an SME, will have to choose a small subset of these objectives as it would be impossible and in many cases contradictory to attempt to achieve all.

Once the objectives have been detailed the organisation must have a suitable set of measurements by which they can track the anticipated changes. The measurability of an objective is one of its key criteria for choice. There is little value in choosing an objective that cannot be measured.

### **Derive Key performance indicators**

A strategic initiative cannot be considered fully complete until a measurement of its effect has been made. Once a mission statement has been formulated, the goals determined and the operational objectives have been detailed it is important that the organisation has a correct set of measurements by which they can track the anticipated changes.

Table 2. Partial table listing the relationship between objectives and KPIs

	Inventory Days - Finished Goods	Inventory Days - WIP	Inventory Days - Raw Material	Order fill rate	Percentage of defect free orders	Forecast Error	Raw material lead time	Production lead time	Total lead time	Cycle Time
<b>Inbound Logistics</b>										
Reduce procurement costs		X				X				
Optimise supplier base										
Increase service level to manufacturing		X			X	X				
Reduce raw material levels		X								
Reduce the level of customer returns				X						
Reduce the cost of dealing with returns										
Reduce contract initiation time										X
<b>Operations</b>										
Reduce finished goods inventory	X									
Reduce forecast error					X					
Increase inventory turns	X	X	X							
Reduce overall operating costs	X	X	X	X	X	X	X	X	X	
Reduce WIP inventory		X								
Improve first pass quality				X						
Increase speed of prototyping								X		X
Reduce waste/excess losses				X						
Reduce production lead time						X				
<b>Outbound Logistics</b>										
Increase customer service levels			X	X				X		

The operational objectives should be set out in the form of Key Performance Indicators (KPIs). KPIs can exist at each level of the organisational hierarchy as in figure 1. They become more tangible further down the hierarchy where operational data is structured and relatively easily accessible.

When measuring objectives KPIs may include, for example, the order fill rate, inventory turnover, inventory days on hand or forecast error. It may be an objective of the enterprise to achieve a level or a range of order fill rate within a specified length of time.

The authors have derived a set of KPIs in relation to the objectives listed in table 1. The matrix presented in table 2 is part of a larger table which shows how objectives may have a one-to-one or a one-to-many relationship with KPIs. The matrix serves to demonstrate how objectives can be easily translated into measurable indicators.

For example, from this table, the objective “Increase service level to manufacturing” is measured using the KPIs; “Inventory Days – Raw Material”, “Forecast Error” and “Raw material lead time”. The KPI measurements related to the chosen objectives are taken before, during and after the implementation of the solution. A comparison of these results provides an indication of the success of the project.

**Derive the strategic components required to meet the objectives**

In section 3.1.3 the authors explained how technology is now allowing enterprises to take a step-by-step approach to enterprise improvement. In this section a matrix, which uses the same set of objectives that derived the KPIs, is used to derive a set of strategic components.

In this matrix the strategic components are also subdivided into categories based on Porter’s value chain. Table 3 illustrates a partial view of the matrix:

Table 3. Partial table listing the relationship between objectives and strategic components

Objectives	Inbound Logistics	Online product news	Online tendering	Online price negotiation	Automatic purchasing	Automatic purchasing - VMI	Contracts, supplier database maintenance	Online returns handling	Operations	Online prototyping	Online technical support	Vendor collaborative support	Outbound Logistics	Online order tr	Online c
<b>Inbound Logistics</b>															
Reduce procurement costs		X	X	X	X										
Optimise supplier base		X	X	X		X									
Increase service level to manufacturing					X				X						
Reduce raw material levels					X										
Reduce the level of customer returns						X		X		X					
Reduce the cost of dealing with returns						X									
Reduce contract initiation time		X	X			X									
<b>Operations</b>															
Reduce finished goods inventory										X	X				
Reduce forecast error										X	X				
Increase inventory turns										X					
Reduce overall operating costs				X	X	X		X		X	X				
Reduce WIP inventory										X					
Improve first pass quality										X					
Increase speed of prototyping									X						
Reduce waste/excess losses										X					
Reduce production lead time										X					
<b>Outbound Logistics</b>															
Increase customer service levels		X				X		X		X	X		X	X	
Increase delivery efficiency															
Reduce delivery costs															
Reduce delivery breakages															
Reduce level of delivery or installation queries													X	X	

For example, if an enterprise decides that one of their objectives is to increase service levels to manufacturing then the matrix will recommend that they implement the following components: “Automatic purchasing – VMI” and “On-line prototyping”.

**Model the requirements based on previous partial models of the selected component**

In order to facilitate the most efficient path from objective selection through to component implementation it is preferable, if possible, to reuse models of components that have already been implemented in other enterprises. If a requirements model already exists then this can be used to build a new model faster. Shen et. al. (Shen, 2002) describe a web based model repository system with a database containing models of related implementations of e-business components. This methodology provides an input to the model repository tool proposed by Shen. If the model exists, even in partial form, in the repository then it can form a basis for the requirements definition of the component and its interactions with other existing enterprise elements. This speeds up the entire process significantly.

## Measurement and feedback

The next stages in the process, design specification and implementation follow on as normal from this point. At the point of implementation the KPIs that were derived earlier are used to measure the success of the component implementation. If the objectives achieved then a further new initiative may take place and new goals and objectives may be set.

Graphically the methodology is depicted in figure 4. The objectives are derived from the goals. These objectives are then “plugged into” the two matrices to produce the appropriate sets of KPIs and components. The components list is compared to the list of available relevant models in the model repository. The relevant existing models are used to derive new models quickly and this feeds into the design and implementation stages. When the component has been implemented the relevant KPIs are measured to assess the success of the implementation against the objectives.

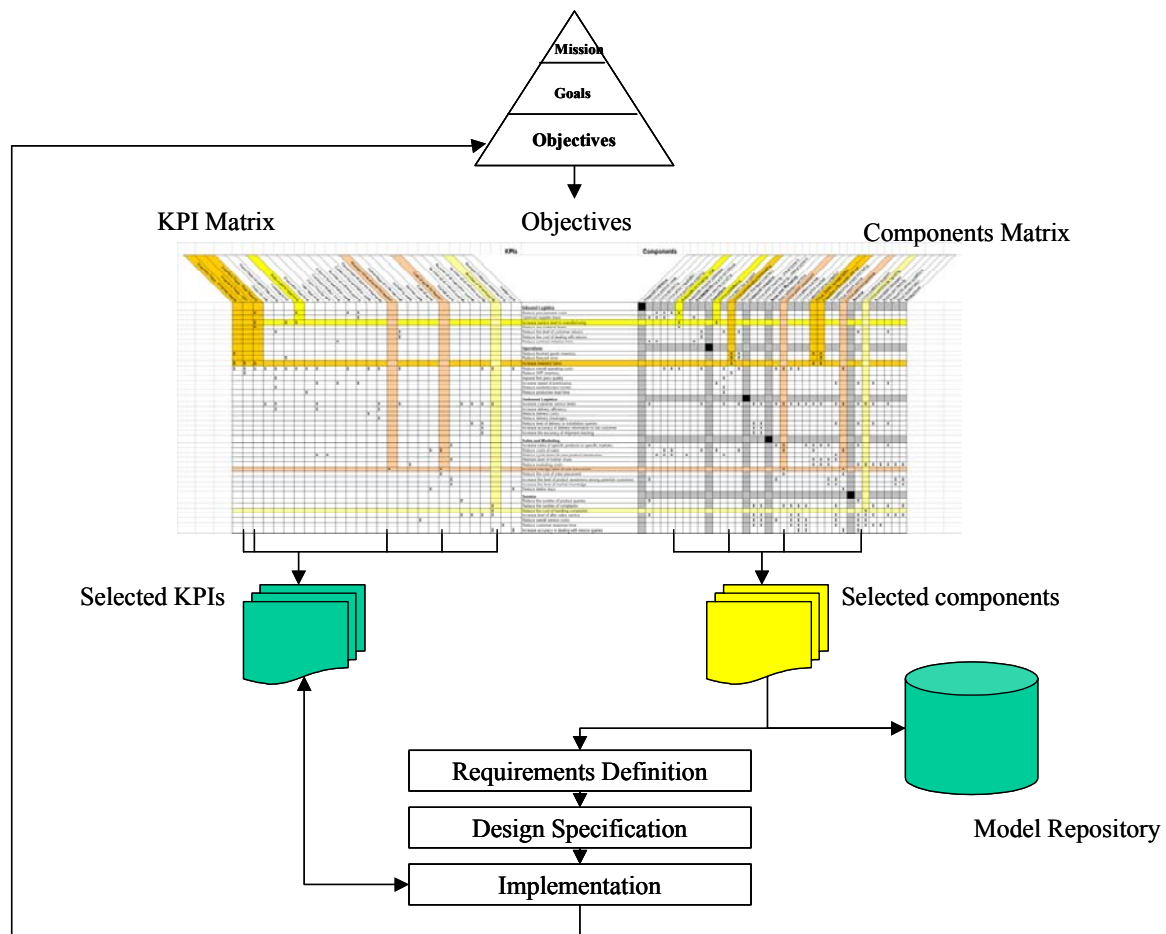


Figure 4. Graphical flow of methodology

## CASE STUDY

### The end user

The end user in this case study is an SME which produces spring water, flavoured water, re-hydration drinks and soft drinks and sells mainly to the UK and Irish markets. They have a lean management structure and because of this there is a large degree of overlap with regard to the tasks that are performed by staff members. They have a small number of large customers who account for more 80% of their business and a number of smaller local customers. They have recognised the vulnerability of their position within the market and have realised that in order to stay competitive they needed to review their overall business strategy.

### Defining the business mission, the goals and the objectives

In the second section the authors described how a business strategy translates into measurable operational objectives (see figure 1). In the section this concept is illustrated using a case study.

#### *Mission*

Part of the mission of this SME is to have the ability to deal with smaller customers in the same way as they currently deal with larger customers. They currently use Electronic Data Interchange (EDI) to transact business with large customers. They have predicted that if they had a similar functionality with smaller customers it would make this market more accessible and profitable.

#### *Tactical Goals*

This SME has succeeded in listing a number of products with various franchisees in Ireland. In total these products will be listed in approximately 1,600 outlets. Normally these listings would require them to employ a number of sales representative to service these customers, however they have made the franchisee aware of their intention to capture these orders electronically in the coming months. In the meantime they will service these accounts through a series of agents.

These agents have a minimum margin expectation of 30%, while sales representatives cost on average €51,000 per annum. The implementation of an alternative to using agents and sales representatives would yield a considerable and measurable cost saving to this company in servicing these customers.

#### *Operational Objectives*

Based on this strategic statement and the goals the management team at the end user site were able to expand on the objectives that needed to be met in order to achieve their overall aim.

Their objectives, in terms of the methodology described are as follows:

- *Inbound logistics*: Optimise Supplier Base
- *Operations*: Increase speed of prototyping
- *Outbound logistics*: Increase accuracy of delivery information to the customer

- *Sales & Marketing*: Increase sales of soft drinks to the small retail market, reduce cost of sales, increase market share in existing sectors, reduce cost of order placement, reduce debtor days
- *Service*: Increase accuracy in dealing with invoice queries.

This produced the matrix of KPIs and recommended components shown in figure 5. The KPIs that are selected are:

- Total lead-time
- Contract Initiation Time
- Number of active suppliers
- Cost of sales
- Cost of sales transaction
- Market share
- Number of delivery queries
- Number of complaints
- Debtor days

The components that were selected based on the objectives are:

- Inbound Logistics
  - Online tendering
- Operations
  - Online prototyping
- Outbound Logistics
  - Online order tracking - pre-shipment
- Sales and Marketing
  - Web catalogue service
  - Online order placement
  - Online price queries
  - Customer personalisation
  - Virtual Sales representative
  - Proactive virtual order planner
  - Targeted email direct marketing
  - Virtual expert advice
  - Online payment services
- Service
  - Online customer support

Some of the components that were derived from this process can be implemented inexpensively and quickly. Others are not so easily done. The test company had to make a choice based on their own resources of time and money as to which of the shortlist of components would be used. In the end they wanted an e-business tool that allows their customers to do the following on-line, without intervention from telesales operators:

- Take the order – input directly to order processing system
- Track the order – prior to shipment
- See sales history and calculate a re-order quantity
- See status of their account.

They also wanted the system to allow them to send details of promotions, account statements and payment reminders to its customers automatically. The methodology allowed the test

company to make a quick decision based on understandable business criteria. The choice of components reflected a combination of the best decision support information and their own knowledge of the available resources.

### **Establishing the end user requirements**

In order to establish a structured user requirement specification it is good practice to conduct an AS-IS analysis followed by a TO-BE design. The AS-IS analysis describes the system as it currently stands and provides a starting point and a basis for future process improvement. The TO-BE design typically requires much input from the management with regard to the types of improvements that they are trying to achieve.

Using the proposed methodology the process of TO-BE design was shortened considerably. The test company established their overall objectives and the transition into KPIs and components followed from these objectives in a transparent and automatic way.

The user requirements models were also generated quickly based on the availability of models that had already been created for the implementation of the components in other companies. The methodology provided a bridging mechanism which resulted in the creation of models using IDEF0, IDEF3 and DFD which reflected the mission, goals and objectives of the test company.



## CONCLUSIONS AND NEXT STEPS

Many existing processes and methodologies currently deal with the management of specific aspects of an enterprise. There are well-documented means of formulating strategies and goals. There are also proven methodologies for dealing with the transformation of requirements, through design specification to implementation. The authors have presented a methodology that acts as a bridging mechanism between these two areas.

Goals and objectives are translated into detailed user requirements through a series of simple steps using a set of translation matrices. The user requirements definition including the IDEF and DFD models provide the basis for a full-scale design and implementation of the selected components at the end user.

System architectures of enterprises are becoming increasingly component-based due to the recent developments in enterprise integration software methods and tools. Organisations wishing to assemble enterprise solutions can do so more readily provided they use common standards. In the case of inter-company web integration the XML standard is most noteworthy.

In this paper the authors have presented an approach for deriving user requirements and key performance indicators based on the business strategy of an enterprise and have shown how this approach fits into the overall development process. The issues related to devising a business strategy have been presented and the particular difficulties related to strategy development in the digital age are examined. Enterprise engineering is discussed as a means of realising a strategic business initiative. In the past it would have been very difficult to reengineer part of a business but the research has shown that advances in integration technology have made it possible to apply best of breed solutions to different areas and then join them together. This is of particular interest to SMEs with limited financial and technical resources available to them.

In conclusion, the authors have presented an approach that derives the measurable components required to realise a business strategy, and have demonstrated its use through an actual case study. The next steps may involve the creation of web-based software that can exploit the methodology to its full extent and make it available to the SMEs who would benefit from its use.

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## REFERENCES

- Aberdeen Group, Inc. 2001. Component-Based Architectures: Time to Migrate the Enterprise Application Portfolio. Boston, Massachusetts.
- Burgess, N., T. George, and R. Lawson. 2001. A Taxonomy of Operational Strategies and their Application in Fast Moving Consumer goods Sectors. in The Fourth SMESME International Conference.
- Frizelle, G.D. 2001. Business Strategy - do SMEs face special problems? in The Fourth SMESME International Conference.
- Hammer, M. and Champy, J. 1993. Reengineering the Corporation, London, HarperCollins
- Hammonds, K. 2001. Michael Porter's Big Ideas, in Fast Company: Learning.. Issue 44, p. 150.
- Higgins, P., Le Roy, P., Tierney, L. 1996. Manufacturing Planning and Control Beyond MRPII, London: Chapman & Hall
- Kalakota, R. and Robinson, M. 2001. E-business 2.0 : roadmap for success, in Addison-Wesley information technology series., Addison-Wesley: Boston, MA.
- Malhotra, Y. 2000. Knowledge Management for E-Business Performance: Advancing Information Strategy to "Internet Time". Information Strategy, the Executives Journal, 16(4): p. 5-16.
- McMahon, C. and Browne, J. 1993. CAD/CAM : from principles to practice., Reading, MA: Addison-Wesley Pub. Co.
- Mintzberg, H. 1989. Mintzberg on Management: Inside our strange world of organisations, , New York: Free Press
- Porter, M. E. 1985. Competitive Advantage: Creating and Sustaining Superior Performance, New York: The Free Press.
- Simple Object Access Protocol (SOAP) 1.1 2000 -< <http://www.w3.org/TR/SOAP/>> 12.12.2002.
- Schulte, R. 2001. Understanding the Convergence of B2B and Internal Application Integration: Questions and Answers.
- Shen, H, Chen, Y., Wall, B., Browne, J. 2002. Collaborative Enterprise Modelling Supported By A Web-Based Model Repository System, 1st CENNET Workshop, April 14-15, Beijing, China
- Shen, H., et al. 2003. Business Process Modelling for Enterprise Information System Analysis and User Requirements Gathering. Journal to be decided.
- Timmers, P. 1999. Electronic commerce: strategies and models for business-to-business trading. Wiley series in information systems., Chichester, UK New York: Wiley.
- Vernadat, F. 1996. Enterprise modeling and integration : principles and applications. 1st ed., London ; New York: Chapman & Hall.
- Definition of an SME. 2002. <<http://europa.eu.int/ISPO/ecommerce/sme/definition.html>>, 12.12.2002
- Quality Function Deployment. 2002. <<http://www.qfdi.org/>> 12.12.2002