The McGraw-Hill Companies

ERP *in Practice*

ERP Strategies for Steering Organizational Competence and Competitive Advantage

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To

My Parents
Saradambal and Vamanan
and their grandchildren

Contents

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Jagan Nathan Vaman

Preface

The technical complexity and cost of implementing integrated Enterprise Resource Planning (ERP) systems are well known. Yet, despite the difficulties, companies of all sizes are choosing to adopt them. The ERP software system, which serves as the backbone of an organization's information needs, offers unrivaled improvements in business processes and a great opportunity for true connectivity and standardization. Information can be shared internally and externally in real-time; supply and demand can be perfectly coordinated; and business managers can understand every aspect of a company's operations and performance with a click of the mouse. However, achieving these benefits is hardly a matter of buying or installing an ERP software with hired consultants—it is more a matter of choosing the right ERP solution; finding the process and functionality fit; and executing ERP to reap the benefits of best practices.

This is not just another ERP book. It is a practitioner's manual with concepts, principles, practices and programs that are 'in practice'. Such ERP practices are presented in the context of making your business processes and ERP systems gain a competitive edge. Each part offers a useful framework, models, concepts and ERP specific knowledge that can be applied in real-life situations. They gently lead to complex ERP scenarios with the aid of case studies, and provide pointers to many references, websites and resources in case you want more depth of the subject under discussion. Besides these, there is a ready mix of information that you can start using right away after reading *ERP in Practice*.

This book will show that to achieve the business benefits of ERP, companies must treat their implementations as a business initiative, not a technical one. Our main research finding is that this means setting up clearly defined objectives at the beginning and monitoring their achievement throughout the life of the ERP project. It means putting business executives in charge — not technical managers — who can make the organizational changes necessary to achieve benefits. And like all business projects, the responsibility of achieving the set objectives should belong to every manager, not only those involved in the ERP project. Part 1, ERP overview, presents the basics of ERP, fundamental concepts and how ERP evolved to a comprehensive enterprise solution that includes CRM, SCM systems.

ERP systems are unlike any other software systems. They don't merely change the look and feel of an employee's computer screens, they reinvent the way a company and its people operate. Therefore, as an organization changes its information systems, it must also make simultaneous changes in its business processes and its business strategy. We will describe these changes in detail with extensive examples of real organizations that have been successful at managing their implementations including Microsoft, Siemens, Compaq-HP and many others. From these case studies, you can see how companies can balance getting the ERP system in from a technology standpoint and getting benefits and ROI from it from a business standpoint.

We are presenting both the opportunities and perils of ERP system, and there are no right choices or magic formulae of success for every company. The ERP selection process is key to success and the strategy and actions required for choosing the right ERP are presented in Part 2, ERP Selection. This is an extensive discussion on ERP selection process and we draw your attention to the ideas discussed in this part. We provide a set of guidelines to help managers evaluate the benefits and risks for their organizations, as we know from experience many ERPs failed at the beginning, due to wrong selection and not at the end due to faulty execution.

A good decision executed quickly beats a brilliant decision implemented slowly. ERP projects may take years but process and

technology decisions while executing an ERP project need to be made quickly to reap the benefits fast. The true measure of success of an ERP system is its effective execution. Effective execution is not just on time—on budget—but effective in delivering desired results including ROI. Part 3, ERP Execution, discusses key strategies relating to ERP execution and how developing key capabilities to install, customize and develop and implement will determine an organization's competitive advantage.

For those who decide to forge ahead with an implementation, or are currently living with one, there are many discussion chapters of how they can move beyond using ERP in Part 4, ERP Future Directions. Companies that have already completed their implementations could use the ideas in the book to achieve greater value from their ERP systems adopting ERP portals, service oriented architecture and other new ERP extensions.

Given the business changes, the high cost of ERP implementations, and the importance of the projects to the long-term success of the organization, CEOs and business managers cannot afford to delegate ERP entirely to CIO, technology staff and IT departments.

This book is for CEOs, CIOs, CFOs, business managers and technical managers, IT and ERP professionals or just anyone interested in ERP systems and business process management. You will be able to apply the practical ideas, frameworks and models in ERP driven environments. Read on and enjoy *ERP in Practice*.

Jagan Nathan Vaman

PART 1

ERP Overview

CHAPTER 1

ERP Overview—What is so Revolutionary about ERP?

"In a time of drastic change it is the learners who inherit the future. The learned usually find themselves equipped to live in a world that doesn't exist."

—Eric Hoffer

ERP (Enterprise Resource Planning) is a set of applications for core business operations and back-office management that was originally developed for manufacturing companies. Introduction of an ERP system involves the creation of a working information system from standard software package. ERP is often misunderstood and confused with software tools and implementation—it is actually a management system for continuous improvement.

The last half of the 21st century has been heralded 'The ERP Era' and 'The Enterprise Resource Planning revolution' with enterprise systems implemented in most *Fortune* 500 companies. Business leaders were persuaded by the concept of an emerging 'global marketplace' and were

Software in Aircrafts

As Boeing Computer Services Head John Warner announced at a Boston conference, the Boeing 777 aircraft is a $4 billion flying machine with a highly complex design involving three million parts flying in close formation. Once the plane is airborne, four million lines of error-free code run it. The Boeing 777 is a big collection of flying software with lots of hardware.

Software in Cars

Software is also driving cars. For example, the BMW launched an international advertising campaign in 1998 that showed an Apollo 11 rocket blasting into the sky. The byline read, 'When you start up a BMW 7 Series, you activate 20 MBs of computing power. That is more than on Apollo 11's mission to the moon.'

Software in Enterprises

SAP Claims—best-run companies run SAP! Oracle and PeopleSoft have their own catchy taglines to say that their ERP has helped them to steer ahead in terms of competence and competitive advantage to achieve growth and success. ERP runs in big organizations, such as Alcoa, Honeywell, Siemens, Microsoft, Johnson & Johnson, Anheuser-Busch, Lockheed Martin, Reebok, Adidas, Procter & Gamble, Rolls Royce, Honda, Mercedes, Bosch, Lufthansa, AlliedSignal, Deutsche Bank, IBM, and Hewlett-Packard.

enamored with the technology's promise to streamline organizational activities, eliminate duplication of effort, and data and coordinate business operations across geographically dispersed locations according to Davenport—a leading authority on Enterprise Software. ERP enables looking at an organization from a process perspective that provides a much more dynamic view than a departmental or functional perspective.

Increasingly, global and local organizations are opting for standard products rather than building customized systems within their local IT departments. During implementation and use, organizations are involved in fitting their local needs to a global package and vice versa. Thus ERP

environment differs from traditional software implementation, both because of the nature of the Information Systems (IS) development activities, and the partnerships with vendors and management consultants that accompany these initiatives.

As the business environment is getting more and more competitive, companies frequently resort to IT to improve their bottom line or even to create competitive advantage. One of the broadly adopted technologies is the ERP system that promises to integrate various divisions and functions within an organization, creating a cohesive information system of the business. The integrated-process framework provided by ERP enables standardization, visibility, traceability, and controllability over the business.

ERP applies to a wide variety of businesses, utilities and government departments with many add-ons such as Customer-Relationship Management (CRM), Supply Chain Management (SCM) that are called ERP extensions or ERP II by the global research organization Gartner.

ERP systems, such as SAP® R/3®, Oracle ® and PeopleSoft® (now part of Oracle), are pervasive enterprise-wide computing systems in large and medium size organizations across the globe. An ERP system is a business software system that allows an organization to:

- Automate and integrate the major part of its business processes
- Share common data, procedures and practices across the entire enterprise
- Produce, share and access information in a real-time environment
- Provide ability to analyze data real-time and carry out what-if analysis, etc. and support business planning and reporting

A number of immediate problems such as Y2K and disparate or poor systems were addressed by implementing an ERP system. Companies have now moved beyond this initial implementation and are looking for ways to optimize their investment. This includes extending the implemented functionality of their ERP system and implementing new components such as data warehousing, CRM, advanced planning and optimization techniques in production.

ERP Provides Single Source of Truth

You compete in a real-time world. But the biggest obstacle stopping you from becoming one of the leading players in your industry is your lack of access to real-time business intelligence.

Information Matters: Therefore ERP Matters

Without real-time information about your customers, your suppliers, your competition, and changes in market direction, you simply cannot thrive in an increasingly winner-take-all world.

With renewed market emphasis on regulatory compliance and operational transparency, information has become more than just an issue of 'keeping the house in order'. It is increasingly the basis on which companies are valued, supply chain partnerships are determined, and a key criterion for assessing quality management.

Unfortunately, you will never get the information you need when your data resides in disparate systems cobbled together over the years. As many executives have discovered, such fragmentation leads to duplication, confusion and an escalation in costs.

ERP is the alternative in such a situation. This is a highly unified, consolidated and reliable network of business systems, built on a single integrated platform. It is capable of delivering accurate and actionable information thereby allowing executives to make informed decisions. This is called real-time business intelligence.

From manufacturing, high-tech and financial services to retail and government, leading enterprises are reviewing their technology processes and strategies, empowering users with the ability to retrieve and interpret vast amounts of data and make informed decisions. They unlock information hidden across systems—turning data into knowledge and knowledge into profits.

Basics of ERP

Almost any discussion on ERP starts with the Materials Requirement Planning (MRP I) and Manufacturing Resource Planning (MRP II) systems of the 1970s and the 1980s. In the past, the manufacturing environment kept the 'Finished Product' as their main focus. Organizations generally asked the following questions: How many items do I need? How long does it take to produce that number? How can I make more items using the same capacity? What are the capacity constraints, bottlenecks and the critical path? These, of course, were valid questions, but as manufacturing evolved over time, the number of difficult questions increased. Such questions largely focused on the areas of component procurement for the finished product and on storing the material necessary to make the finished product. Organizations were trying to understand both—the number of manufacturing totals and the path to the finished product.

MRP II had a great focus on the planning aspect of this process. These systems integrated capacity, machine lead-time, routing, design engineering and management, costs, and long range planning of the enterprise into the MRP calculation. Many organizations that implemented this approach instituted mechanisms to correlate the planning and forecasting process with the actual production numbers. This allowed the organization to achieve a higher level of overall efficiency. The fundamental issue was that while the organization had a better handle on the manufacturing aspect, the other components of business like finance, sales, marketing, customer satisfaction, and distribution were not integrated with it. The production efficiency thus achieved was neutralized by stockpiles, and insufficient demand and sales. This was because market demand did not drive production orders. This market-pull effect on production was not available to companies due to lack of an integrated enterprise-wide computing system. This lead to the birth of a new breed of systems called ERP systems.

ERP is a massive software engine that seeks to provide a single seamless interface to all departments, systems, and existing data within an organization. This helps each department understand how it fits within the organization's macrostructure and how it impacts that macrostructure. Such understanding is crucial in facilitating enhanced

communication between departments, better knowledge management, and improved processes. Such enhancement is the foundation for fundamental business change. To achieve success, ERP systems are to be looked at from a dual perspective-macrolevel structure perspectives and microlevel processes—that impact every single activity performed in the organization.

Although there is a huge focus on technological aspects of an ERP deployment, there must be an equal focus on changing the way an organization functions. Deploying ERP for the sake of ERP can be dangerous. ERP is not simply about reengineering systems; it is about reengineering the way organizations do business.

ERP is the next jump in the evolution of MRP II. From a business perspective, ERP has expanded from coordination of manufacturing processes to the integration of enterprise-wide backend processes. From a technological aspect, ERP has evolved from legacy implementation to a more flexible tiered client-server architecture.

Table 1.1 summarizes the evolution of ERP from the 1960s to the1990s.

Table 1.1 Evolution of ERP from the 1960s–90s

Timeline	System	Description
1960s	Inventory Management and Control	This is the combination of IT and business process of maintaining the appropriate level of stock in a warehouse. The activities include identifying inventory requirements, setting targets, providing replenishment techniques and options, monitoring item usages, reconciling inventory balances, and reporting its status.
1970s	MRP I	MRP utilizes software applications for scheduling production processes. MRP generates schedules for the operations and raw material purchases based on the production requirements of finished goods, the structure of the production system, the current inventories levels and the lot-sizing procedure for each operation.

(*Contd*)

(*Contd*)

1980s	MRP II	MRP II utilizes software applications for coordinating manufacturing processes, from product planning, parts purchasing, inventory control to product distribution.
1990s	ERP	ERP uses multi-module application software for improving the performance of internal business processes. An ERP system often integrates business activities across functional departments, from product planning, parts purchasing, inventory control, product distribution, fulfilment, to order tracking. ERP software systems may include application modules for supporting marketing, finance, accounting, logistics and human resources departments.

Features of ERP for Manufacturing

ERP is the next evolutionary stage after MRP I and MRP II. The design and implementation of ERP software in the manufacturing sector is more mature than ERP software for other industries. ERP software for manufacturing has built-in workflow processes that is tailored specifically for manufacturers to manage the entire lifecycle of the orders: from raw material procurement, production planning, manufacturing, marketing, sales, and service to financial reconciliation. Real-time and paperless manufacturing processes are a reality in a few well established manufacturers. Enterprise can maximize utilization of resources, and minimize the total costs by streamlining and optimizing the order cycle and manufacturing process.

Vendors of ERP Software for Manufacturing

ERP for manufacturing captures a large percentage of the market. All major ERP vendors (SAP, Oracle, Microsoft and PeopleSoft) offer ERP

solutions for manufacturing industry by expanding production planning and inventory-control modules of their software systems. Small vendors targeting the niche market, such as Epicor, Shop-Tech and Ramco Marshall (Virtual Works), offer ERP software for Make-to-Order and Mixed-Mode Manufacturing companies. Their out-of-the-box solutions support built-in workflow processes that enable manufacturers to manage the entire order and manufacturing cycle. Large organizations prefer ERP from major ERP vendors and invest significantly in customization. Small to medium-sized manufacturing companies can benefit from niche vendors for competitive pricing and special features, if the products from niche vendors meet their needs.

Implementation of ERP for Manufacturing

Many ERP vendors and ERP consulting firms have accumulated vast knowledge of implementing ERP software for manufacturing. Implementation of this system involves less customization as the packaged software is designed specifically for this industry. The workflow process with respect to manufacturing has been built into the software system. The chances of successful implementation in manufacturing industry is higher than those of other industries. The integration with legacy applications existing old non integrated RDBMS (Relational Data Base Management Systems) running on mainframe/ mini computers remains a challenge for both vendors and buyers of ERP software for manufacturing.

The Modular Nature

ERP software is made up of many software modules. Each module mimics a major functional area of an organization. Common modules include those for product planning, parts and material purchasing, inventory-control, product distribution, order-tracking, finance, accounting, sales and logistics, and HR. Organizations are often selective about

implementing modules that are both economically and technically feasible, without compromising core ERP functionality in production, finance and sales and logistics.

ERP Production Planning Module

In the process of evolution from MRP II to ERP, both vendors and consulting firms have accumulated vast knowledge coupled with robust software for implementing production-planning module. Production-planning optimizes the utilization of parts, components and material resources using historical production data and sales forecasting using MRP strategies, demand-driven production, etc. This boosts the manufacturing capacity.

ERP Purchasing Module

Purchase module streamlines procurement of raw materials. It automates the processes of identifying potential suppliers, negotiating price, awarding purchase order to the vendor, and also the billing processes. This module is tightly integrated with inventory control, production-planning and often with SCM/SRM software.

ERP Inventory Control Module

Inventory module facilitates the processes in maintaining an appropriate level of stock in the warehouse. The activities include identifying inventory requirements, setting targets, providing replenishment techniques and options, monitoring item usages, reconciling inventory balances, and reporting its status. Integration of this module with sales, purchase and finance modules allows ERP systems to generate vigilant reports at the executive level.

ERP Sales Module

Revenues from sales are the lifeline for commercial organizations. Sales module implements functions of order placement, order scheduling, shipping and invoicing. This module is closely integrated with

organizations' e-commerce websites. Many ERP vendors offer online web store, sales operations planning, sales forecasting as part of the sales module.

ERP Marketing Module

ERP marketing module supports lead generation, offer making, direct mailing campaign, sales information system, new product campaigns and more.

ERP Financial Module

The financial*Fortune* is the core of many ERP software systems. It can gather financial data from various functional departments, and generate valuable reports such as balance sheet, general ledger, trail balance, and quarterly financial statements, and facilitates business planning and cost accounting. Many ERPs are compliant with country specific accounting standards such as GAAP, US IFRS, etc.

ERP HR Module

Human Resources (HR) module is another widely implemented ERP module. The HR module streamlines the management of human resources and human capital by routinely maintaining a complete employee database of contact information, salary details, attendance, performance evaluation and promotion of all employees. In its advanced version it is integrated with knowledge management systems to optimally utilize the expertise of all employees.

ERP: Real Benefits

Let's look at the classic example: order fulfilment. In a traditional environment, the customer would place an order, which would be entered by the customer representative. The output immediately reaches the warehouse where the inventory would be set aside (if available) for the customer. Then, the information from the warehouse would be re-entered

into a shipping system for delivery, and the inventory system would have to be updated, so that the output would be accurate when it was the input into the manufacturing system. Next, the information would be entered into a billing system, which might or might not tie directly into corporate financial systems. Throughout this whole process, the sales and marketing departments are trying to determine forecasts, funnel management, and determine future marketing plans. In the meantime, when the customer called back to check the status, the representative could not access the appropriate systems to answer the customer accurately. Needless to say, the customer was frustrated. Such frustration leads to unsatisfied customers, which leads to lower sales.

Now imagine that the above example takes place in an organization with a successful ERP system. ERP sits between all the systems and users, regardless of where they are in the pipeline. It knows all the different data collection points, and it must interface with the different formats of the particular data (from Legacy to Windows, to proprietary formats). It also intelligently routes the order to an appropriate department at an appropriate time. This dramatically reduces the human error while entering the data more frequently. ERP also undertakes data formatting so that each department can perform its required function. For example, customer representatives can see everything associated with the order to fully satisfy the customer.

While the benefits of ERP are impressive, deploying an ERP system is a major undertaking for any organization. The surface level reasoning of better order tracking and management aside, some of the real issues that occur during an ERP deployment relate to people and job function. Changing the attitude of employees is critical to changing the business process model. Corporate goals must be communicated, socialized, and supported. Otherwise, the organization will spend millions of dollars in time, software, and hardware with negligible results.

Generally, the goals revolve around integrating information, perhaps financial or customer-related. Sometimes the goals reflect the desire to manufacture more efficiently. At any rate, many vendors have specialized their ERP offerings for a particular vertical market, and most have modularized their offerings, so that customers do not have to endure the headache of an all-or-nothing approach.

Several companies have implemented ERP, with varying costs. In 2000 Meta Group reported that the Total Cost of Ownership (TCO) for an average ERP implementation among 63 companies ranged from $ 400,000 to $ 300 million. Although the range was wide, the bottom line is that the costs can be extremely high. Meta Group also estimates that the 'heads-down' user (i.e. customer representatives who can access all details regarding an order) costs around $ 53,000. Additionally, implementation timeframes vary widely, from eight months to several years. However, even with high cost and long implementation time frames, companies are seeing the benefits of ERP. Jeri Dunn of Nestle in a CIO interview said its annual savings are approximately $ 325 million, and the implementation is not even complete. Diana Near from *The Principal Financial Group* reported to *CNN.com,* that it is saving $ 165,000 alone in salary for reduced staff requirements.

Ultimately, the goal of ERP is to change current ineffective business processes. Despite all of the well-publicized failures, companies are still spending money in this environment. Why? Companies that perform better, know their business better, and react more effectively are in a better position to survive.

ERP driven by Management Consultants

International management consultancies such as Accenture, KPMG, PWC, E&Y, Deloitte, were 'driving forces' behind the proliferation of the trend, as they worked with software vendors to sell ERP as an appropriate 'solution' for a variety of vertical markets such as discrete manufacturing, retail, oil and gas, chemical and media, etc. Fuelled by media coverage of the feared Y2K millennium bug, the trend increased as a critical mass of organizations, from a variety of industries, jumped on the ERP bandwagon. By early 2000, ERP-related sales generated $ 40 billion in revenue, split between software vendors and consulting firms (Willcocks and Sykes, 2000), and ERP practitioners such as Davenport claimed enterprise systems were a prerequisite for business success in the 21st century. The current generation of ERP systems evolved from

technology designed specifically for the manufacturing industry and is still embedded with a template of 'best business practices' based on a 'traditional, hierarchical and functional view of organizations', limiting the extent to which the technology can be customized to meet local organizational needs. The integrated, 'whole-house' view underpinning ERP technology tries to force decentralized and autonomous departments into a standardized template. This becomes more complex as companies need to change business processes and systems while keeping their organization running. It's like changing the engines of an aircraft whilst on flight or performing a 'Beating Heart' surgery. You cannot afford to shut down the business for the sake of implementing an ERP system.

The potential benefits of ERP systems have been espoused by many, especially the ERP vendors. To many companies around the world the realization of these benefits is paramount and should greatly outweigh any costs associated with the ERP system implementat*Fortune*their companies.

ERP Synergy Effect

ERP systems comprises software, business processes, users and hardware. These are the common components of the Management Information Systems (MIS). An ERP system is more than sum of its parts or components. Those components interact together to achieve a common goal—to streamline and improve organizations' business processes. The synergy effect of an ERP is significant.

CRM and SCM are two other categories of enterprise software that are widely implemented in Global corporations. While the primary goal of ERP is to improve and streamline internal business processes, CRM attempts to enhance the relationship with customers and SCM aims to facilitate the collaboration between organization with its suppliers, manufacturers, distributors and partners.

The Way ERP Works

Before ERP systems were developed, an organization was typically set

up around functions or departments (e.g. sales, purchasing, inventory and finance), and not by business processes (e.g. purchase to pay, order to cash). Functions of one department were independent of the rest. Each function may have had an individual application system or a number of systems to support it, with or without interfaces among the systems. This approach resulted in time delays, additional cost, need for reconciliation and data redundancy. For example, before the widespread use of ERPs, it was common for purchase orders (PO) to be approved when generated. When the invoice arrived, the PO was either printed out again or retrieved from filing, and then stapled to the invoice. The invoice was then approved for payment. The documents may have been scrutinized once again and approved during check payment.

Many non-ERP or traditional systems also suffer from an inherent design problem. Typically, they are designed around disparate and independent modules that transmit transaction data among themselves by means of interfaces, where the information normally is summarized (as a total or balance) in nature. In such cases further details of such transaction are often difficult to ascertain, unlike the ability to drill down as provided by the ERP systems.

The ERP systems have business process as its focus. They grew out of the integration of separate MRP systems (used to integrate material requirements to production, demand and capacity) and financial accounting systems in manufacturing organizations. The relational database tables are designed around a complete set of core functions for an enterprise rather than disparate modules that merely pass transaction data from one module to another. In particular, with the SAP R/3 software, the financial accounting and controlling (or Management Reporting) modules are tightly integrated into the logical chain that begins with purchasing, and ends in sales and distribution. If configured appropriately, every business transaction is recorded in this module automatically. For example, the purchase of inventory in the SAP R/3 software is illustrated with the following example.

- A purchase requisition in the Materials Management (MM) module creates a commitment in the Controlling Module (CO). This purchase requisition can also be evaluated in the controlling component.

- The placement of the purchase order (MM module) will then confirm the commitment in the CO and Cash Management (CM) modules simultaneously.
- Entering the receipt of goods ordered in MM will generate an accounting document in Financial Accounting (FI), General Ledger and CO. The receipt will also update the material masters (Stock Records) in MM.
- Receipt of the invoice generates an accounting document in FI accounts, also updating controlling and cash management.

Summary

Building ERP is a business initiative that serves the needs of people in finance, in human resources and in warehouse. Each of these departments typically has its own computer system optimized for the specifications of the department. But ERP combines all of them into a single, integrated software system that runs on a single database so that the various departments can share information more easily and communicate with each other. This kind of integrated approach can have a tremendous payback only if companies install the ERP software correctly.

ERP vanquishes the old stand-alone computer systems in finance, HR, manufacturing and the warehouse, and replaces them with a single unified software program divided into software modules that roughly approximate the old systems. The departments do get their own software, except that now the software is linked together. This means that someone in finance can look into the warehouse software to see if an order has been shipped.

Re-engineering of Business Processes

We can classify organizational processes into three levels—**strategic planning, management control and operational control**. The driving force behind the acceptance of ERP was to streamline and automate enterprise-wide resource planning at the level of strategic planning. In reality, much of ERP success has been in facilitating operational

coordination across departments. The success of ERP at strategic planning, management control calls for the integration of ERP with other enterprise applications and demand long term management commitment.

ERP Users

Following this classification of organizational processes, workers can be classified into:

- Those who execute strategic planning
- Those who perform managerial control
- Those who are in charge of operational control

Even though ERP applications have been mostly beneficial to the operational control, the users of ERP system include workers from all levels of an organization.

Operating Systems for ERP

ERP software runs on various operating systems and hardware, from UNIX, Linux, and Windows to mainframe. Since one organization may acquire ERP and other enterprise software from many different vendors, the requirements for running ERP applications are common—security, stability, scalability and open standards.

The Boundary of an ERP System

The boundary of an ERP system is usually at the end of all internal processes but that depends on the organization that implements the ERP system. An ERP application with CRM and SCM will have the boundary of SRMs and e-commerce systems extending to suppliers, distributors, partners and customers. In practice, however, many ERP implementations involve the integration of ERP with external information systems such as an interface with bank for payments, interface with a web store, etc.

Why ERP Systems Fail?

We have identified the four components of an ERP System:

- ERP software
- Business Processes supporting ERP software
- Users ERP systems
- Hardware and operating systems that run ERP applications

The failure in one or more of these four components cause the failure of an ERP project. The failure in hardware is easier to identify and to fix than those in software. We will analyze the failures in ERP software implementation.

Failure of ERP Implementation

Module-based ERP software is the core of ERP systems. Most ERP projects involve a significant amount of customization. Packaged ERP software modules have built-in functionality that work in a standard and simplified enterprise environment. However, every organization is unique in data requirements and business processes. It is the customization that transforms the packaged ERP software into the one that meets organizations' business processes and operations. Long and expensive customization efforts often result in the pass of release deadline and budget overrun. Customization that is made without smart business process reengineering makes the software more fragile and harder to maintain, when it finally goes to production. Major changes may be required in the later stage of the implementation as a result of incomplete requirement and power struggle within organizations. Many ERP vendors come up with new releases claiming enhanced functionality and features forcing customers to upgrade. This will result in additional customization. While smart customization is very essential to differentiate it is prudent to keep them under control.

Failure of Accommodating Processes

Business processes fall into three levels—strategic planning, management and operational control. Organizations continuously realign their

business processes at all levels in response to the ever-changing market environment. Many ERP systems are not flexible enough to accommodate the quick evolution in business processes. The ERP system that worked well last year may necessarily need a major overhaul or an upgradation.

Failure of User Acceptance

In an organization employees at all levels are the users of ERP systems. As part of the initial goal ERP projects usually modify the company's business processes that create extra workload for employees, who use them initially. They don't think that the workflows embedded in the software are better than the ones they currently use. Ongoing end-user involvement and training eases the difficulty in the organization's adaptation to new systems and processes.

ERP and Competitiveness

An insight into the ERP Transformation Programs reveal that ERP is the engine that facilitates change and helps drive transformation in many organizations.

Researchers and analysts have identified a number of stages associated with the life cycle of ERP implementations.

- In the first stage 'first wave' companies have implemented the ERP core functionality, in response to a number of pressing business needs. For many of these companies, the initial ERP implementation has reached a level of maturity whereby the initial benefits are attained.
- The next phase, 'second wave', of ERP implementation is characterized by the move to 'fine tune' and extend their ERP to get better ROI—Return On Investments. This optimization and the focus on Continuous Business Improvement (CBI) has become the priority for many ERP-implemented customers. This focus is not limited to any specific ERP package such as SAP, Oracle E Business Suite or PeopleSoft or isolated to any specific geography. One of the identified core issues in IT is optimizing enterprise-wide ERP

systems. This ERP optimization has gained increasing prominence with the downturn in economy, the move to e-business and the subsequent impact on companies.

The challenges while trying to establish baseline ERP requirements in order to reach the benefits of business improvement processes through their ERP system is more of an evolutionary process than a revolutionary one.

Shortened time cycles in organizations—whether in development, production or sales processes—accompanied by rapid developments in information and communications technology create market dynamics which influence the speed with which decisions have to be made as well as the extent of their effect. These dynamics are further intensified by the reduction in geographical distances and borders resulting from internationalization and globalization—and consequently, by optimized logistics. The growing expectations of customers, employees and shareholders lead to greater pressure and new challenges for companies. In short: today organizations have to react significantly faster to significantly greater changes in their situation, if they want to remain successful in their marketplace. This need for constant transformation in terms of a forward-looking adaptation to changes in environment has led to rapid ERP adoption. This has had an effect on:

- Strategies, e.g. concerning changes in customer requirements, internationalization or a new concentration on core business
- Human, technological resources
- Organizational structures and processes
- Culture

All listed aspects are interlinked and affect each other. The relationships between them are also subject to change: whereby, for example, the ERP technology that was used for support strategies, can today set a major change process into action in its own right because of the maturity of vertical industry-specific ERP solutions. The industry type can range from retail, manufacturing, banking, utilities, oil and gas, to healthcare.

Despite the complex nature of the subject of ERP introduction and organizational transformation the most identified four critical factors for success and target-oriented change are:

- Ability to plan and execute
- Leadership
- Culture, value, objective and vision
- Soft factors—the people doing it

The biggest difficulty in planning and implementing of an ERP system is bringing a change in attitude. We know that—'When the winds of change blow, some build storm protection, others windmills'. In this context, we can say—when the winds of change blow, some build their own IT applications, others, ERP systems. The logic is quite simple—ERP brings a unified organizational transformation without having to re-invent the wheel.

In short the following are some practical insights that demystify ERP:

- There are different systems in a large company's 'back office', including planning, manufacturing, distribution, shipping, and accounting. ERP is an IT-enabled system that integrates all of these functions into a single system, designed to serve the needs of all the different departments.
- Although ERP does incorporate several software applications, it is more of a methodology than a piece of software, packaged together under a single, integrated interface.
- An ERP system spans multiple departments in a corporation, and in some cases, an ERP will also transcend corporate boundary to incorporate systems of partners and suppliers as well, to bring in additional functions like SCM & Supplier Relationship Management (SRM).
- Because it is so vast and all-encompassing, the ERP system goes far beyond from being just a simple piece of software. Each implementation is unique and is designed to correspond to the implementer's various business processes.
- An ERP implementation can cost millions of dollars to create and may take several years to complete.
- An ERP system is likely to correspond to the company's largest investment in IT therefore some companies prefer to implement ERP in a more incremental fashion, rather than all at once. Some ERP vendors provide modular software units together with a unified interface to allow this gradual approach.

- Regardless of how a company approaches it, ERP is sure to bring significant changes to how a company does business. It tinkers with the workflows, and alters long-standing processes. Companies often meet with resistance on the part of employees who are reluctant to let go of their proven methods. Since ERP makes such radical changes to business processes, employees may also fear for their jobs. It's not unusual for job descriptions to change or be eliminated altogether.
- However, once implemented the ERP system brings tremendous advantages. Because all systems are joined together and all departments can share information more easily. The workflow that takes place between departments can become much more automated, and ultimately, customers are better served because individuals using the customer-facing applications will have access to every bit of information regarding each relevant process. For example, someone in sales would easily be able to log-in to a single system to determine the status of a customer order that is still in manufacturing. All this comes at a cost though; training costs are high because employees must not only learn how to use the new software, they must also learn new processes.
- There are many reasons a company undertakes an ERP implementation. The ERP system integrates information, such as order information and financial data. It can speed up the manufacturing process by automating processes and workflow, and as a result, it also reduces the need to carry large inventories. Although the up-front costs may be enough to give the CFO nightmares, in the end, if implemented correctly, the rewards will give the company implementing the system a major competitive edge.

ERP Process Innovation

ERP is an enabler of process innovation. An important measure of the process is customer satisfaction with the output. Process innovation combines a structure for doing work with an orientation to visible and

dramatic results. Selecting processes for innovation is a critical exercise and selecting processes for redesign is a much more complex exercise. An organization must understand the level of change and upheaval it can endure and must use that knowledge to determine how many processes it can successfully innovate.

ERP, which is a part of IT, is an enabler of process innovation. Identifying enablers of process innovation is the first step in this direction. At some early point, in a process-innovation initiative, specific enablers must be identified. A process designer pursuing innovation should consider all the tools that can help to shape or enable the process. Although the present capabilities are most important to a process team, it is helpful to make team members aware of medium-term future capabilities of an application. That is when an empowered team begins to innovate. During this process-innovation journey, often, information gathered for one process proves to be useful in another. The event-driven process chains need to be mapped to ERP to start the process mapping to mimic real-business processes in the ERP system.

A key aspect of information management in ERP is the structure of the organizational units that have responsibility for it. A prototyping approach is generally more appropriate than a life cycle model for implementing process innovations in an ERP system. Moreover, ERP implementers must discover the benefits of process management themselves.

Creating a Process Vision

A process vision should be determined on the basis of what is necessary from a business standpoint, rather than what seems reasonable or accomplishable.

Understanding and Improving Processes

There are at least two reasons to document existing processes before proceeding with innovation. One is to gain a grasp of the number of processes and two, to find out why they exist. However when selection of a process is based on a limited definition of what a process is or on the

match between a process and the availability of familiar tools to improve it, the company runs the risk of investing in the wrong processes. Hence the following points are worth considering:

- Designing and Implementing the New Process and Organization—Only when firms adopt more process-based organizational structures, processes will be managed in congruence with other aspects of the organization.
- Understanding process innovation and the organizational change it occasions are equivalent to radical surgery.
- Process mapping is the critical link that your reengineering team can apply to better understand and significantly improve your business processes and bottom-line performance.
- The pivotal link between business enterprise and individual performance can be established through the three process-based variables: process goals, process design, and process management.

Implementing Process Innovation with Information Technology

- Engineering and design process innovation which reduce the number of changes in product development cycles can yield significant process benefits.
- Manufacturing Process Innovation—the challenge for companies striving to bring quality to manufacturing will be to integrate the notions of radical process change.
- Logistical process innovation as close relationships with third parties are central to the success of both in-bound and out-bound process innovation.
- Market process innovation involves a process orientation that can benefit such activities as market selection and definition, customer and market information collection and use, and marketing-initiative planning and tracking.

- Order management process innovation is critical as companies are adopting several strategies for effecting major process innovation in order management.
- Service process innovation is another key strategy for service process innovation that lies in customer individualization.

Process-driven reengineering often begins with an assumption that the hierarchical, non-value added, departmentalized structure of most business enterprises today is fundamentally flawed.

Process mapping tools such as ARIS from IDS Scheer, are available as part of an ERP ecosystem or can be a simple flow diagramming and drawing tools such as MS VISIO that help define processes and workflows by linking text descriptions of processes to symbols.

Adopting a process management approach is the core of the process innovation exercise. In successful business organizations, senior managers set strategic directions and goals for strategic business performance improvements that cascade to process-specific goals and push decision making down to the individual in the team. Significant change does not happen without top management commitment and support.

Simplify System Processes

There are an interminable number of questions relating to the system trade-offs between ERP performance and reliability, cost, and timing or schedule. The process map can be used to describe what a process does, what controls it, what things it works on, what means it uses to perform its functions, and what it produces. Once the 'As is' and 'To be' process maps are available, the next step is to configure the ERP system to mimic the 'To be' processes.

ERP Strategy

Throughout the 1990s, most large industrial companies installed ERP systems. According to McKinsey, businesses around the world invested some $ 300 billion in ERP during that decade.

What most attracted the C-suite (CEO/CFO/CIO) was the opportunity to replace incoherent network of complex, disparate, and obsolescent applications with a single Y2K-compliant system from a reliable and stable vendor. By entering customer and sales data in an ERP system, a manufacturer can generate the next cycle's demand forecast, which in turn generates orders for raw materials, production schedules, timetables for shifts, and financial projections while keeping a close track of inventory. It sounds like magic, but if done right, ERP does deliver.

Some critics say that 80 percent of the benefit that we get from our ERP system comes from changes, such as inventory optimization, which could have been achieved without making the ERP investment. Yet companies shouldn't regret the cost of their investment: the hard-won skills and capabilities they acquired during the ERP installation process will facilitate them to improve their ERP applications incrementally, and these improvements collectively add considerable value. ERP can also accommodate technologies that facilitate promising developments, such as e-commerce and continuous-relationship marketing using CRM systems, that didn't exist when ERP systems were first installed. The right ERP strategy will deliver the right results.

ERP Strategy Gains

Many of the benefits that organizations are able to achieve today could not have been predicted at the time companies started work on ERP. In fact, in hindsight it appears that much of the value of these large systems lay in the infrastructure foundation they created for future growth based on IT. So ERP brings sustainability. The following are the foundations of a great ERP strategy.

- The first element of this foundation is common data. To make an ERP system work in an enterprise, everyone must agree to enter information using the same vocabulary and format. This discipline renders the data transparent, easy to compare and also helps in exposing anomalies—for instance, the use of different exchange rates to calculate the financial results of different plants.

- Standardized business processes are the second part of the foundation. ERP demands standardization to reduce the number of process variants that must be supported. Painful changes in even the best local traditions may be needed so that orders can be fulfilled consistently throughout a business. When customers demand consistent global quality, globally consistent processes become essential. At least the new processes resulting from ERP are a consequence of design rather than evolution.
- The third and last part of the foundation is an organization that has been built to change continually. The implementation of ERP gives many people their first experience of an IT project that truly changes the way a business works. Companies learn—sometimes the hard way—the need for business leadership of IT initiatives, and for operating in project rather than line structures. The ability to execute such business initiatives is a valuable asset at a time when fast and flexible IT deployment has become a major success factor in almost all industries.

Riding the ERP Value Elevator

For companies that already have ERP systems in place, the key problem is translating this infrastructure into bottom-line value. Think of such companies as standing at the foot of a 'Value Elevator'. In most cases, the initial implementation will have generated IT cost savings and process efficiencies. Ascending the lower levels, say ground or first floor requires many small adjustments that will cut IT costs and further improve business processes. Reaching the top floor means placing applications that can support new initiatives such as e-commerce and CRM on top of ERP.

Thus the value Elevator to ERP can be summarized as:

- The Ground Level—IT Cost Savings
- First Level—Process Efficiencies
- Second Level—Process Effectiveness
- Third Level—Process Innovation—Competitive Advantage

The key to continued success is pushing the responsibility for change outward by appointing a network of 'ERP Process owners,' from different functions and sites, who understand the ERP system. Their task should be to find the best ways to implement and sustain each of the improvements locally, and to discover new opportunities for improvement.

Refining the System

One such initiative involves refining the ERP system's technical and commercial operation in order to drive out costs. For example, service functions such as accounts payable or IT operations that are duplicated in different locations can be consolidated.

'Nice-to-have' Features

Deadline pressures probably forced the original ERP implementation team to jettison inessential but useful functions. Look for add-ons, such as electronic ordering and payment systems, whose payback times could be very short.

Captured Data

ERP systems capture reams of information on customers, suppliers, and internal processes. By analyzing all this, businesses can find opportunities to sell more or spend less. Information from a payment database, for example, may show that a company buys comparable products from a number of suppliers. Placing orders with just a few could win a substantial discount.

Extending Uniformity

Sometimes the desire to optimize local operations exacts a global price. One manufacturer, finding that its different distribution processes interfered with its ability to manage its stock-control system in a number of European countries, unified the distribution process. 'It was obvious in hindsight', a manager said, but employees 'needed the experience to understand why we all had to do it the same way.'

With these initiatives in hand, you can start riding the floors, which build on the ERP infrastructure, to achieve competitive advantage. A range of technologies, many of which emerged after ERP began to be implemented, can extend and enhance the capabilities of the original system. The following four initiatives are given as examples.

E-commerce Initiative

It is easy to build a website to advertise products and accept credit card numbers. But to become an industrial-strength, high-volume on-line retailer, a company must have world-class order fulfillment and distribution—one of the biggest challenges for electronic retailers. Whatever advantages nimble new online entrants may enjoy, there is tremendous value in having a system that can handle not only order fulfilment but also returns, partial shipments, and refunds. Internet commerce applications such as BroadVision, Intershop, and InterWorld can build on existing ERP systems to offer customers high-quality service through the Internet channel.

Electronic Procurement

On the buy side, attaching an e-procurement module to an ERP system can restrict purchases to preferred suppliers and cut out maverick spending by employees who have too little time to go through required procedures. For example, an accountant needs a new computer. An e-procurement module allows that person to choose 'computer supplies' from the procurement folder appearing on everyone's desktop and to select the desired model from the company's preferred supplier. If the price exceeds the limit, the order automatically circulates to all designated approvers, and once they sign off, it goes to the supplier for fulfilment. The clincher is that the ERP system also receives and pays the invoice electronically, cutting out liaison with the accounts organization. E-procurement specialists such as Ariba and Commerce One have developed such systems, as have established ERP vendors, including, SAP and Oracle.

CRM

Electronic orders yield far more information about customers than over-the-counter sales. They not only provide information as to who those customers are, but also what else they looked at and even, (if you care to track this), how much time they spent on each screen. An add-on application can combine customer data obtained from e-commerce with information in the existing ERP system, helping you cater to individual tastes and create lifelong relationships with customers. Such tools supplied, for example, by the specialists Siebel Systems and Vantive and by the major ERP vendors, make it possible to track customer interactions across all sales channels.

Supply Chain Optimization

Suppose that a toy manufacturer has a requirement of plastic. Applications from companies like i2 Technologies and SAP can take the production schedules generated by the manufacturer's ERP system and compare them with information about current raw material costs. These applications can then automatically place orders with the supplier offering the best price in the right volume, at the right time.

Roads to ERP Gains

Standard ERP systems use a single logical database shared by all ERP modules to provide a common view of an organization's data. In the early 90s, this was a farsighted way to overcome inconsistency and fragmentation; today it seems monolithic and inflexible.

But a number of technologies, collectively known as middleware, are eliminating the requirement that all ERP modules share the same database. Middleware allows application components to communicate through standardized messages, which simplify the coupling between systems. As a result, the integration of disparate applications becomes increasingly flexible and manageable; indeed, middleware can integrate applications running not only within but also beyond a company's

boundaries. Therefore, it is particularly useful in fast-moving environments where alliances, mergers, and acquisitions are routine.

Such technical advances mean that companies enhancing their old ERP systems or buying new ones will gradually feel that there is less need to get all the elements from a single vendor. Fast-changing businesses that use middleware to manage the integration of components are likely to choose different best-of-breed vendors for each of them.

But an organization that has already made a big commitment to a major ERP vendor should think hard before moving toward the best of breed. SAP, the ERP market leader, and Oracle, the number two player, have consistently extended their product ranges to compete against emerging products in 'hot' functional areas.

Companies that build on existing ERP systems can stick with their original vendors, an approach that lowers their exposure to risk but leaves them lagging, to a certain extent, behind the state-of-the-art technology currently in use. Alternatively, they can use third-party products to extend their ERP systems, with the original vendors controlling the overall architecture. Or, they can take the bull by the horns and combine products from a number of different vendors into a suite of heterogeneous applications linked by messaging middleware. Although the third approach frees a business from dependence on a single vendor, it is more expensive.

ERP systems may feel like an albatross to companies that have expensively and painfully installed them. Nonetheless, they constitute a valuable foundation for a wide range of new value-enhancing applications. And the emergence of middleware will give companies seeking distinctive solutions, greater flexibility and choice.

ERP—the Modern Marathon for Companies

While riding the ERP elevator, the trick is not to try and walk through walls, but to use your eyes to find the door. This is particularly true in

the ERP introduction and business process transformation of companies, where the most direct method of implementation is not necessarily the best way forward. Action may often appear efficient in the context of transformation, but in the end effectiveness must be the focus of activities to provide new long term perspectives for a company and to strengthen its competitive position. Here the ability of the company to change becomes a core competence. To achieve this, the organization must train for an ERP marathon:

- Program and project management
- Process design
- Information and communications technology
- Organizational development
- Change management and human resources

How effectively these disciplines will be dealt with and represented along with Key Performance Indicators (KPIs) (which can be used as the basis for measurement and evaluation of targets reached) will decide the overall success of an ERP transformation.

Case Study—US $20 Million Saved by Microsoft

Here is a preview of the case study that describes how Microsoft saved US $20 million by using SAP. This provides many practical insights that a newcomer to ERP can put in practice during ERP implementation. Although it is relating to SAP but many key points such as modules implemented, strategy for each ERP module, solution can be adopted for any generic packaged ERP system. This is presented to give the readers a real world ERP user experience. The complete case study is presented in Chapter 15—Best ERP case studies.

SAP: The ERP Software that Drives Microsoft

Microsoft's major problem was too many systems and too little integration.

- Executives at Microsoft wanted to implement an integrated ERP solution. SAP R/3 provided a scalable, three-tier client/server infrastructure that offered broad, integrated business functionality.

Microsoft Profile

As the worldwide leader in business and personal computing software, the vision of Microsoft Corporation is to empower people through great software—any time, any place and on any device. Employing more than 55,000 people, Microsoft had revenues exceeding $ 25 billion for the year ending June 2001.

Situation

Microsoft's tremendous growth rate was straining its operations, finance and human resource support systems. Microsoft needed an effective ERP solution to increase efficiency and reduce operating costs.

Solution

SAP R/3, a scalable, three-tier client/server infrastructure that offered broad, integrated business functions was implemented by the executives at Microsoft.

Benefits

- Provides accurate, global, real-time information to enable managers to make faster and better-informed decisions.
- Consistent month-end closings in four to five days, instead of a waiting time of four weeks.
- Savings of over $ 20 million per year in reduced procurement costs.
- Provides for highly efficient communications between servers and client systems around the world.

Improving a Company's Performance

ERP's best hope for demonstrating its value for improving the way a company takes a customer order and processes it into an invoice and revenue—otherwise known as the order fulfillment process. That is why ERP is often referred to as back-office software. It doesn't handle the up-front selling process (although most ERP vendors have recently developed the CRM software to do this); rather, ERP takes a customer order and provides a software road map for automating the different steps along the path to fulfilling it. When a customer service representative enters a customer order into an ERP system, he has all the information necessary to complete the order (for example the customer's credit rating and order history from the finance module, the company's inventory levels from the warehouse module and the shipping dock's trucking schedule from the logistics module).

All the people in these different departments see the same information and can update it. When one department finishes with the order it is automatically routed via the ERP system to the next department. To find out where the order is at any point, you need to only log-in to the ERP system and track it down. The order process moves like a bolt of lightning through the organization, and customers get their orders faster and with fewer errors than before. ERP can apply that same magic to other major business processes, such as employee benefits or financial reporting. That, at least, is the dream of ERP.

Let's go back to the day's of In trays for a minute. That process may not have been efficient, but it was simple. Finance did its job, the warehouse did its job, and if anything went wrong outside the department's walls, it was somebody else's problem. Not anymore. With ERP, the customer service representatives are no longer just typists entering someone's name into a computer and hitting the return key. The ERP screen makes them businessmen and women. It flickers with the customer's credit rating from the finance department and the product inventory levels from the warehouse. Will the customer pay on time? Will we be able to ship the order on time? These are decisions that customer service representatives have never had to make before, answers

that affect the customer and every other department in the company. But it's not just the customer service representatives who have to wake up. People in the warehouse who used to keep inventory in their heads or on scraps of paper now need to put that information online. If they don't, customer service representatives will see low inventory levels on their screens and tell customers that the requested item is not in stock. Accountability, responsibility and communication have never been tested like this before.

People don't like to change, and ERP asks them to change how they do their jobs. That is why the value of ERP is so hard to pin down. The software is less important than the changes companies make in the ways they do business. If you use ERP to improve the ways your people take orders, manufacture goods, ship them and bill for them, you will see value from the software. If you simply install the software without changing the ways people do their jobs, you may not see any value at all—indeed, the new software could slow you down by simply replacing the old software that everyone knew with a new software that no one uses.

ERP Market

As market consolidation continues, top 5 ERP vendors account for 72% of revenue today. AMR Research released its annual report on the state of the ERP market. *The Market Analytix Report: Enterprise Resource Planning, 2004–2009* revealed that ERP market revenues increased 14% in 2004. The report indicates that approximately one-third of the growth in the overall market was due to fluctuations in currency exchange rates.

While the ERP market has grown in revenue, consolidation continues to change the industry. In 1999, the top five vendors (J.D. Edwards, Baan, Oracle, PeopleSoft, and SAP) in the ERP market accounted for 59% of the industry's revenue. AMR Research expects the top five vendors in 2005 (SAP, Oracle, Sage Group, Microsoft, and SSA Global) to account for 72% of the ERP vendors' total revenue.

'The ERP market showed solid organic growth in 2004 as IT spending improved,' says Jim Shepherd, vice president of research at AMR Research. 'The market was also affected by consolidation within the segment, as well as ERP vendors acquiring best-of-breed players to broaden their portfolios.'

While many ERP vendors struggled in 2004, SAP AG increased overall revenues by 17% and license revenues by 20%, without any acquisitions. SAP's ERP market share increased to more than 40%. Oracle nearly doubled the size of its application business through the acquisition of PeopleSoft, but AMR Research expects SAP to finish 2005 with more than twice the revenue and market share of the combined Oracle-PeopleSoft.

Report Findings and Analysis

The report delivers revenue and growth rates for the top ERP players as well as growth forecasts through 2009. ERP vendors ranked by 2004 ERP license revenue can be seen in Table 1.2. The top ten ERP vendors by revenue include the following companies:

The pace of acquisitions shows no sign of slowing down. Oracle's purchase of Retek and vendors like Sage Group, SSA Global, Infor Global Solutions, and Epicor have all been very active in the M&A space and have grown more rapidly than the overall ERP market.

Table 1.2 ERP vendors ranked by 2004 ERP license revenue

Jan-Dec 2004 Revenue Rank	Company Name	Revenue 2004 {$M}	Revenue 2005 {$M}	Revenue Forecast 2004–2005 {$M}	Revenue Share 2003 (%)	Revenue Share 2004 (%)	Revenue Share Forecast 2005 (%)
1.	SAP	7994	9372	10403	39	40	43
2.	PeopleSoft	2682	2880	0	13	12	0
3.	Oracle	2470	2465	4534	12	10	19

(*Contd*)

(*Contd*)

4.	Sage Group	900	1243	1375	4	5	6
5.	Microsoft Business Solutions	683	775	891	3	3	4
6.	SSA Global	471	700	400	2	3	3
7.	GEAC	431	445	445	2	2	2
8.	Intentia	361	407	407	2	2	2
9.	Infor Global Solutions	123	395	395	1	2	2
10.	Lawson	341	358	358	2	2	2
Total Including (Other ERP Vendors)		20711	23649	24288	100	100	100

The mid-range ($ 50M—$ 1B in annual revenue) and SMB (less than $50M in annual revenue) markets continue to be a major focus area for many of the ERP vendors. Midrange solutions and channels are critically important for penetrating China, India, Eastern Europe, and Latin America.

ERP buyers have moved away from large, upfront purchases. Now most tend to license user seats and functional ERP modules incrementally as they deploy a product. Along with widespread discounting, this has led to smaller average deal sizes.

Source: *AMR Research Releases*, ERP Market Report Showing Overall Market Growth of 14% on Tuesday, June 14, 2005, 2004, Kevin Reilly, *www.amrresearch.com.*

ERP in Concert with Business

If you have an ERP system that is not giving a good return or if you are contemplating your first ERP system, don't learn the hard way. Process

alignment—business process within the company and in concert with the ERP system is the absolute key to success.

Nestle was a company that got caught in the Y2K squeeze and, according to a CIO article, overlooked important steps. The first time around, the project included 'no one from the groups that would be affected by the new business processes' ("*Nestle's ERP Odyssey,*" Ben Worthen, CIO, May 15, 2002). But the story didn't end there. In fact, it ends with one of our favorite quotes on this topic:

If Dunn [the CIO] were to do it over again, she'd focus first on changing the business processes and achieving universal buy-in, and then and only then on installing the software. "If you try to do it with a system first, you will have an installation, not an implementation," she says. And there is a big difference between installing software and implementing a solution.

Readers will find the entire article informative. After working through all the issues and changing its functions, Nestle is achieving a nice ROI. While Nestle had a false start, it examined where it wanted to go and made the changes that were necessary to get there: common accounting, and purchasing to take advantage of scale, optimized supply chain planning, better forecasting, better integration of sales, better manufacturing practices and, last but not the least, much better management than before for the people involved.

We hear it over and over again: 'We are a group of (autonomous, independent, loosely-held, etc.) companies and we want to install a common ERP system.' Our advice is simple, 'Don't.' If the company doesn't want to or can't move to a uniform way of conducting business and if there are no synergies to be gained by conducting business that way don't embark on a common system. It will end in failure. Common systems demand common processes for the activities that they support.

Successful companies have come to the same conclusion: if you want to get a good return on the ERP system, you must align your company processes and facilitate that alignment with a well-chosen ERP system.

CHAPTER 2

ERP is today CEA—Comprehensive Enterprise Application

ERP is a Bit of Everything

Today with the label of new-enterprise application-CEA, ERP work involves a bit of everything—classical ERP, business process re-engineering, SCM, web work, CRM, and more—delivered as a steady stream of fast projects.

Like a remake of an old movie, the ERP software made a comeback in early 2000—but it isn't the same ERP we knew when ERP was king, before the great Y2K crisis turned out to be a hoax and before ERP was shunted aside in the ensuing rush to Internet. ERP now is experiencing a dramatic resurgence as CEA, which encompasses not just conventional ERP capabilities but also CRM, SCM, sales force automation (SFA), and more.

ERP the New Wave

It was in 1998–99 that ERP made its strong appearance. Large companies were then madly scrambling to protect their systems from the Y2K disaster. Instead of trying to untangle and fix innumerable legacy code, large organizations turned en masse to ERP solutions. These systems promised not only to be Y2K-ready, but also to provide comprehensive, integrated systems that handle the entire internal production process from forecasting and planning, through production and production order processing to shipping.

Y2K-ready or not, the ERP systems represented an improvement over the non-integrated spaghetti of homegrown and packaged legacy systems that made up the software portfolios of most large companies at that time. The ERP systems not only integrated the most advanced functionality at the time, but they also incorporated what amounted to best practices. If you molded your business process to fit the software, you would at least be assured of a proven, effective process. Most organizations, however, chose to change the software rather than change their practices, which led to a lot of ERP customization, wildly expensive implementation projects, and, ultimately, failed or partial implementation.

When the millennium year 2000 dawned, these same organizations dropped their ERP initiatives midstream and turned their attention to the Internet and e-business faster than you could say, Amazon.com. The race to business B2C and B2B websites, Internet portals, and online exchanges had begun.

Today, it is the Internet that has lost the luster. *Amazon.com* or *eBay* models cannot be replicated so easily. Independent online markets flashed across the business horizon like a comet and mostly disappeared before they even started to reshape the supply chain. Although private and consortium exchanges and web portals still hold promise, the vaunted first-mover advantage has proven to be no advantage at all. With stock prices far below their highs witnessed last year and the economy seemingly in a tailspin, today managers are focusing on basics of business survival—cost reduction and efficiency. Suddenly, they are becoming aware of all the unfinished ERP work.

The news that ERP is back is no big surprise. Companies still need to process transactions internally. There is a big need for internal systems like ERP. With or without the Internet, companies still have to ring up sales, schedule production, and move materials and finished goods in and out of inventory, and through warehouses.

The Internet and online business actually put even more pressure on companies to perform well. Companies have realized that they can't just have the web, CRM and SFA as a standalone. They need an integrated enterprise, a connected enterprise and such a connected enterprise would feature an ERP system at its core.

The IDC projected the ERP software market at $ 21.5 billion in 2000 and projects that it would hit $ 46.1 billion in 2005. But the ERP solutions today are different from the pre-Y2K systems (that have been heavily criticized). System Application and Products (SAP), for example, comes as a portal—MySAP ERP with Portal. The ERP systems have become more externally accessible, and the large ERP vendors—SAP, PeopleSoft, Oracle, J.D. Edwards—have extended their core offerings with CRM, SFA, Web, and various supply chain functionalities. Also different is the type of consulting engagement surrounding ERP implementation. Most of the large organizations already have an ERP package of some sort, maybe even more than one, but the implementation is limited. A lot of the original scope definitions were quite extensive, but the companies made concessions for time due to the pressure to meet the Y2K deadline. Now, they want to go back and finish and add in new e-business capabilities. Where vendors have multiple ERP systems; they now want to consolidate on a single system. Often they want to follow up with the process re-engineering they skipped in their rush the first time through.

The Web enablement of ERP and provide access to ERP data and functionality for suppliers or the sales force. Integration has also emerged as a major focus of ERP customers. Companies want their ERP system to work seamlessly with their websites, portals, e-business, CRM, SFA, and other systems.

The size and scope of the new ERP engagements have changed, too. Gone are the juicy three-year, $100 million ERP implementations. Companies don't want a Big Bang implementation. The Big Bang projects greatly increased the risks of failure; today businesses can accurately predict its needs in three years down the road and are not willing to wait several years to see a return on its software investment.

Consulting firms are being asked to break ERP projects into small deliverables. They are being given three, six or nine months at the most, to implement a specific set of capabilities. Even when ERP was big in the run-up to Y2K, there was a clamor for faster, cheaper implementations that could deliver a quick, tangible payback. This led each of the vendors to launch fast implementation programs that usually revolved around templates and a set of preconfigured settings instead of infinite switches, settings, and parameters that ordinarily need to be set. Typically, these packages were aimed at specific vertical markets.

About the same time, ERP customization came under increasing scrutiny. Large companies would customize—actually add to or alter the underlying code—to shape the package to meet some very specific need unique to the organization. However, managers began to recognize that whatever advantage they gained through customization came at an enormous cost, which included both that of the original custom coding, and that, from the delays the customization invariably entailed.

But there was also an ongoing cost. Every time the company moved to a new release of the ERP application, it had to code the customization all over again. As huge customization bills mounted, managers sought to limit customizations to those that were absolutely critical and would deliver a big payback. Otherwise, it really was smarter and cheaper to change the business process in most cases, even with all the change management, retraining, expense, and hassle that entails. So, the consulting industry's customization gravy train was already slowing down, even if not actually grinding to a complete halt. This is an 80/20 approach, and the reality is that this is not how business works. As large companies need to determine their own best processes, they need to adapt their software so they can innovate.

As we started under the new-enterprise application label called CEA, ERP projects might involve a bit of everything—classic ERP, business process re-engineering, supply chain, web work, CRM, and more—delivered as a steady stream of fast projects.

ERP and CRM

CRM is an information industry term for methodologies, software, and Internet capabilities that help an enterprise manage customer relationships in an organized way. For example, an enterprise might build a database about its customers that described relationships in sufficient detail so that management, sales people, service providers, and perhaps the customer directly could access it, match customer needs with product plans and offerings, remind customers of service requirements, know what other products a customer had purchased, and so forth.

For most businesses customers are the lifeline of their operations. The better a business can manage the relationships it has with its customers, the more successful it will become. Therefore IT systems that specifically address the problems of dealing with customers on a day-to-day basis are growing in popularity.

CRM is not just the application of technology, but is a strategy to learn more about customers' needs and behaviors in order to develop stronger relationships. As such it is more of a business philosophy than a technical solution to assist in dealing with customers effectively and efficiently. Nevertheless, a successful CRM relies on the use of technology.

This part will outline the business benefits and the potential drawbacks of implementing CRM. It will also offer help on the types of solution you could choose and how to implement them.

What is CRM

CRM software systems automate many customer-related business tasks. In the commercial world, the importance of retaining existing customers

and expanding business is paramount. The costs associated with finding new customers mean that every existing customer could be important.

The more opportunities that a customer has to conduct business with your company the better, and one way of achieving this is by opening up channels such as direct, online sales, franchises, use of agents, etc. However, the more channels you have, the greater the need to manage your interaction with your customer base.

CRM helps businesses to gain an insight into the behavior of their customers and modify their business operations to ensure that customers are served in the best possible way. In essence, CRM helps a business to recognize the value of its customers and to capitalize on improved customer relations. The better you understand your customers, the more responsive you can be to their needs.

CRM can be achieved by:

- Finding out about your customers' purchasing habits, opinions and preferences
- Profiling individuals and groups to market more effectively, and increase sales
- Changing the way you operate to improve customer service and marketing

Benefiting from CRM is not just a question of buying the right software. You must also adapt your business to the needs of your customers.

CRM vs. ERP and SCM

ERP and SCM are two other categories of enterprise software that are widely implemented in corporations and non-profit organizations. While CRM attempts to enhance the relationship with customers, the primary goal of ERP is to improve and streamline internal business processes, and SCM aims to facilitate the collaboration between the organization, its suppliers, manufacturers, distributors and partners.

CRM Definition—A Systems Perspective

The goal of CRM is to learn more about customers' needs and behaviors in order to develop stronger relationships with them, and to facilitate acquiring, enhancing and retaining of customers.

Components of CRM System

CRM Software

The core of a CRM system is module-based CRM software application. Each software module automates business activities pertinent to one functional area. Common modules in the CRM software system include customer contact management, direct marketing, sales automation, call center application and help-desk module.

Business Processes

Business processes within an organization falls into three levels—strategic planning, management control and operational control. While ERP has been promoted as solution provider for supporting or streamlining business processes at all levels, CRM systems are clearly designed to enhance management control and operational control with regard to customer relationship.

Users

The primary users of CRM systems are workers who perform management and operational control. In an environment of extended enterprise, the CRM users may include customers and business partners.

Hardware and Operating Systems

UNIX is the most common operating system for running the CRM software. Windows NT and Linux are other popular operating systems to run CRM software. Larger CRM systems are UNIX based. UNIX is a computer operating system designed to be used by many people at the

same time and has built-in TCP/IP. There are many reasons to host your CRM software on UNIX.

Boundary of a CRM System

The boundary of a CRM system is the boundary of extended enterprise that implements the CRM system. The boundary of supply chain systems and e-commerce systems extends to the organization's suppliers, partners and customers.

CRM Software

Application software, end users, business processes and computer systems (hardware and operating systems) are four components common to business information systems or Management Information Systems (MIS). ERP, CRM, and SCM systems consist of those same components. The characteristics of each component may be different for each category of enterprise software—ERP, CRM or SCM.

Technical Architecture of CRM Systems

A CRM system consists of the following three major components.

CRM Software

This is the backend of CRM systems that usually includes a relational database for storing persistent information, software applications for handling business logic.

Client Hardware

It could be a PC or handheld devices for accessing enterprise information.

Mobile Middleware

A middleware facilitates the interactions between CRM software and access devices or PCs. The mobile middleware provides great benefits for mobile workers to access, and share enterprise information across organizational line*Fortune*ocations.

Comparison of CRM Technology

Online CRM, Web-based CRM, Hosted CRM, Mobile CRM and Wireless CRM are the terms that refer to information technologies used in the implementation, deployment and integration of CRM systems.

- **Online CRM**—Online CRM or web-based CRM is a system that uses web pages as the user interface (UI) of a CRM system. It eliminates the need for deploying client software. Instead, it uses web browsers as common and standard client software for accessing enterprise applications.
- **Hosted CRM**—A hosted CRM is an online CRM whose CRM backend systems are hosted at data centers of Application Service Provider (ASP) and eliminates the need of deploying CRM systems in-house.
- **Mobile CRM**—While a handheld device with browser-based UI can access web-based CRM systems, the more robust solutions for mobile CRM and wireless utilize a mobile middleware for interactions between the wireless device and the CRM applications.
- **Wireless CRM**—It highlights the connectivity between CRM-backend software and access hardware (devices or PCs). Wireless CRM is mobile and web based. It may or may not be a hosted CRM.

Business Processes

The CRM attempts to improve the processes relevant to the acquiring, enhancing and retaining of customers.

We can classify business processes into three levels—strategic planning, management and operational control. While part of both ERP and SCM are responsible for strategic enterprise planning, CRM systems support and automate activities at the levels of management and operational control.

Direct Marketing Module

Direct marketing is a set of promotional activities in which direct contact is made with the target customer. Direct marketing software allows companies to identify target customers for particular promotional criteria, generate direct mails, analyze response from target customers. Common techniques include direct mail and telemarketing. Direct marketing module can automate and streamline many of the marketing efforts.

CRM Sales Module

Revenues from sales are the lifeline for commercial organizations. Sales module implements the functions of pre-sales support, order placement, order scheduling, shipping and invoicing. Sales module is closely integrated with organizations' e-commerce websites. Many sales modules from CRM vendors offer online stores as part of the CRM system.

Call Center Module

A call center is a sophisticated voice operations center that provides a full range of high-volume, in-bound or out-bound call handling services, including customer support, operator services and directory assistance. It generally refers to reservations centers; help desks, information lines or customer service centers. A call center consists of a complex telecommunication infrastructure, sophisticated computer systems and skilled service representatives organized to effectively manage the incoming and outgoing telephone calls. CRM call center module captures the vast amount of data in call center operation, by prioritizing call center service, and directing incoming calls to the appropriate representatives.

Help-Desk Module

Help desk software can improve customer satisfaction and productivity by automating customer support processes. Basic features of this software include requests submission, email notification, searching knowledge base and administration interfaces. Web-based help-desk software allows users to access a support knowledge base so that they can find the answer online without calling a representative for help.

CRM is a strategy as well as a process that is used for learning more about customers' needs and behavior in order to develop stronger relationships with them. CRM software systems automate many customer-related business tasks. CRM applications are traditionally developed as client–server software that involves higher initial cost of ownership. The proliferation of the Internet and the Web has fueled the rapid growth of Web-based CRM or online CRM applications. Web CRM systems are widely deployed for Web-based call center, contact management and scheduling.

The life cycle of CRM consists of three phases—customer acquisition, customer relationship enhancement and customer retention. This software streamlines the activities at each of those phases of customer relationship management.

Customer Acquisition

The contact-management module and the direct-marketing module of CRM allow companies to effectively promote and market their products and services to prospects. These modules help speed up the acquiring processes and reduce the cost of acquiring new customers.

Customer Relationship Enhancements

CRM helps companies better understand existing customers' needs and behaviors and enhance the profitability from existing customers by cross selling. They can customize their products and services to individual customers' needs and preferences.

Customer Retention

Customer service module of CRM system gives the organizations the edge in customer support. They can increase customer satisfaction while reducing the cost of support. Customer retention is critical to the overall profitability of an organization. A customer you spend hundreds of dollars and months to acquire may leave you in seconds as a result of poor customer services.

There're lot of similarities between the implementation of CRM and the implementation of ERP. The critical factors of successful CRM implementation are very similar to that of ERP implementation.

Sales Force Automation (SFA)

Sales Force Automation is the combination of business strategies and information systems that automate business processes of sales and marketing functions, such as sales campaign management, lead assignment, contact management, information sharing, quick proposal and presentation generation, product configurators, calendars, to-do lists and opportunity reporting. Sales Force Automation electronically manages all sales activities within an organization.

While many CRM systems include SFA modules, a lot of SFA systems are termed CRM systems to leverage the greater awareness of the CRM systems. However they are different in many aspects.

Difference between CRM and SFA Systems

Goals

The goal of CRM systems is about finding, acquiring, and retaining customers. Sales Force Automation is about managing and supporting sales representatives.

Clientele

CRM systems are used by many different organizational units, such as customer service, marketing, accounting, warehouse and etc. The primary users of SFA are sales representatives.

Characteristics of Web-Based CRM

The major difference between online CRM and enterprise CRM is the user interface of the systems. Enterprise CRM software is typically developed in VB, C++ or Java. Web-based CRM systems use web browser as a client universal software. CRM systems*Fortune*y use relational database as backend for storing customer information.

Benefits of Web-Based CRM

- **Low total cost of ownership**—The cost of Web-based CRM software itself may not be cheaper than their counterparts in EPR. The total cost of ownership for Web-based CRM, however, is much cheaper because of the lower cost of implementation and deployment.
- **Rapid deployment**—Online CRM systems use Web browsers as thin clients for accessing CRM backend. It saves the cost of deploying CRM clients. Deployment of CRM clients is a major burden for enterprise CRM application, when organizations have hundreds of thousands of end users.
- **Accessibility**—Users can access Web-based CRM from anywhere as long as they have Internet access.
- **Instant information sharing**—Information entered remotely on the Web can be transmitted back to CRM backend for instant information sharing across organizational lines and locations.

Web-based applications use HTTP protocol for communication between Web servers and browsers. HTTP is a stateless protocol, which does impose limited interactions compared with traditional client software. The alternative to overcome the drawback is to develop and embed Java Applet to facilitate interactivity.

Vendors of Web-Based CRM Systems

All major CRM vendors (Microsoft, Oracle, SAP, and PeopleSoft) offer their CRM products in both Enterprise and Web-Based version. Many small CRM vendors focus exclusively on providing Web-based solutions.

The new generation of CRM applications are Web-based to ease the deployment and facilitate the remote access of enterprise information.

Hosted CRM

A Web-based CRM is called hosted CRM where the system is hosted at

an Application Service Provider (ASP). Organizations using the CRM don't own the software, instead they subscribe to the services by paying a subscription fee. Web-based CRM systems have Web browsers as their clients.

Benefits of Hosted CRM

A hosted CRM option has additional benefits beside the benefits of an online CRM.

- **Low initial cost**—CRM software is expensive and the life cycle of CRM implementation would mean millions of dollars. A yearly subscription fee to CRM services is only a fraction of that cost. Hosted CRM option allows organizations to try out CRM and they may eventually choose to host online CRM in-house, if economically and technically feasible.
- **Low cost of deployment**—The Web-based CRM eliminates the need of deploying clients for CRM backend software. Hosted CRM further eliminates the need of deploying backend systems.
- **Rapid implementation**—The implementation of hosted CRM involves initial setup, configuration, data migration and integration. CRM ASPs usually accommodate custom requirements at a cost. The cost of implementing a hosted CRM is only a fraction of the traditional CRM. Hosted CRM can shorten the implementation from years and months to a few weeks.
- **Accessibility**—Users can access Web-based CRM from anywhere as long as they have Internet access and a Web browser.
- **Instant information sharing**—Information entered remotely on the Web can be transmitted back to CRM backend for instant information sharing across organizational lines and locations.

The major limitation and drawback for hosted CRM is the problem of limited customization and risk of exposing sensitive information to third parties. For organizations that process sensitive information, hosted CRM may not be the best option.

Vendors of Online CRM Systems

Hosted e-business systems are widely deployed for call center, workflow management, e-procurement, SCM, document management, ERP and SFA among other B2B and e-commerce applications. Most CRM vendors (Siebel, Web methods, SAP, Ariba and PeopleSoft) offer an option of application hosting for their systems. Some vendors such as, salesforce.com and iqnavigator, focus exclusively on Hosted CRM solutions. Small organizations can develop their own simple CRM on the Intranet in PHP (Personal Home Page), CGI (Common Gateway Interface) or cold-fusion.

While a handheld device with browser-based UI (User Interface) can access Web-based CRM systems, the more robust solutions for mobile or wireless CRM include utilization of a mobile middleware for the interactions between the wireless device and its applications.

Infrastructure of Mobile and Wireless CRM

Mobile enterprise solutions are made up with three components—backend systems, wireless handheld devices for mobile access and a mobile middleware for the interactions. What distinguishes a mobile or wireless CRM from a traditional one is its middleware. A mobile CRM provides greater benefit for workers on the move to access and share enterprise information across organizational lines and locations. Traditionally, they have had to fax, or email customer information back to corporate headquarters.

Vendors of Mobile CRM/Wireless CRM Systems

All major CRM vendors (SAP, Oracle, Siebel, PeopleSoft and Microsoft) offer mobile and wireless CRM solutions.

1. **SAP**—The mobile middleware layer is an integral part of the underlying SAP architecture. mySAP mobile business enables mobility with all the SAP ERP applications including CRM.

2. **Oracle**—Oracle field service applications leverage existing mobile technology and devices to provide field service representatives with real-time information in dial-up or use wireless access.
3. **Siebel systems**—Siebel offers several mobile CRM/wireless applications, including Siebel Sales Handheld for Windows and Siebel Mobile Sales Solutions for Palm OS.
4. **Microsoft CRM**—MS CRM is built on top of .NET framework. It supports access from Pocket PC devices and wireless devices.
5. **Salesforce.com**—Salesforce.com offers several alternatives for remote access. For instance, users can request contact sheet and product data in emails.
6. **PeopleSoft**—PeopleSoft's mobile solution is Web-based that requires a network connection.

Other Vendors include Best Software's SalesLogix, FrontRange's GoldMine, Pivotal's wireless CRM and ACCPAC International's CRM products.

Business benefits of CRM

Implementing a CRM solution might involve considerable time and expense. However, there are many potential benefits.

A major benefit can be the development of better relations with your existing customers, which can lead to:

- Increased sales through better timing due to anticipating needs based on historic trends
- Identifying needs more effectively by understanding specific customer requirements
- Cross-selling of other products by highlighting and suggesting alternatives or enhancements

This can lead to better marketing of your products or services by focusing on:

- Effective target marketing communications aimed specifically at customer needs

- A more personal approach and development of new or improved products and services in order to win more business in the future.

Ultimately this could lead to:

- Enhanced customer satisfaction and retention, ensuring that the good reputation in the market place continues to grow
- Increased value from existing customers and reduced cost associated with supporting and servicing them, increasing overall efficiency and reducing total cost of sales

Once the business starts to look after its existing customers effectively, efforts can be concentrated on finding new customers and expanding the market. The more one knows about one's customers, the easier it is to identify new prospects and increase one's customer base.

Even with years of accumulated knowledge, there's always room for improvement. Customer needs change over time, and technology can make it easier to find out more about customers and ensure that everyone in an organization can exploit this information.

New Trends in ERP and CRM

The rise of CRM deployment has increased the role of architecture in CRM product selection. While application functionality and business fit should remain at the top of CRM priority lists, the right architecture can dramatically reduce long term deployment, maintenance costs and improve solution flexibility. Despite unanimous claims of 'Web-architected' applications, the major CRM vendors still show significant differences in approach to architecture, integration, platform, data model, data ownership and customization. Companies must understand architecture and design philosophy of CRM vendors upfront, in order to identify likely trade-offs and business adjustments for the long term.

Best Practices

Make vendors go beyond the glossy architecture slides to illustrate differences in implementation and approach. Look at the data model

and have vendors show how the application handles complex relationships.

Examine company-skill sets and weigh the trade-offs between open and vendor-centric (but more mature) CRM infrastructure. Pay particular attention when a vendor offers a variety of deployment options (Web, mobile, Java) as each deployment option may have its own development environment, complicating customization and upgradation problems.

Integration is far more than a packaged interface or a single vendor. Identify key processes that cross applications and match requirements to the specific processes supported, not just the existence of application connectors. Verify that the vendor can perform integration using pre-defined integration points and watch for customization on either side (CRM/ERP) that could lessen the effectiveness of packaged integration.

Go to the details of glamourous end-user demos and examine how products can be customized and/or configured. Be sure to understand process, data and integration changes, as well as user interface modification. Understand scope and limitations of configuration parameters.

The business user should be able to perform the ultimate configuration—selecting or tuning screen display, information detail level, event timing, alert threshold, etc. Understand what facilities are appropriate and factor-in additional expense when systems administrators seem compelled to make simple changes.

ERP and Supply Chain Management

The supply chain includes all the processes involved in producing and delivering a product or service, from the procurement of raw materials to the distribution of finished products to customers. Improving one's own business' performance is important, but the entire supply chain must also operate effectively and efficiently. Getting the supply chain right can be one of the biggest challenges facing a business.

Supply chain software helps to automate the supply chain. It allows you to monitor and transfer information about orders and deliveries to and from partners and suppliers. This enables you to conduct business with greater speed and accuracy.

Supply chain solutions and software go along with internal process changes. Internal processes are impacted by changes in the supply chain—and vice versa and information flow is crucial to success.

Supply Chain

A supply chain is the global network used to deliver products and services from raw materials to end customers through an engineered flow of information and physical distribution. The most successful companies are characterized by their products being developed in Europe and the United States; manufactured in Asia and Latin America, and sold worldwide, global sourcing is becoming a prerequisite for companies competing in today's market. Hence, understanding the problems and processes of ERP in the context of SCM and outsourcing strategy is important to ensure the success of the global supply chain. With the advent of advanced computer technologies, such as the Internet and the widespread use ERP systems, many companies are achieving effective integration and coordination. However, at the global level, where information, material, and cash needs to move across borders, numerous challenges and difficulties may occur.

SCM helps businesses understand better the activities that provide component-level material for their finished product. For example, in the retail sector, wholesaler relationship is the key to success, and in the automotive industry, part-supplier relationship can affect the manufacturer's ability to build a car on time. By focusing on SCM, corporations can greatly improve operational efficiency. SCM seeks to help businesses control costs by uncovering the difficulties in their key relationships (e.g. with internal suppliers and external vendors).

The fundamental issue is the need to understand customer demand and align it with the supply side of the business. By doing this,

organizations can reduce or even prevent costly overruns and/or product shortages.

SCM software achieves these outcomes in a variety of ways through a variety of implementation. Basically, SCM links suppliers to databases that show forecasts, current inventory, shipping, or logistics timeframe within the customer organization. By giving those suppliers such access, they can better meet their customers' demands. For example, the supplier can adjust shipping to ensure that their customers have the inventory necessary to meet their customers' needs. Suppliers can download forecasts into their own manufacturing systems to automate their internal processes as well.

Some in the industry categorize SCM into two fundamental components—Supply Chain Planning (SCP) and Supply Chain Execution (SCE). SCP is the software that produces the numbers for production, inventory, etc. based on input about customer sales and forecasts. SCE is the automated process that deals primarily with routing pieces of information to the appropriate systems, departments, and vendors. We could also link the SCM systems to the ERP systems to integrate invoicing. The variations are limitless. It all goes back to that interface into the data warehouse. That data, mined effectively, can produce information and knowledge to streamline the organization.

Cisco Systems Inc. is a good example of a company effectively using cutting edge SCM. In May 2001 Cisco experienced a well-publicized write-down of over $ 2 billion. The SCM platforms were designed to handle growth pretty well, but when the bubble burst, Cisco had $ 2 billion in inventory that could not be moved. There was a disconnect in the supply chain between Cisco, the contract manufacturers that assembled the Cisco product, and the component-level providers that provided parts to the manufacturers. Lack of communication and information from the top of the supply chain to the bottom created forecast overlaps that fueled inflated forecasts and expectations. Cisco is merely one of many industry examples that have increased the connectivity and the exposure of their supply chain among all chain participants. The e-Hub strategy proved critical to its future success.

What is Supply Chain Management

SCM is the combination of enterprise strategies, business processes and information technologies that integrates the suppliers of raw materials or components, the manufacturers or assemblers of the finished products, and distributors of the products or services into one cohesive process to include demand forecasting, materials requisition, order processing, order fulfillment, transportation services, receiving, invoicing, and payment processing.

While ERP and CRM systems are intended to re-engineer internal business processes to achieve better resource planning and coordination across departments, SCM systems are utilized to facilitate the coordination with outside business entities, or in the scope of extended enterprise. SCM usually refers to the redesign of supply chain processes in order to achieve streamlining. It is generally performed only by large corporations with large suppliers. B2B exchange can extend SCM to all trading partners regardless of size by providing a central location to integrate information from all supply chain participants.

SCM is the combination of art and science that goes into improving the way your company finds the raw components it needs to make a product or service and deliver it to customers. The following are the five basic components of SCM.

- **Plan**—This is the strategic portion of SCM. You need a strategy for managing all the resources that go toward meeting customer demand for your product or service. A big piece of planning is developing a set of metrics to monitor the supply chain so that it is efficient, inexpensive and delivers high quality service to customers.
- **Source**—Choose suppliers who will deliver the goods and services you need to create your product. Develop a set of pricing, delivery and payment processes with suppliers and create metrics for monitoring and improving relationships. And put together processes for managing the inventory of goods and services you receive from suppliers, including receiving shipments, verifying them, transferring them to your manufacturing facilities and authorizing supplier payments.

- **Make**—This is the manufacturing step where one has to schedule the activities necessary for production, testing, packaging and preparation for delivery. As the most metric-intensive portion of the supply chain, measure quality levels, production output and worker productivity.
- **Deliver**—This is the part that many insiders refer to as logistics. Coordinate the receipt of orders from customers, develop a network of warehouses, pick carriers to get products to customers and set up an invoicing system to receive payments.
- **Return**—This is the problem part of the supply chain. Create a network for receiving defective and excess products back from customers and supporting customers who have problems with delivered products.

What is the Relationship Between ERP and SCM?

Many SCM applications are reliant upon the kind of information that is stored maximum inside the ERP software. Theoretically you could assemble the information you need to feed the SCM applications from Legacy systems (for most companies this means Excel spreadsheets spread out all over the place), but it can be nightmarish to try to get that information flowing on a fast, reliable basis from all the areas of the company. ERP is the hub that integrates all that information together in a single application, and SCM applications benefit from having a single major source to go to for up-to-date information. Most CIOs who have tried to install SCM applications say they are glad they did ERP first. They call the ERP projects 'putting your information house in order'. Of course, ERP is expensive and difficult, so you may want to explore ways to feed your SCM applications the information they need, without doing ERP first. These days, most ERP vendors have SCM modules. Therefore, doing an ERP project may be a way to kill two birds with one stone. Companies will need to decide if these products meet their needs or if they need a more specialized system.

Applications that simply automate the logistics aspects of SCM are less dependent upon gathering information from around the company, so they tend to be independent of the ERP decision. But chances are, you'll need to have these applications communicate with ERP in some fashion. It's important to pay attention to the software's ability to integrate with the Internet and with ERP applications because the Internet will drive demand for integrated information. For example, if you want to build a private website for communicating with your customers and suppliers, you will want to pull information from ERP and supply chain applications together to present updated information about orders, payments, manufacturing status and delivery.

Improving the Supply Chain

Supply chain software helps make your supply chain and customer order processes more transparent. It gives you a better understanding of your processes, which brings many benefits. For example, you can forecast demand and supply more accurately—this allows you to plan your business around customer demands, rather than around your production capabilities. The ideal supply chain makes only what and how much is needed, when it is needed, and where it is needed.

Supply chain software streamlines your business processes by installing an ERP with SCM capabilities. This speeds up communication between partners and suppliers. Orders are sent more quickly and accurately, and partners can collaborate online on a project.

The main benefits from making these changes are improved performance in delivering on time and in full, lower inventory levels, and a better responsiveness to unforeseen events. These include machine failures, staff absences, delivery delays, and the receipt of wrong, faulty or missing goods, urgent customer orders and human error.

Other benefits include:

- Improved planning and scheduling capabilities, due to better visibility
- Reduced administration costs as orders are sent electronically

- Reduced costs for logistics, warehousing and manufacturing, due to better planning
- Better decision-making, due to real-time knowledge of sales rates, inventory and production rates
- Improved customer service, due to more effective order tracking and automated messaging—for example, letting customers know if deliveries will be late
- Fewer data errors, due to automated processes

What is Supply Chain Collaboration?

Let's look at consumer-packaged goods, for an example, of collaboration. If there are two companies that have made supply chain a household word, they are Wal-Mart and Procter & Gamble. Before these two companies started collaborating back in the '80s, retailers shared very little information with manufacturers. But then the two giants built a software system that hooked P&G up to Wal-Mart's distribution centers. When P&G's products run low at the distribution centers, the system sends an automatic alert to P&G to ship more products. In some cases, the system goes all the way to the individual Wal-Mart store. It lets P&G monitor the shelves through real-time satellite link-ups that send messages to the factory, whenever a P&G item swoops past a scanner at the register

With this kind of minute-to-minute information, P&G knows when to make, ship and display more products at the Wal-Mart stores. There is no need to keep products piled up in warehouses awaiting Wal-Mart's call. Invoicing and payments happen automatically too. The system saves P&G so much in time, reduced inventory and lower order-processing costs that it can afford to give Wal-Mart 'low, everyday prices' without putting itself out of business.

Roadblocks to Installing Supply Chain Software

- **Gaining trust from your suppliers and partners**

  Supply chain automation is uniquely difficult because its complexity extends beyond your company's walls. Your people will need to change the way they work and so will the people from each supplier that you add to your network. Only the largest and most powerful manufacturers can force such radical changes down suppliers' throats. Most companies have to sell outsiders on the system. Moreover, your goals in installing the system may be threatening to those suppliers, to say the least. For example, Wal-Mart's collaboration with P&G meant that P&G would assume more responsibility for inventory management, something retailers have traditionally done on their own. Wal-Mart had the clout to demand this from P&G, but it also gave P&G something in return-better information about Wal-Mart's product demand, which helped P&G manufacture its products more efficiently. To get your supply chain partners to agree to collaborate with you, you have to be willing to compromise and help them achieve their own goals.

- **Internal resistance to change**

  If selling supply chain systems is difficult on the outside, it isn't much easier inside. Operations people are accustomed to dealing with phone calls, faxes and hunches scrawled on paper, and will most likely want to keep it that way. If you can't convince people that using the software will be worth their time, they will easily find ways to work around it. You cannot disconnect the telephones and fax machines just because you have supply chain software in place.

- **Many mistakes at first**

  There is a diabolical twist to the quest for supply chain software acceptance among your employees. New supply chain systems process data as they are programmed to do, but the technology cannot absorb a company's history and processes in the first few

months after an implementation. Forecasters and planners need to understand that the first bits of information they get from a system might need some tweaking. If they are not warned about the system's initial naiveté, they will think it is useless. In one case, just before a large automotive industry supplier installed a new supply chain forecasting application to predict demand for a product, an automaker put in an order for an unusually large number of units. The system responded by predicting huge demand for the product based largely on one unusual order. Blindly following the system's numbers could have led to inaccurate orders for materials being sent to suppliers within the chain. The company caught the problem but only after a demand forecaster threw out the system's numbers and used his own. That created another problem: forecasters stopped trusting the system and worked strictly with their own data. The supplier had to fine-tune the system itself, and then work on reestablishing employees' confidence. Once employees understood that they would be merging their expertise with the system's increasing accuracy, they began to accept and use the new technology.

Extended Supply Chain

The extended supply chain is a clever way of describing everyone who contributes to a product. So if you make text books, then your extended supply chain would include the factories where the books are printed and bound, but also the company that sells you the paper, the mill where that supplier buys their stock, and so on. It is important to keep track of what is happening in your extended supply chain because a supplier or a supplier's supplier could end up having an impact on you (as the old saying goes, a chain is only as strong as its weakest link). For example, a fire in a paper mill might cause the textbook manufacturer's paper supplier to run out of inventory. If the textbook company knows what is happening in its extended supply chain it can find another paper vendor.

Some Emerging Technologies

The most notable is Radio Frequency Identification, or RFID. RFID tags are essentially barcodes on steroids. Whereas barcodes only identify the product, RFID tags can tell what the product is, where it has been, when it expires, whatever information someone wishes to program it with. RFID technology is going to generate mountains of data about the location of pallets, cases, cartons, totes and individual products in the supply chain. It's going to produce oceans of information about when and where merchandise is manufactured, picked, packed and shipped. It's going to create rivers of numbers telling retailers about the expiry dates of their perishable items—numbers that will have to be stored, transmitted in real-time and shared with warehouse and inventory management, financial and other enterprise systems. In other words, it is going to have a really big impact.

Another benefit of RFIDs is that, unlike barcodes, RFID tags can be read automatically by electronic readers. Imagine a truck carrying a container full of widgets entering a shipping terminal in China. If the container is equipped with an RFID tag, and the terminal has an RFID sensor network, that container's whereabouts can be automatically sent to Widget Co. without the truck ever slowing down. It has the potential to add a substantial amount of visibility into the extended supply chain.

Right now the two biggest hurdles to widespread RFID adoption are the cost of building the infrastructure and the lack of agreed-upon industry standards.

SCM Software and Hardware

The core of an SCM system is its software. Supply chain software is a module-based application. Each software module automates business activities of a functional area in the supply chain. UNIX is the most common operating system for running SCM software. Supply chain management software is possibly the most fractured group of software applications on the planet. Each of the five major supply chain steps

previously outlined composes dozens of specific tasks, many of which have their own specific software. Some vendors have assembled many of these different chunks of software together under a single roof, but no one has a complete package that is right for every company. For example, most companies need to track demand, supply, manufacturing status, logistics (i.e. where things are in the supply chain), and distribution. They also need to share data with supply chain partners at an ever increasing rate. While products from large ERP vendors like SAP's Advanced Planner and Optimizer (APO) can perform many or all of these tasks, because each industry's supply chain has a unique set of challenges, many companies decide to go with targeted best of breed products instead, even if some integration is an inevitable consequence.

It's worth mentioning the old adage that systems are as good as the information they contain and this applies doubly to SCM. If the information entered into a demand forecasting application is not accurate then you will get an inaccurate forecast. Similarly, if employees bypass the supply chain systems and try to manage things manually, then even the most expensive systems will provide an incomplete picture of what is happening in a company's supply chain.

Business processes—Business processes of supply chain include supply chain planning, execution and collaboration, and operational control.

Users—The users of SCM systems are workers of supply chain participants at all levels.

Processes of Supply Chain Management

- **Demand planning and forecasting**—A critical factor to achieve success in supply chain management is accurate demand forecasting. Supply chain software systems utilize sophisticated mathematical models for predicating future demand from historical data.
- **Procurement**—This is the process of choosing the suppliers that will deliver the goods and services you need to manufacture or assemble your products, or create your services. It involves price negotiation, receiving, and verifying the shipments.

- **Manufacturing and assembly**—Raw components are assembled into final products or raw materials are manufactured into finished goods.
- **Distribution**—This is the process of delivering your products or services to consumers. Distribution involves warehousing, delivering, invoicing and payment collection.
- **Return**—Return and refund are important parts and also the problem parts of supply chain management.
- **Boundary of the SCM systems**—The boundary of a SCM system is the boundary of an extended enterprise, which includes the company, suppliers, partners, distributors and customers.

Supply Chain Planning

A SCM software system consists of many modules or applications. Those applications either support supply chain planning or supply chain execution. Supply chain planning includes demand forecasting, inventory simulation, manufacturing planning and transportation scheduling. Supply chain execution includes procurement, manufacturing and distribution. While supply chain planning is part of enterprise strategic planning, supply chain execution is part of managerial and operational control.

Demand Forecasting

The critical success factor to supply chain management is accurate demand forecasting. Supply chain software systems utilize sophisticated mathematical models for predicating future demand from historical data. The accuracy of the demand forecasting is largely dependent on how abnormal data is treated in the demand forecasting. Demand forecasting is an ongoing process. Supply chain management software systems can generate alerts at the frequencies of your preference on a weekly, or monthly basis.

Inventory Simulation

Inventory simulation estimates appropriate stock levels from historical inventory data. Items used for special events, road shows, or kitting are common causes that result count discrepancies, When a discrepancy occurs or the actual quantity physically counted doesn't match the stock level in the computer system, inventory specialists need to reconcile the discrepancy in terms of cycle counting. A cycle counting program can improve your business process, and accuracy of estimating inventory levels.

Manufacturing Planning

Manufacturing planning details the coordination of all manufacturing activities. It tries to achieve the optimal use of raw materials, manufacturing equipment and skilled labours based on orders placed by individual customers.

Transportation Scheduling

Transportation scheduling optimizes the use of resources in shipping raw materials from suppliers to manufacturers, and in delivering finished goods from manufacturers to distributors and customers. Transportation planning module of SCM utilizes linear and/or non-linear programming from operations research to ensure the delivery of materials and goods at right time, to right place at a minimal cost.

Supply Chain Execution

While supply chain planning applications facilitate demand forecasting, inventory simulation, manufacturing planning and transportation scheduling, supply chain execution applications automate order

processing, manufacturing, and distribution and return function. Supply chain planning is considered a part of enterprise strategic planning. Supply chain execution is about managerial and operational control. Supply chain execution is the process of putting supply chain planning into action.

Order Processing

In supply chain execution, order processing involves order placement, order confirmation, order fulfillment and order inquiry. Supply chain management software has a build-in capability that allows both workers and trading partners to easily place orders. Orders are confirmed by email notification and online confirmation. Users can easily look up their order status online.

Production and Assembly

In manufacturing or production phase, raw components are assembled into final products or raw materials are manufactured into finished goods. Workers perform kitting, packaging and labeling work for specific products. Manufacturing involves production, testing, packaging and preparation for delivery.

Distribution

After manufacturing, products or services are needed to be delivered to distributors or to consumers. Distribution involves warehousing, delivering, invoicing and payment collection. Distribution management is integrated with transportation planning and scheduling.

Return

Handling return and refund is an important part of supply chain execution. Lack of planning and logistics for processing return and refund have been a common problem in supply chain execution. The supply chain management systems should have infrastructure in place for receiving defective and excess products back from customers. In the holiday season, the rate of return to sales could hit more than 10% at some retailers and catalog-order firms.

The Supply Chain System of Wal-Mart and Procter and Gamble

SCM is utilized to facilitate the coordination with outside business entities, or in the scope of extended enterprise. SCM usually refers to the redesign of supply chain processes in order to achieve streamlining of supply chain collaboration. It is generally performed by only large corporations, with large suppliers.

Much of the popularity of supply chain management in business community is attributed to the success of Wal-Mart's supply chain system—an example of collaboration between a large supplier or a manufacturer (Procter and Gamble) and distributor/retailer (Wal-Mart). Before these two companies started in 1980s, the two giants built a software system that linked P&G up to Wal-Mart's distribution centers. At Wal-Mart's distribution center, when the inventory level of P&G's products reaches re-order point, the system automatically alerts P&G to ship more products. In some cases, the collaboration between P&G and Wal-Mart goes all the way to the individual Wal-Mart store. P&G was able to pass the saving from inventory management and order processing to Wal-Mart and eventually to Wal-Mart's consumers at 'low, everyday prices'.

Supply Chain Optimization

Enterprise can maximize utilization of resources, minimize the costs by streamlining and optimizing the supply chain from demand forecasting, materials requisition, order processing, order fulfillment, transportation services, receiving, invoicing, and payment processing.

SCM is the combination of the process and IT that integrates the suppliers of raw materials or components, the manufacturers or assemblers of the finished products, and distributors of the products or services into one cohesive process to include demand forecasting, materials requisition, order processing, order fulfillment, transportation services, receiving, invoicing, and payment processing.

Business to Business or B2B refers to electronic trade or partnering between organizations. The volumes of B2B transaction is estimated to be counted about 90% of e-commerce transaction, while B2C or business to consumer takes about 10% of the e-commerce activity. Many B2B exchanges offer functionality for managing procurement of raw materials and coordinating with suppliers. Speculating of B2B market had driven the stock prices of B2B software providers (such as Ariba) to sky-high in 2000. Public B2B exchanges have not lived up to their original ambitions. Today, many companies use both public B2B exchanges and their private supply chain management software for procurement.

Advantages and Disadvantages

Public B2B exchanges often have more suppliers participating. Companies have more options to select the suppliers that fit in their business needs, and they also have more power in negotiating the prices and terms of services. The cost of participating in a public exchange is significantly lower than implementing your own SCM systems.

The disadvantages of public B2B exchanges are lack of customization and limited supplier participants in a specific industry. Both industry-specific business requirements and company-specific business models

dominate the processes of procurement. While public B2B exchanges usually have features for supporting common procurement, they have very little to offer to support procurement processes in particular industry.

Advantages and Disadvantages of SCM

Private SCM software, on the other hand, is tailored to specific industry and particular company. SCM systems are often tightly integrated to a few suppliers and trading partners. The purpose of SCM is more of collaboration than price negotiation. The disadvantage of private supply chain software, compared with public B2B exchanges, is the cost of implementation. Many small companies who could not offer the implementation of private SCM systems, will use B2B exchanges for their SCM.

Strategies of e-procurement

To get the most out of SCM software and public B2B exchanges, large organizations have both of them in place. They use B2B exchanges for the procurement of commonly used materials, and use private SCM systems for collaboration with suppliers and trading partners who are industry-specific.

The public exchanges, with their independence and neutrality, may eventually attract more buyers and suppliers together in one place. Before that happens, companies will continuously build private exchanges in their supply chain management systems.

Inventory Management in SCM

Inventory Management is part of SCM. Inventory management is the systems and processes of maintaining the appropriate level of stock in a

warehouse. The activities of inventory management involve identifying inventory requirements, setting targets, providing replenishment techniques and options, monitoring item usages, reconciling the inventory balances, and reporting inventory status.

Inventory Planning and Demand Forecasting

A key to inventory planning is forecasting of accurate demand. Through software systems utilizing sophisticated mathematical models one can predicate future demand from historical usage data. The accuracy of the demand forecasting is largely dependent on how unusual usage is treated in demand forecasting. It is imperative that historical usage be corrected for any unusual activities. Demand forecasting is an ongoing process. The frequencies of forecasting depend on the length of acquiring inventory items. Some businesses may run forecast monthly, while others may need weekly forecasting. Inventory management software systems can alert inventory owners at the frequencies of their preference, whether on a weekly or on a monthly basis.

Inventory Monitoring and Balance Reconciliation

Inventory Monitoring involves activities of monitoring arrival, use, shipment and disposition of inventory items to ensure the accuracy of inventory management. Items used for special events, roadshows, or kitting are common causes that result count discrepancies, When a discrepancy occurs or the actual quantity physically counted doesn't match the stock level in the computer system, inventory specialists need to reconcile the discrepancy in terms of cycle counting. A cycle counting program can improve your business processes, ensuring the correct recording of material movement, proper stocking of inventory items and accurate order fulfillment.

Inventory Reporting

Various reports are indispensable for inventory management. Reports can come in canned or static or ad hoc forms. Static reports provide periodical summary of inventory items and usages. Ad hoc reports allow

users to look at inventory in criteria they prefer—by SKU (Stock Keeping Unit), product category, product type, or item owners.

SCM and Radio Frequency Identification Tags (RFID)

Good things come in small packages. This familiar cliché usually refers to precious stones, but today it's taken on a new meaning, in that, small things are now protecting items we deem valuable.

Analysts estimate that the retail industry loses US $ 50B a year to theft and upto ten times that amount to counterfeiting. High-end products such as cosmetics, fragrances and pharmaceuticals are most likely to be stolen or counterfeited. Many retailers and manufacturers believe that this big problem may have a tiny solution—RFID smart tags.

RFID is an automatic data capture technology that offers unparalleled accuracy in inventory control and SCM. Although RFID is not exactly in the media spotlight, the technology has been quietly working its way into our culture and into our lives, since it was drafted by the U.S. military 60 years ago.

The US Department of Defense first used RFID to track military aircrafts during World War II. Since then, this compelling technology has been used extensively in highway toll collection, building security, library circulation, parcel delivery and airport luggage transportation.

RFID and Future of Packaging

A basic RFID system consists of three components: An antenna or a coil, a transceiver (with a decoder) and a transponder (with a RF tag) electronically programmed with a unique information. The antenna emits radio signals to activate the tag, and read and write data to it. Antennas are the conduits between the tag and the transceiver, which controls the system's data acquisition and communication. Antennas are available in a variety of shapes and sizes; they can be built into a door frame to

receive data tag from persons or things passing through the door, or mounted on an interstate toll booth to monitor the traffic passing on a freeway.

RFID will change the way we think about SCM:

- A world where active tags track all shipments of goods using global positioning
- Inventory updated automatically as it enters or exits a warehouse
- Retail outlets using RFID technology
- Tagged pallets provide control of bulk storage warehouses and security items
- RFID technology is now here—the key challenge is the reduction in the cost of tags

RFID functions as a network of microchip 'smart tags' and receivers. Each smart tag is embedded with a unique Electronic Product Code (EPC) and a micro-antenna. Once assigned, the EPC becomes a DNA-like marker for the item, identifying it from every other item in the world. When a tagged item passes within the range of a reader, the reader retrieves the EPC via radio waves, identifies the item and its exact location, and relays this real-time information to a central computer. Taken together, the series of transactions comprise a comprehensive record of the tagged item's movement from point of origin to point of sale.

The greatest promise of RFID lies in its versatility in application. Smart tags can be affixed to either individual products or to pallets containing multiple units, and can be 'read' through most materials. RFID readers can scan multiple items at one time, making them functionally superior to traditional, uni-task barcode scanners.

Scientists at the Auto-ID Center, Massachusetts Institute of Technology (MIT), began to explore commercial applications of RFID in 1999. Wal-Mart, The Gillette Company and Proctor & Gamble were among the first to conduct pallet-level pilot tests. They quickly found that RFID offers improved supply chain visibility and more accurate inventory forecasting. Because RFID does not require line-of-sight operations (contrary to manual barcode scanning), the end users achieved improved inventory control with reduced labor costs.

Encouraged by their success, British retailers Marks & Spencer and Germany's Metro AG quickly adopted RFID applications in their production and distribution channels. The US Department of Defense, Benetton, Home Depot, Gap, Target, Kohl's, Tesco, Coca Cola and Albertsons have all begun incorporating RFID into their supply chain operations. In 2004 Wal-Mart issued a mandate that their Top 100 suppliers become RFID compliant by 2005, and the U.S. FDA plans to convert to item-level RFID distribution tracking by 2007.

In spite of strong industry support for RFID, widespread adoption of this technology has been rather slow. One reason for the delay is the lack of uniform standards for network and data management. For example, smart tags are currently available in low, high or ultra-high frequency versions, with read ranges of as little as a few inches to as much as 30 feet. AIM Global is a consortium of RFID developers and suppliers who are working to establish global RFID standards. Their goal is to educate manufacturers and suppliers about the potential benefits of RFID, and to provide the education and resources necessary to realize ROI from the use of this technology.

Cost and quality concerns have further dampened enthusiasm for RFID. Tag failure rates are reported to be as high as 20% to 30%. At an average cost of $0.30 per tag, many suppliers find the prospect of item-level tagging prohibitive.

So far, RFID compliance has been the responsibility of suppliers. Retailers have generally refused to accept any price increases resultant from RFID start-up expenses. As a result, suppliers have had to either absorb the cost of becoming RFID compliant or risk losing lucrative commercial contracts.

However, as RFID becomes the norm, manufacturers will look for converters who can provide pre-tagged packaging that is market-standard compliant and ready for entry into the RFID regulated supply chain.

Technology is inherently evolutionary. The logistics of RFID are changing rapidly, with ongoing advancements in ink, labels and methods of smart tag attachment.

Within the last few years RFID has steadily migrated from the inner circles of science and technology into the public consciousness. RFID is now well-integrated into the packages of food you eat, the clothes you wear, the car you drive... even what's in your medicine cabinet.

Looking Ahead

Worldwide spending on RFID is expected to top $3 billion by 2008, almost triple the market of 2003. The widespread adoption of RFID in diverse industries has made one thing abundantly clear. Frequency standards must be established to facilitate the full potential of RFID implementation.

EPCGlobal, an international consortium of RFID technology manufacturers and suppliers, has established its own protocols that they intend to submit to ISO for acceptance as international standards.

Supporters embrace RFID's positive impact on the business bottom line, including reduced labor costs, increased supply chain accountability and improved product availability to the customer. Some privacy advocates and consumer groups have raised concerns about potential abuses of RFID and erosion of personal security.

Like the Internet, RFID enables significant advances to our business and personal lives. And like the Internet, it can be misdirected with negative consequences. As with any technology, it is incumbent upon each one of us to become educated and remain involved in the implementation of RFID in our communities.

SCM and CPFR

Collaborative Planning, Forecasting and Replenishment (CPFR)—is a concept that allows collaborative processes across the supply chain, using a set of process and technology models that are:

- Open, yet allow secure communication
- Flexible across the industry

- Extensible to all supply chain processes
- Support a broad set of requirements (new data types, interoperability with different DBMSs, etc.)

The mission of the CPFR initiative is closely tied with similar efforts that have preceded it—such as ECR (Efficient Consumer Response), Quick Response and VMI-Vendor Managed Inventory. Its objectives are consistent with the objectives of the Voluntary Inter-industry Commerce Standards Association (VICS), a voluntary, non-profit organization, which takes a global leadership role in the ongoing improvement of the flow of product and information throughout the entire supply chain in the general retail merchandise industry. Specifically, the merchant issues group within VICS has undertaken several improvement initiatives related to general merchandising. One of these initiatives is called Dynamic Information Sharing (DIS). (For further reading visit: *www.cpfr.org*)

ERP, Data Warehouse and Business Analytics

According to *Fortune*, 90% of organizations today fail to execute on their corporate strategy. The reason for this boils down to a simple fact: most companies lack effective mechanisms for properly aligning execution with strategic initiatives. A study by the Balanced Scorecard Collaborative cites the following findings:

- Only 5% of the workforce in a typical company understands corporate strategy
- Only 25% of management incentives are linked to strategy
- 60% of organizations do not explicitly link budgets to strategy

The reality is that most companies work within organizational chaos. Seldom are the constituent parts of the enterprise coordinated in thought or action. What's needed is next-generation analytics that can help companies drive strategic imperatives down to the process level. Only in this fashion can all members of an enterprise, across the complete

value network, make informed decisions and take action in concert with organizational objectives. To achieve this, organizations need to do the following:

- Embed information into relevant business processes and provide decision-making guidance to the end user
- Provide in-process access to collaboration tools, enabling workers to communicate with their colleagues to make informed decisions in a productive manner
- Establish a firm data foundation to ensure integrated, consistent, timely information and metrics
- Apply new business insights to business processes on an ongoing basis to improve efficiency, lower risk, and continuously improve business performance

ERP Analytics leverages existing enterprise application components—regardless of vendor—to seamlessly integrate analysis, transaction, and collaborative steps across the entire value network. Configured with industry-specific business content in some cases, ERP Analytics also bring together historical and operational data in the context of business processes. ERP analytics provides quick, easy, in-process access to the tools employees require to make informed business decisions that align with strategy. Just as ERP automated the business process, now ERP Analytics reinforces strategically aligned decision making by supplying relevant business insight at the time and place decisions are made. For each step in a given process that requires a user to make a decision, ERP Analytics assists the user to weigh options in the context of the overall strategy. Where decisions require additional cross-functional input, the application invokes collaboration tools required to communicate with all the relevant process participants, stakeholders, and strategic decision makers. Once a decision is made, appropriate transactional elements are available for completing the process. Rather than stepping outside the process to access separate systems, the user is guided along and presented with the relevant transactional options.

Comprehensive analytics for a wide range of business needs supports a vast array of industry and cross-industry functions, ERP Analytics needs to be quickly modified to fit your individual needs of valuable time.

Example: Customer Relationship Management

With the benefit of at-a-glance key performance indicators (KPIs) delivered directly to the business user, the CRM capabilities combined with ERP Analytics enable you to analyze won or lost opportunities over time, assess the relative potential of sales opportunities, and gain a quick overview of orders to stock. Service managers can also get a quick overview of important KPIs for service-level agreement compliance, service order status and details, and profitability by service organization. For campaign management purposes, ERP Analytics can be used to pull planning data from the backend CRM system and to compare that data with actual progress, telling the user whether or not target margins are being achieved.

ERP Analytics integrates with the backend system at the transactional level as well. For example, when call center service levels are breached, ERP Analytics can automatically notify the customer service manager and present various options for corrective action. If the problem is an unexpected shutdown of an associated call center that typically shares the call load, the customer service manager can easily redirect calls to other available service centers without having to log-in to the CRM system on the backend. This helps workers on the front line align their activities with overall strategic objectives, in a highly productive manner.

ERP—The Platform for Business

The ERP platform plays a critical role in enabling the unique functionality of ERP Analytics. The ERP Portal component, for example, provides a zero-footprint client for fast deployment, simplified administration, and role-based personalization. Leveraging a 'no code to write', drag-and-drop, WYSIWYG composition environment, ERP Analytics exposes the business logic of analysis in modular fashion, allowing you to focus on how analytics can help your business without getting lost in the technology that enables it. On an ongoing basis, you'll be able to reuse

existing business intelligence assets and enhance ERP Analytics to meet the needs of your evolving business—lowering your total cost of ownership in the process.

The Benefits of ERP Analytics

Combining analytical, transactional, and collaborative functionality to enable seamless, intelligent, composite business processes, ERP Analytics delivers the following tangible benefits:

Better Informed Decisions

ERP Analytics provides accurate, comprehensive, timely, and actionable information for better business decisions. Out-of the-box business analytics with seamless integration of relevant ERP and non-ERP business data enables quick delivery of comprehensive insight.

Better Business Performance

Decision Making

With ERP Analytics, businessmen are able to understand the impact of their decisions to more effectively support organizational strategy. This improves the overall corporate performance and enables executives to move the enterprise in new directions, in response to competitive pressures and emerging opportunities.

Faster Innovation

A better-informed workforce can take quicker action to improve and succeed.

Faster Response

ERP Analytics helps businesses survive and thrive in a changing world by anticipating and identifying changes to key business drivers. Because ERP Analytics is flexible and extensible, businessmen can easily extend and adapt their analytic applications to meet any kind of future needs.

Increased Competitive Advantage

ERP Analytics enables businessmen to understand the context of their business, gain relevant insight, and take action to maximize the competitive advantage. With knowledge gained from ERP Analytics, organizations can deploy innovative business processes and optimize business performance across the value network.

ERP and Warehouse Management Systems

Typically, after the ERP software has settled in, you may start to investigate ways to improve your management of operations through the use of a Warehouse Management System (WMS). Unless you're faster than a speeding bullet and can leap tall buildings in a single bound, normally you do not install both ERP software and a WMS at the same time. Regardless of your approach, early on, you will notice an overlap in warehouse functionality between the ERP software and a WMS. When comparing the warehouse functions and features embedded in ERP software against those in a WMS, the ERP software usually comes out on the short end of the measuring stick. So your path is obvious; use the WMS for inventory related functions.

Focusing on warehouse functionality that is typically contained in both software solutions, it is a good idea to discuss the merits of using the features of one software solution over the other. This discussion should concentrate on out-bound, in-bound, and miscellaneous warehouse processes. Most importantly, it concludes with an identification of the critical interface, where a majority of the work is to be done. While there are no exactitudes and you may be left with more questions than answers, completing the thought process can help you gain an appreciation of the complexities of making these two software solutions work together effectively for your organization.

ERP for Small and Medium Size Businesses

IT Motor for Business Success

Globalized markets, growing requirements for internal and external communication and fast response time to continually changing market conditions mean that small and midsize businesses are nowadays up against new challenges. Cutting-edge business software systems can help SMBs apply optimum solutions to complex business and technological requirements, both now and in the future. And future-oriented, flexible and cost-effective ERP software that supports the business strategies of SMBs is crucial.

The pressure on SMBs to modernize their IT at some point is essentially due to ever-shorter technology cycles. As a recent META group study on IT for SMBs identifies, ERP is one of the foremost important driving forces behind IT growth.

ERP is Back in Favor

Being again in the spotlight is an amazing development; since just a few years ago ERP was thought to be outdated and was frequently equated with inflexible, low-function architecture and functionalities. However, the image has changed dramatically and ERP has regained acceptance. The term ERP II coined by the US market research company, Gartner Group, described the paradigm change that business software has undergone since the early 1990s and there are essentially two aspects to this change.

Corporate solutions nowadays have to satisfy e-business requirements and, in addition to data exchange functions, also have to support cross-company transactions. But increasing cost pressure, shorter product life cycles and new forms of cooperation with suppliers, partners and customers also mean there is a need for detailed analysis, restructuring and acceleration of business processes. Information on a business's 'operating parameters' (e.g. business and customer data and

business-management analyses) and on customers or stock levels, which can be called up at the click of a mouse, shorten response times and increase company flexibility. And targeted use of resources is absolutely imperative for SMBs who compete on an international level.

In another area too there is evidence of a further paradigm change. The area of application for ERP systems is extending beyond the traditional user groups of business area managers. The new users can more or less be divided into the following three groups.

- **Multi-enterprise users**—Business processes are extending beyond individual companies and creating a need for cross-company cooperation, not only between systems but also between users.
- **Self-service users**—According to IDC analyst Dennis Byron, the number of users working with ERP software within companies, to record vacations or absenteeism for instance, is set to increase from its current level of 20 percent on average to 75 percent by 2008.
- **Mobile users**—Increasingly the field staff has to be able to call up important customer data while out of the office.

SMBs looking for an ERP system should move forward by cautiously following specific selection criteria and ensure they are well prepared. Key requirements for cutting-edge business software are a flexible architecture and modular structure, support for popular standards, internal and external interfaces, and scalability. Other factors include simple configuration, fast implementation and user friendliness.

(*Source: www.detecon.com/en* ERP Strategies in Collaborative Business, *www.gartner.com* ERP II Studies, *www.forrester.com, www.idc.com, www.metagroup.co.uk/, www.pac-online.de* SAP: *www.sap.com/solutions/erp* and *www.sap.com/solutions/smb)*

Balanced Score Card

ERP Performance Management

This approach is a very successful one for implementing ERP with a

numeric management or the BSC method. Performance management translates the big picture of the organization into the actions of individuals, using language, values and behaviors that they can understand and act upon. Similarly the ERP system must meet these criteria, and there are no 'silver bullet' solutions.

Reasons for ERP Failures

- No clear definition of why ERP is needed
- Unrealistic expectations on the part of senior management (sometimes viewed as a 'black box' or technology solution)
- No clear linkage with business strategy
- A poorly developed and articulated business strategy
- No strategy map to define the 'cause and effect' linkages
- Inappropriate measures
- Inadequate consultation, communication and training through the whole implementation process

Elements of an Effective ERP

The elements of an effective ERP are:

- A sound business strategy as a starting point
- Aligned with strategy
- Value metrics based around 'cause and effect'
- Cascading design
- Appropriate measures
- Sound implementation
- Linkages to recognition and reward

'Value Metrics' Action Plan of ERP Implementation or Rollouts

- Build a business case for the ERP
- Use strategy maps to link strategic objectives to the ERP
- Track only the most vital metrics
- Solicit ideas on performance metrics from stakeholders close to the action

Table 2.1 Appropriate measures using ERP

Key objective	Outcome (lag) measure	Activity (lead) measure
Strong cash flow	Strong cash flow	• Late fees and interest charges • Late payment/prompt payment, discounts
Accurate invoice payments	Number of accounts payable transactions with errors	• No. of errors on invoice/vouchers • No. of duplicate payments and overpayments • % of cheques processed manually • % of invoices processed via EDI • % of invoices paid on time
Effective supplier relationships	Supplier satisfaction as reported in surveys	• No. of supplier inquiries • Days to resolve supplier inquiries

Table 2.2 Key financial & non-financial metrics

Non-financial	Financial Metrics
• Days stock cover	• Gross sales
• Out of stocks	• Gross margin
• Employee opinion survey	• Warehouse inventory
• Mean time to market	• Revenue growth
• Demand forecast accuracy	• Internal costs to sales
• Employee turnover	• Return on investment
	• Promotional spend to sales

(*Contd*)

(*Contd*)

• Consumer opinion survey	• Market share per segment
• Supplier opinion survey	• Competitive comparison of market share
• Consumer complaints	• Market size and growth
• Share price movements	• Purchases through alliances

- Group performance measures into the ERP perspectives, drawing on priorities of company strategy
- Track a complementary range of 'lead' and 'lag' indicators
- Select a software package that maximizes ERP potential
- Cascade the ERP

'Best practice' criteria for measures are:

- Easy to understand, process and report
- Allows for easy comparison to industry averages
- Staff and management buy into and trust the measures as worthwhile
- Interpreted the same way by everyone who uses the ERP system
- Easy to change as the organization needs change

The "Ten Commandments" of Implementation

1. Use the ERP for implementing strategic goals
2. Business strategy must be in place first
3. Sponsorship at senior management level
4. Implement a pilot project
5. Introduce the ERP gradually to each business unit once the needs are understood
6. Do not use the ERP as an extra method of hierarchical control
7. Do not use a standardized product—tailoring is the key
8. Do not underestimate the need for training and communication

9. Do not overcomplicate the ERP
10. Do not underestimate the costs of data migration recording, administering and reporting

Warning Signs

- Loss of commitment from the top (financial and participation)
- Resistance and difficulty in gaining consensus
- When the business strategy cannot be translated into a strategy map
- Gaps in the strategy map or unclear linkages
- ERP viewed as one individual's special cause
- People starting to manage the measures rather than their areas of responsibility
- Outbreak of 'private' reporting systems

Exploiting ERP Technology

The benefits available from technology:

- External and internal data from multiple sources
- Multi-dimensional data access and management
- Drill down in terms of data detail
- Cascading facility down through the hierarchy
- Accessibility (e.g. web-based facilities)
- Integration ensures consistency of data (no 'private' or fragmented measurement systems)
- A number of software vendors experienced in ERP

Technology Solutions

The technology solutions in an ERP framework are:

- Follow the accepted method of seeking software solutions
- Define the objectives

- Needs analysis, including the ERP framework and the way the measurement process will operate
- Define the 'look and feel' required
- Involve the software provider in the design and provide as much information as possible
- Don't expect a totally 'turn key' solution
- Adequately provide for training resources
- Be prepared for refinements, but give the initial version time to fine tune

Conclusion

- No 'shrink-wrap' model for a balanced ERP—it must be tailored
- The ERP must be aligned with the organization's strategy and 'cause and effect' factors must be recognized in the strategy map
- Relevant measures with a balance between 'lead' and 'lag' 'fewer is better'
- It must cascade down to everyone—'strategy is everyone's responsibility'
- Do the preparation and design work before seeking a software solution

CHAPTER 3

Users of ERP Systems

Everyone Around You is Using an ERP

Is that an answer to who is using ERP systems? Now the qualifier—best-run companies run … ERP! Is that a fact? Or better still, innovative companies run ERP systems. Companies that use ERP, perform better. Globally, above-average performers leverage ERP technology. Let's analyze the statements carefully in this chapter.

The first ERP-like application was developed in the early 1960s from a partnership between J.J. Case, a tractor manufacturer, and IBM. Manufacturing Resource Planning (MRP) was born to help plan and execute efficient manufacturing resources. A decade later, five bright ex-IBM executives in Germany formed 'Systeme, Anwendungen und Produkte', or SAP, to apply the lessons learned from MRP to business processing.

The idea caught on with other IT wizards, and with companies such as Oracle, JD Edwards and PeopleSoft. They sprung up, with a vision of creating the mother of all business software—the ERP.

By the 1990s, ERP applications controlled the flow of business information in America and Western Europe. But they were limited to procedural functions inside the four walls of the organization. Web and e-businesses were still at a nascent stage.

SCM and CRM, all happened as extensions to ERP or as best-of-breed applications with the promise that vendors could have more visibility of their customers with a knowledge of what to sell. ERP along with BI applications promise to serve-up what every knowledge worker needs to know to be efficient, effective and profitable. They are the new paradigm that distills plain data into key performance indicators.

But SCM, CRM and BI applications are all add-on functionalities that aren't worth much if they don't have an ERP foundation in an organization. ERP is the best innovation that has happened and companies using ERP have gained through innovation and extensions of ERP to CRM, SCM and Business Analytics.

ERP—A Knowledge Innovation

Peter F. Drucker in his seminal article *Discipline of Innovation* states, "Among history-making innovations, those that are based on new knowledge—whether scientific, technical, or social—rank high. They are the superstars of entrepreneurship; they get the publicity and the money. They are what people usually mean when they talk of innovation, although not all innovations based on knowledge are important."

Knowledge-based innovations such as ERP differ from all others in the time they take, in their casualty rates, and in their predictability, as well as in the challenges they pose to entrepreneurs. They have, for instance, the longest lead-time of all innovations. There is a protracted span between the emergence of a new knowledge and its distillation into usable technology. Then, there is another long period before this new technology appears in the marketplace, in products, processes, or services. Overall, the lead-time involved is something like 50 years, a figure that has not shortened appreciably throughout history. Although Peter Drucker is right about the basic principles of innovation—his lead-

time definition is no longer valid. Today innovations in IT and ERP are taking place at the speed of thought—to borrow a cliché from Bill Gates.

The computer, to cite another example, required no fewer than six separate strands of knowledge:

- Binary arithmetic
- Charles Babbage's conception of a calculating machine, in the first half of the nineteenth century
- The punch card, invented by Herman Hollerith for the US Census of 1890
- An electronic switch called the audition tube, invented in 1906
- Symbolic logic, which was developed between 1910–13 by Bertrand Russell and Alfred North Whitehead
- Concepts of programming and feedback that came out of abortive attempts during World War I to develop effective anti-aircraft guns.

Although all the necessary knowledge was available by 1918, the first operational digital computer did not appear until 1946. Similarly, ERP evolved from MRP I and MRP II to the present day ERP solutions, over a 30-year span. But the pace of innovations has increased tremendously.

Effective Innovations Start Small

They are not grandiose. It may be for integrating business processes or standardizing core applications like ERP. By contrast, grandiose ideas for things that will 'revolutionize an industry' are unlikely to work. Many companies started with ERP along with simple goals. In fact, no one can foretell whether a given ERP adoption will end up supporting a big business or a modest achievement. But even if the results are modest, the successful ERP innovation aims from the beginning to become the standard setter, to determine the direction of a new technology or a new industry, solution to enable business and remain ahead of the pack. If an innovation does not aim at leadership from the beginning, it is unlikely to be innovative enough.

Above all, innovation is pure work rather than a work of genius. It requires knowledge. It often requires ingenuity. And it requires focus. Clearly there are people who are more talented innovators than others, but their talents lie in well-defined areas. Indeed, innovators rarely work in more than one area. For all his systematic innovative accomplishments, Thomas Edison worked only in the electric field. An innovator in ERP software areas, SAP for example, is not likely to embark on innovations in database. SAP leaves it to Oracle.

In innovation, as in any other endeavor, there is talent, there is ingenuity, and there is knowledge. But when all is said and done, what innovation requires is hard, focused and purposeful work. If diligence, persistence, and commitment are lacking, talent, ingenuity, and knowledge are of no avail.

There is, of course, far more to entrepreneurship than systematic innovation—distinct entrepreneurial strategies, for example, and the principles applied for ERP adoption by management, which are needed equally in an established enterprise, the public service organization, and the new venture.

Most of the top innovative organizations across the globe are early ERP adopters. Siemens, GE, HP, Microsoft, Sony, Ford, ABB, Allianz, REI, Dupont, Halliburton, Shell, Reliance Industries and a host of *Fortune* 1000 and small and medium size businesses use ERP as part of their strategy to remain innovative and competitive. They are able to capitalize on the innovations of the ERP technology by early adoption and usage.

Bringing Teeth to your Organizations by ERP Use

The benefit from integrated ERP system is realized when the business and the software are working to achieve the same ends and when, those ends are known to have real business benefits. So when you are unhappy with the outcome of your latest integrated ERP system purchase, consider the following questions.

- What was the business problem that needed to be solved?
- Can the system benefit that problem?
- Will it require the business to work differently?
- How will it affect the employees and their jobs?
- How can we get the whole business to understand where we must go and how we will get there?

Better still ask those questions before another system is purchased. Systems and businesses that they support will have:

- A better ROI when they are both working in the same direction
- Less training issues, when the employees understand how the business is changing and how the new system supports the change
- Less implementation issues, when the system that is purchased is aligned with the business processes out-of-the-box

James C. Collins and Jerry I. Porras in their best-selling book, *Built to Last* said: 'Intentions are fine and good, but it is the translation of those intentions into concrete items—mechanisms with teeth—that can make the difference between a visionary company or, forever remaining a wannabe.'

Enterprises have long made grandiose statements about getting closer to their customers and streamlining operations. The ERP, CRM, and SCM applications and the organizations implementing them are at least in part, 'bringing teeth' to those strategic intentions. It is not an easy process, though. In fact, the highly publicized failures of these initiatives have in some minds tainted these applications and their possible benefits. However, more and more organizations are moving forward with ERP initiatives, and the successful organizations will benefit from higher margins, better customer relations, and improved back office operations.

Technology for technology's sake is long gone. Organizations are only interested in deploying ERP tools and applications that have a measurable impact on customer and supplier relations, and internal efficiency.

Despite their rapid proliferation, packaged enterprise applications have been the subject of notorious calamity stories over the last few years. High-profile debacles of ERP implementations at such companies as

FoxMeyer and Hershey Foods, have raised questions about the value of these applications. Yet the market for ERP continues to grow, and annual growth rates of 40–50 percent are expected for newer applications like SCM and CRM. At the same time, e-commerce is creating even more demand for these packages. Packaged applications are becoming must-haves, and business leaders are asking, what should we be doing, how do we avoid disasters, and how do we make sure our company gets a healthy return from these investments?

The Core ERP Benefits

An ERP environment operates in line with the business—online and in real time. Management has access to online and up-to-date information on how the business is performing. Common and consistent information is shared among application modules and among users from different departments simultaneously. This feature is illustrated by observations such as, following implementation of an ERP, organizations typically report completion of period or year-end closes in one or two days as opposed to two to three weeks under their Legacy system environment. Another key change brought about by the implementation of ERP systems is that the systems are owned and driven by business process owners or end users, with the technical support of IT, rather than being owned and driven by IT alone.

Organizations implementing ERP systems can achieve significant benefits such as:

- Reductions in inventory
- Re-deployment of personnel into more value-producing activities
- Productivity improvements
- Improvements in order-management cycle time
- Reduction in financial-close/cycle
- IT cost reduction
- Procurement-cost reduction
- Improvement in cash-management

- Reductions in transportation or logistics cost
- Reductions in hardware and software maintenance
- Improvements in ontime delivery

The intangible benefits of an ERP implementation while difficult to quantify, can deliver significant business value through improved organization capabilities, including:

- Information and visibility (e.g. drill-down capability, consistent and reliable information across business areas)
- New/improved processes
- Improved customer responsiveness
- Integration and standardization
- Flexibility
- Globalization

How ERP Evolved

An understanding and appreciation of ERP—how it evolved, how it is being used—helps gain deeper insights into smart ERP deployment and usage.

ERP is a packaged software product that can be bought 'off-the-shelf' and tailored by an organization to integrate and share its information and processes within and across functional areas (Davenport, 2000). Unlike custom-built software that must be programmed in traditional ways to meet local needs, ERP software is '*generic, targeting multiple industries, and must be configured before it can be used. Modules are combined together to create ERP suites for specific industry sectors (e.g. manufacturing, retail) or company size and it is through the configuration of these modules that local solutions are derived. The technology often replaces 'home grown'* discrete information systems and applications with a single infrastructure that when combined with efforts to re-engineer work practices, promises to streamline organizational activities by eliminating duplication of effort and data according to Davenport. This is expected to facilitate increased confidence in organizational data and lead to timely and informed

decision-making by squashing silos or stove pipes of technology—large, diverse, unintegrated and ageing systems and building an integrated platform upon which all administrative activity takes place.

Back-office ERP systems evolved from technology designed to aid operations in the manufacturing industry. First, to help with Inventory Control (IC) and later to manage materials and manufacturing processes (MRP I and MRP II). Software vendors exploited the notion of designing standard software packages that could be sold within multiple markets and across organizations within particular industries, thereby increasing their economies of scale. This business strategy was based on the notion that all contemporary organizations have generic business needs and could benefit from vendor and consultant expertise by implementing a standard business solution as their information infrastructure. As such, MRP II functionality was expanded into ERP by including most enterprise processes, such as operations and logistics, financial and managerial accounting, human resources, and sales or order management.

The 1990s was a decade where companies were turning away from decentralized computing systems in favor of company-wide initiatives for organizational transformation. Company managers began situating their organizations within a global context and in turn they developed a sense of worldwide business solutions. This awareness was supported by international management consultancies whose revenues increase as approaches become more widespread and standardized. These consultancies—the Big 4—were the 'driving force' behind both the ERP trend and its precursor, BPR that forms an integral part of most ERP implementation.

BPR initiatives are aimed to increase organizational efficiency through more streamlined work practices. However, at the height of BPR's popularity in the early 1990s, it was difficult to achieve such transformation because information systems remained as functionally-based silos of technology that contradicted process-oriented models. In 1992, the press first reported on integrated technology solutions and SAP, the German software company, launched its 'R/3' ERP package from SAP AG. The viability of an integrated, enterprise-wide solution developed from the decreasing cost of computing technology, the advent

of client-server architecture, and the increased use of internet by organizations.

By the mid-1990s the media began to report on the ERP trend in conjunction with fears about the 'millennium bug' and the Y2K system compliance. Management consultants were touting the global ERP software solutions available from the several vendors that had come to dominate the market SAP, the industry leader, as well as Oracle, Baan, JD Edwards and PeopleSoft introduced 'mega-packages' and by this time, high-profile organizations had already begun installing the software. In 1998 'The ERP Revolution' was named and by late 1999, most of the *Fortune 500* companies had implemented the technology. This 'revolution' continued to grow as a number of organizations began jumping on the ERP bandwagon in an attempt to regain control over their systems in a time of global insecurity.

It was Davenport's (1998) seminal article that provided the first solid overview of the technology substantiated through succinct case studies of ERP implementation at several multinational companies. He consolidated what the trade press had been reporting in bits and pieces for approximately one year: complexity and challenges abound when organizations try to reconcile the promises of ERP with the realities of its implementation and use (*Economist*, 1999; Stein, 1999).

Business executives seeking expert advice about operating in the new millennium were encouraged by management consultants and ERP vendors to replace outdated, home grown systems and applications with a single, integrated solution.

Not only did the off-the-shelf ERP solutions provide a 'comfort-level' to organizations because the technology was Y2K compliant, but also because its integrated design promised to increase management control and centralize decision making.

- Purchasing packaged software allows organizations to 'acquire functionality' rather than 'reinvent the wheel' by designing in-house administrative systems that may not differentiate the organization in terms of competitive advantage.
- The notion that backoffice administrative functions are non-strategic and best automated based on a standard ERP template, seems to

be taken for granted by organizational leadership. ERP has become a prerequisite for operating in the 21st century.

- ERP has gained in momentum because organizational leaders believe their administrative infrastructure should be based on the 'best business practices' embedded within ERP software.

Hosting a generic or customized ERP system through networked servers using the Internet or a virtual private network offers organizations the architecture without the ownership of it. This strategy is expected to reduce administration costs and redirect human resource efforts away from the management, monitoring, and maintenance of backoffice ERP technology, and toward strategic issues of systems. Whether it is purchasing the software or outsourcing applications, overhauling administrative systems to an ERP model encourages organizations to adopt a normative administrative model, the basis of which underpins a vast number of contemporary organizations around the globe. Whilst the revision of backoffice work practices through ERP may not be considered an activity that will increase competitive advantage, it certainly has impacted the ways in which organizations must confront and work toward their strategic IT goals.

The differences between developing and implementing customized information systems versus configuring packaged software such as ERP has been the subject of several information systems studies. Large organizations choose to modify standard ERP packages to such an extent that the technology cannot appropriately be defined as off-the-shelf software. Rather, organizations are involved in something in-between, complete customization and configuration, which impacts the implementation risk and cost of subsequent system upgrade.

The reported popularity of ERP technology coupled with the challenges of implementing an integrated software package into an organization has led academic researchers and software vendors to try and provide insight into controlling the implementation processes. The transition from locally accepted, 'Legacy' systems to standard enterprise-wide architecture is complex impacting both organizational outcomes and the momentum of the global ERP trend.

Four Major Reasons for Undertaking ERP

Integrate Financial Information

As the CEO tries to understand the company's overall performance, he may find many different versions of the truth. Finance has its own set of revenue numbers, sales has another version, and the different business units may each have their own version of how much they contributed to revenues. ERP creates a single version of the truth that cannot be questioned because everyone is using the same system.

By integrating customer-order information ERP systems can become the place where the customer-order lives from the time a customer service representative receives it until the loading dock ships the merchandise and finance sends an invoice. By having this information in one software system, rather than scattered among many different systems that can't communicate with one another, companies can keep track of orders more easily, and coordinate manufacturing, inventory and shipping among many different locations at the same time.

Standardize and Speed up Manufacturing

Manufacturing companies—especially those with an appetite for mergers and acquisitions—often find that multiple business units across the company make the same widget using different methods and computer systems. ERP systems come with standard methods for automating some of the steps of a manufacturing process. Standardizing those processes and using a single, integrated computer system can save time, increase productivity and reduce head count.

Reduce Inventory

ERP helps the manufacturing process flow more smoothly, and it improves the visibility of order fulfillment process inside the company. That can lead to reduced inventories of the material used to make products (work-in-progress inventory), and it can help users better plan

deliveries to customers, reducing the finished-good inventory at the warehouses and shipping docks. To really improve the flow of your supply chain, you need supply chain software, but ERP helps too.

Standardize HR Information

Especially in companies with multiple business units, HR may not have a unified, simple method for tracking employees' time and communicating with them about benefits and services. ERP can fix that.

In the race to fix these problems, companies often lose sight of the fact that ERP packages are nothing more than generic representations of the ways a typical company does business. While most packages are exhaustively comprehensive, each industry has its quirks that make it unique. Most ERP systems were designed to be used by discrete manufacturing companies (that make physical things that can be counted), which immediately left all the process manufacturers (oil, chemical and utility companies that measure their products by flow rather than individual units) out in the cold. Each of these industries has struggled with different ERP vendors to modify core ERP programs to their needs.

Finding the Right FIT

It's critical for companies to figure out if their ways of doing business will fit within a standard ERP package before the checks are signed and the implementation begins. The most common reason that companies walk away from multimillion-dollar ERP projects is that they discover the software does not support one of their important business processes. At that point there are two things they can do: They can change the business process to accommodate the software, which will mean deep changes in long-established ways of doing business (that often provide competitive advantage) and shake up important people's roles and responsibilities (something that few companies have the stomach for). Or they can modify the software to fit the process, which will slow down the project, introduce dangerous bugs into the system and make

upgrading the software to the ERP vendor's next release excruciatingly difficult. This is because the customization will need the ERP system to be torn apart and rewritten to fit with the new version.

Needless to say, the move to ERP is a project of breathtaking scope, and the price tags on the front end are enough to make the most timid CFO, a little twitchy. In addition to budgeting for software costs, financial executives should plan to write checks to cover consulting, process rework, integration testing and a long laundry list of other expenses before the benefits of ERP start to manifest themselves. Underestimating the price of teaching users their new job processes can lead to a rude shock down the line, and so can failure to consider the requirements of data-warehouse integration and the cost of extra software to duplicate the old report formats. Oversight in budgeting and planning can send ERP costs spiraling out of control.

ERP business value is created at all levels of the organization—enterprise, business unit and business processes. Let's see how this works.

Gaining Agility

ERP brings the combination of speed and flexibility—not only the ability to do things faster, but also to change direction quickly. Thus, this is not only about speed and acceleration, but also about turning direction. The drivers are—24X7, zero latency, IT—Workflow, collaborative commerce.

Managing Knowledge

ERP creates the ability to capture what is tacit, including the intellectual and experience base of the organization, to make it available to improve decisions, improve work processes and enhance learning for creativity and innovation. The drivers are: skill shortage, intellectual capital based economy, IT content and KM, CRM.

Enhancing Quality

The ability here is to ensure consistency, correctness and accuracy of products and services provided. Callback of goods can kill companies. And, on the other hand, without quality IT processes, callback may even be impossible. The drivers are: zero defect expectation, global competition, IT liability, in-service and warranty systems.

To apply the ERP imperatives at the business level, it's useful to view them through the prism of business process. After all, these competencies should help in improving process and adding value to the business.

In this case, the business processes are—developing products, managing operations, selling and servicing customers. Then there are cross-functional processes, such as finance and HR. Business unit and process managers typically have a well-honed set of value measures for these processes.

Getting the ERP Value

For instance, if you asked the owner of the product development process in your organization, 'what are the most important measures of the success (value, in other words) of your process?' he may have no hesitation in saying 'faster time to market or desired functionality in the product'.

If this is where business value is created, this is where we need to see if ERP is making a difference. The IS organization can sharpen both the perception and reality of business value by:

- Mapping where ERP is a critical enabler of business value in a process
- Focusing measurement on critical areas likely to most impact business value

Well-designed systems can critically impact multiple business imperatives and generate business value through many processes. This framework can form the basis of a dialog between IS and business units about which business imperatives are most critical and how ERP can contribute to them.

As noticed earlier, the link between business value and the contribution made by ERP is tenuous. The trail has to be, therefore built very carefully. Establishing the trail of evidence requires:

- Defining the appropriate business value
- Measures for business value
- Determining the ERP value-add

The first step in building this trail is to select basic business values for each business process. Thus,

- For product development process, the business values are—faster to market, new product functionality and easier regulatory compliance. In your own businesses, there may be one or more different values.
- In the process of managing operations the values are—reduced inventory, faster collections, higher productivity, etc.
- In the selling process, better cross-selling, easier customer acquisition, more profitable customers, etc.
- In customer service—reduced wait-time, improved retention and fewer returns
- In cross-functional processes—reduced cycle-time and faster decision making

In each process, where ERP is a critical enabler of business value, a measure of the business value is generated.

What Cannot be Measured, Cannot be Controlled

Where measures do not exist, they should be created jointly with business process owners. The measure for reliability, for instance, could be 'defect rates for new products'. Or, the measure for faster collection could be 'day's sales outstanding'—DSO. Now, this is something that can be tracked overtime or against a benchmark, and success of the process can be objectively measured. Who can argue with a DSO number?

In the case of process of product development, for instance, the measure for 'faster to market' value could be 'time taken from concept design to availability of product'. The measure for new product functionality could be '% of sales from new products'. These are also objective measures of the value of the product development business process.

Now that we know how to measure the success of a business process, let us identify how ERP adds value to each of the processes. ERP can help in the reduction of 'elapsed time from concept to availability' by

improving collaboration, either within the company or between collaborating companies, while enhancing the coordination of concurrent activities. Likewise ERP reduces time to achieve regulatory approval through workflow and document-management solutions. Thus, each process and its success measure is mapped directly to one or more ERP interventions and/or tools.

What Next?

While we now know how ERP impacts business value, we still need to create concrete measures in each area. In the example that we are following, the ERP value add of 'collaboration' is supported by two indicators:

- Reach of infrastructure; and
- Range of collaborative services supported

For example, in terms of reach, perhaps seven out of your company's ten divisions have a collaborative support infrastructure, such as Lotus Notes. In terms of range, perhaps, only two of the divisions have videoconferencing and electronic whiteboard support for product development, along with Notes.

The IS can set up goals for each of these ERP indicators and monitors the progress regularly. This is done through scorecards and we would return to it in a moment.

Similarly, in the operations process one of the business values is 'faster collections'. ERP could add value through electronic bill presenting systems. The indicator for the value added by ERP could be reduction in DSO.

- Likewise, the indicators for ERP value add in are—higher productivity business value, % of relevant users with shared access to relevant manufacturing systems.
- In the selling process, one of the business values is 'better cross-selling'. The ERP indicator could be used and, the quality of product and customer data supplied to sales.

- In service, it could be reduction in service-delivery time through the provision of dynamic scheduling of resources.

Having identified ERP value indicators for each business value in every process, we now set up quantifiable goals for them.

This enables us to see where the organization stands, where it intends to go, and how far has it come over time, by creating business value scorecards.

For instance, in reach of infrastructure, the organization has set up a goal of connecting 100% of design offices and top 10 subsidiaries to ERP system. At the end of Period 1, 82% of design offices and eight of ten subsidiaries have been connected.

The goal is to cover more than 25% of products by in-service monitoring system, whereas achievement is 10%; likewise for other indicators.

With this, the trail of evidence is complete. To recapitulate:

- For each business process, we identified the values
- For each business value, we established a measure
- For each measure, we identified the ERP value-add
- For each value-add, we established an ERP value indicator
- For each value indicator we set up goals
- Against each goal, we monitored progress through a business value scorecard

All the foregone discussion pertains to the current value that ERP is adding. A new business value is emerging in the form of 'readiness'—readiness to move quickly, to change course and to have proactive capability available, even in the face of a shortage of qualified professionals. ERP readiness indicators can be used to estimate how well IS is positioned to add value in the future.

Four Readiness Issues

- How good is the reach of infrastructure and the range of applications supported on it

- How flexible and scalable are the ERP applications
- Is there provision for adequate expertise with appropriate competencies, especially in view of looming skills shortage
- Are the IS processes sufficiently mature to be consistent and reliable

There are various degrees of reach and range. For example, it is possible to create infrastructure to reach anyone, anywhere or just to reach business units nationally. Where an organization wants to be is a function of several factors, it is best understood by it.

Similarly, the range of applications supported on this infrastructure spans from sending messages to perform complex transactions on multiple applications. Again an organization needs to define where it wants to be. Similarly, the two major assessment criteria for ERP applications are—flexibility and scalability. Flexibility means it can be modified to meet changing business needs. Scalability means the application is able to support short and long term growth. Both flexibility and scalability have a number of dimensions. For example, ability to support new ways for customers to interact with the organization is a measure of flexibility. Similarly, the ability to support five-fold increase in the volume of transaction is a measure of scalability. Each application characteristic can be measured on a three-point scale—ready, can be made ready in a short time and impractical to make it ready.

This way, the current status of application resource can be ascertained quickly.

The third dimension of readiness is access to core competencies. Gartner defines five core areas in which organizations must have competencies. These are:

- Vendor management
- Technology advancement
- Business enhancement
- Architecture development
- IT leadership

Does the organization have skills—whether in-house or outsourced—in all these areas? This is a very important question to answer. We do this

through need-gap analysis. In this example, the need is compared with current availability to derive gap and therefore, overall readiness score. The unit of measurement is the number of professionals.

Just as the scorecards were developed for current value of IT, they can be developed for future readiness of ERP. Thus, goals can be set for each readiness indicator, such as gaps in reach and range implementation and the progress followed regularly against it.

Now, we return to balanced scorecards, but this time, in the context of communication of value of ERP to the rest of the organization. This is a very powerful communication tool, because it is completely objective. The IS department cannot be blamed for 'blowing its own trumpet' or for 'crying for more funds' out of habit.

It helps in clearly establishing linkages between business goals and ERP indicators, thus helping business partners understand value trade-offs of major ERP investments.

The frequency of communication should be in sync with the information needs of stakeholders. More frequent for business-unit management and less frequent for board of directors.

1. View value through the eyes of the customer and measure it in terms that are meaningful and familiar to the customer
2. Use the four business imperatives to focus the measurement process on areas where ERP has high impact
3. Establish clear linkages to provide a visible trail of evidence for current ERP value: business value → business-value measure → ERP value-add → ERP value indicator
4. Measure IS readiness to add future business value in eight key areas:
    - ERP infrastructure—the hard side
    - ERP application capabilities—the soft side
    - Expertise availability—the cerebral side
    - IS process maturity—the process side
    - Communicate the scorecards to all the stakeholders—the talk side
    - Tailor to the needs of each stakeholder group—the action side

- Use as a framework to negotiate goals and to report progress—the goal side
- Leverage as communication vehicles and management tools—the tools side

ERP and IT costs can be separated into two general types:

- Those for supporting ongoing IT operations and maintenance (run-the-company costs)
- Those for innovating and developing new functionalities (change-the-company costs).

Typical Investment Strategies

- **ERP savers**, which spend only what is absolutely necessary on IT, with minimal change—the company costs.
- **ERP consolidators**, whose growing IT costs reflect investments in the harmonization of their application landscape (such as during or after a merger). When consolidation efforts are intense, changing the company costs are generally small.
- **ERP investors**, who spend increasing amounts on new functionalities (such as technologies for optimal business-process support), ERP infrastructure, and the enhancement of employees' IT skills. Change-the-company costs are usually higher for investors than they are for consolidators, reflecting the larger IT project portfolio.
- **ERP optimizers**, which display just slightly growing or even decreasing IT costs but still manage to build new capabilities. Optimizers rely on a cost-efficient and flexible IT architecture that can be enhanced without significant cost increases. Their change-the-company ratio (as a percentage of total IT costs) is usually above average.

The minimized cost strategy of ERP savers usually cannot be maintained. Overly restricted IT investment hinders the competitiveness of most companies in the long term because new products, the demand for higher

backoffice productivity, fluctuating market conditions, and changes in the state-of-the-art technologies require additional IT investments.

A simplified IT-improvement process would be to start, for example, as an ERP consolidator with a well defined target IT landscape based on strategic business and IT objectives. During the consolidation process, benefits could be reaped as redundant and non-critical applications retired, shifting budgets from consolidation to innovation. Next, as an ERP investor, the company could optimize top-priority systems in order to support potentially new and innovative business processes, leading to efficiency gains in backoffice departments. Then, as an ERP optimizer, the company could reduce the total IT costs (compared with the original starting position) and gain benefits from a flexible IT architecture. It should be noted, however, that a high change—the company budget, in itself, does not guarantee added value for the institution. New developments and functionalities must be tightly aligned with strategic business and IT requirements in order for the company to reap benefits.

The Questions Relating to Cost Competitiveness

- What are the most important steps that CFOs can take to help the company reduce its Selling, General and Administrative (SG&A) costs?
- How can the cost of corporate services like finance, HR, IT and procurement be balanced with the demands of supporting global growth?
- What investment models are most effective for assessing the business value of new technologies?
- Are the goals of supporting the growing demand for IT service from business and reducing the cost of technology, mutually exclusive?
- How does the management of IT services need to change in a decentralized model so that increased overhead and complexity are minimized?

- Are there proven approaches for changing mindsets about the goals of pure cost reduction, which diminish over time, and resetting organizational expectations?
- What are the most effective approaches to managing enterprise-spend behavior and assuring compliance?
- Going beyond low-cost country sourcing, how can procurement leaders develop effective global sourcing strategies; and better understand their total cost?

Quality and Timeliness of Information

- What are senior executives doing to obtain better, more timely information, and equally important, how are they using it to help the businesses meet its goals?
- How can executives improve the reliability and timeliness of reporting, in light of the intricacies of assuring regulatory compliance?
- How are organizations justifying investment to fund information access initiatives?
- What trends are emerging in the development of contingency plans and their incorporation into standard reporting?
- How can companies obtain better and more detailed visibility of their global/enterprises spend?

ERP Benefits—Strategies and Tactics

Anyone who has ever survived the implementation of an ERP system can tell you, it's not about the technology; it's about reinventing the business. And, although your company may pay tremendous lip service to people and cultural issues, when it comes to a major ERP initiative, you ignore them at your peril.

In its brief history, ERP is more often identified with out-of-control budgets and questionable returns than with business transformation. Replacing dozens of Legacy systems with a single integrated one for

managing operations across every discipline—finance, human resources, procurement, materials management, sales and distribution, production, order management—is challenging even for companies with generous IS budgets and a hefty staff. Equally daunting, because ERP is so intertwined with business processes, is the task of effectively changing the daily activities and behaviors of many of your employees. For instance, a warehouse worker managing inventory spreadsheets pre-ERP could be forecasting customer demand and making critical business decisions after ERP. Are you confident your workforce is ready for those kinds of changes?

From an organizational viewpoint, ERP concepts are especially tricky because they go against the mantra of decentralization, which many companies adopted in the 70s and 80s to spur innovation among business units. These sophisticated enterprise systems require a switch from a functional to a process orientation because modules often cut across traditional departmental lines. That's tough for companies with myriad independent business units that are unaccustomed to sharing information or coordinating with other divisions.

Finally, the spate of mergers and acquisitions in many industries over the last decade has made the integration problem more vexing. Taking a hard look at your company's unique culture—before you choose a system—is the first step toward preventing resistance in the ranks.

In some cases, the challenge of ERP is not so much gaining buy-in but helping employees cope with fundamental job makeovers.

Before you begin, a few things to ponder when planning for ERP—

- Which processes are most important now and why?
- Does this system meet our needs or go beyond them?
- Who will be the change champion(s)?
- Who are the stakeholders?
- What is the business culture at our company and what are its strengths?
- What subcultures do we have and what are their strengths?

- How can we apply those strengths to business change?
- What cultural attributes are weak or will interfere with change?
- What will be the toughest change, and how will we address them?
- Who will be responsible for change management?

Introducing ERP across a complex production process is an ongoing communications struggle. Imagine the rise in complexity once the project crosses U.S. borders. As AlliedSignal Inc. learned, the people you choose to lead the effort make all the difference. A $14.5 billion manufacturer of aircraft and automotive components, chemicals, fiber and other advanced materials, AlliedSignal's turbocharging systems division manufacturing turbochargers for cars, trucks and air planes is in the middle of an SAP/R 3 project spanning 11 countries, 18 sites and 9 languages. In 1996, the company developed an enterprise systems strategy to help improve productivity in logistics and SCM.

Cultural Hot Spots

Handling ERP's Cultural Issues

- View ERP implementation as a business initiative, not as an IT initiative. Educate and engage senior management as early as possible.
- Don't let technical problems dominate the project's time. Create a dedicated staff position for change management. Use your best and the brightest on the change team.
- Articulate expectations before implementation. What will the project's stakeholders say are the attributes of the new environment in a year? Where are the gaps in the plan? What conflicts of opinion exist today?
- Avoid political infighting between previously isolated divisions. Managers from various business units must have a clear understanding of the reasons behind the change. What's in it for them? Write a change-management document that includes communication strategy and core business principles of the company.

- Encourage users to change their job roles. If employees are already overworked, eliminate any non-essential tasks the system may require. Develop incentive programs to motivate change and incorporate them into performance reviews.
- Don't change too much at once. Major change requires an evolutionary approach. Don't overwhelm your organization with a system that has more functionality than you absolutely need. Consider a phased rollout and shoot for short wins to generate momentum during the project.
- Communicate with stakeholders, develop relationships, foster collaboration, strive for simplicity. Sounds pretty basic, right? Not really. ERP is a long term commitment that requires long term support. Training and education shouldn't end after the system has gone live. While there is no 'right' way to implement ERP, the core ingredient of every project—and the toughest to do well—is active and engaged leadership. Someone from the top—whether it's the CIO, COO, CFO or CEO—must own the role of 'change champion' for the life of the project. The most important step you can take as the leader of an ERP project is to plan for culture change well before the implementation begins. The second step is to act on those plans with a dedicated change-management program.
- Consultants believe that evolutionary change in business from ERP will not occur until organizations begin to reorganize their businesses around processes, which means pitching the old organization chart and starting anew. But remember, there are people behind that organization chart. It's much easier to reprogram a robotic piece of equipment. It's not going to talk back to you.

ERP—Indirect Benefits

It would be difficult to point to an ERP technology that generates no indirect returns. In fact, the results from some of case studies that Nucleus Research has conducted over time reveal that, on an average, indirect returns account for 50 percent of ROI technology.

What is an Indirect Benefit?

An indirect benefit is a return that cannot be directly observed but is nonetheless realized—as opposed to direct benefits like reduced headcount or increased sales that are more easily quantified. Worker productivity is the best example of an indirect benefit from technology; greater efficiency doesn't always lead to the removal of an existing expense item but is realized in the sense that it enables employees to perform their jobs better and faster.

Quantifying indirect returns requires a structured approach and the application of some basic but important concepts like productivity-correction factors and the transfer of time. Because quantifying indirect returns often requires educated assumptions, testing the validity of your estimates against a sample population is always recommended. Further, projecting a best-case and a worst-case scenario based on most conservative and least conservative estimates helps add another layer of confidence to the ROI range.

Driving Factors for Indirect Benefits

If you are trying to estimate the proportion of indirect benefits from a proposed implementation, you should consider three key factors: the kind of technology in question, the areas to which you plan to apply the technology, and your current IT environment and assets.

Companies should consider three key factors when estimating the proportion of indirect benefits from a deployment: the technology itself, the way it is being applied, and the organization's existing IT environment.

The Technology

While all technologies deliver indirect value, some solutions tend to generate more indirect than direct returns. The following are a few examples:

- **ERP and supply chain**—Supply chain planning, forecasting, and other logistical applications are most commonly implemented to boost such metrics as inventory and transportation expenses. These systems can certainly improve productivity, but the lion's share of the payback usually lies in such direct returns as reduced costs in inventory or transportation logistics.
- **Collaboration and portals**—E-mail, groupware, and portal applications are designed primarily to simplify interaction among workers and normally have the biggest impact on worker productivity by reducing the time it takes to share information, coordinate meetings, and execute other group-oriented tasks.
- **Content management**—Content and document management systems generate many indirect returns, such as faster filing and decreased retrieval times through search, version control, and audit-trail functions. Nucleus's benchmark study on document management found that 84 percent of companies interviewed had seen measurable improvements in user productivity, whereas less than half the sample had recorded savings in direct cost.

A technology for collaboration is likelier to bring a higher percentage of indirect returns than, say, a supply chain system. The difference lies in the way the technology impacts operations; groupware will impact employee efficiency first, whereas supply chain will likely generate directly measurable results, such as reduced inventory costs.

Application of the Technology

The technology is not the sole factor dictating the extent of indirect returns a company can expect. The specific way in which the company chooses to deploy the technology and the areas of operations the company targets will also influence the impact on the individual company's bottom line. Here are two cases in point:

- A business intelligence dashboard could generate more indirect or direct benefits, depending on how it is deployed. Time saving will be the primary benefit of a finance dashboard deployed to analysts needing quicker access to weekly metrics. Deploying the same dashboard to a logistics manager promises direct cost savings if it

allows the manager to better monitor, and control transportation and freight costs.

- An integration technology could generate more direct returns if it is used to automate data exchange with customers, hence attracting more revenues through increased ease of doing business. By contrast, an integration platform used primarily for speeding deployment of internal applications may bring mostly indirect returns by boosting developer productivity.

The IT Environment

Often, the magnitude of indirect benefits will depend on how much of a delta, or change, is triggered by the implementation of new technology on the existing IT environment and assets. A company that has relied largely on manual collection of time for hourly employees will see significant direct benefits if it moves to an automated time and attendance application by reducing the number of timekeepers. But if the company already has an automated process for time and attendance, and is upgrading to a new version of the timekeeping system with new auditing and reporting features, the ROI from that upgrade will be driven largely by efficiency through indirect time saving.

Many companies will find that direct returns from technology could pale in comparison with indirect returns once they start quantifying the impact of other returns that are indirect, but equally impressive in terms of the business value generated. In fact, more than 82 percent of the case studies Nucleus has published over time, have included some form of measurable indirect return, with 50 percent of the technology ROI being attributed to indirect returns.

Certainly, user disappointment with CRM, knowledge management, and other solutions that leaned on soft benefits has made many CFOs wary of counting indirect benefits when estimating ROI. But a benefit that isn't directly observed could still be generating significant business value because the problem lies not in the benefits but in the way they are counted. To estimate the extent of indirect returns, companies should

take a structured approach to measurement, employing such concepts as productivity-correction factors and taking into consideration the technology in question, its application, and the IT environment.

How to Make ERP Work for You

No one ever said ERP was easy. Here's an extreme case-FoxMeyer.

The FoxMeyer Corporation used to be one of the largest wholesale drug distribution companies in the United States, with more than $5 billion in annual revenues. Attempting to improve its competitive position and prepare for growth, the company decided to use a popular ERP system, a group of software programs designed to tie together disparate company functions to create more efficient operations in areas such as the assembly or delivery of products.

FoxMeyer became an early believer in the potential merits of ERP systems and installed one with the help of one of the most reputed system integrators. Yet, by 1997, after FoxMeyer had invested two-and-a-half years of effort and more than $ 100 million, the company could only process 2.4 percent of the overnight orders that it had with ancient Legacy systems—and even that small percentage suffered from information errors. The company fell into bankruptcy. It was acquired for a mere $ 80 million. Its trustees are now suing its system suppliers, blaming the ERP implementation for its business failure.

FoxMeyer—An Extreme Case?

Implementations of ERP systems are struggling throughout the world. They take too long, cost too much and fail to deliver the promised benefits of competitive advantage and cost reduction. Despite the promise and the high investment required to implement ERP systems, statistics show that more than 70 percent of ERP implementation, whether self-created or designed by established ERP software vendors, fail to achieve their corporate goals.

In a landmark study, the Standish Group, a US-based market research company specializing in software and e-commerce, looked at implementation with more than $ 500 million in revenues. The study found that the average cost overrun was 178 percent; the average schedule overrun was 230 percent of original expectations; and the average slide in functional improvements was an astonishing 59-percent deficit.

Still, such aggregate statistics hide real and specific facts about companies such as FoxMeyer Drug and the Dell Computer Corporation that have tried the systems. Dell publicly canceled its ERP system after two grueling years and an expenditure that exceeded $ 200 million. The company could tell it would not get the results for which it had paid so dearly and switched to a combined system or process solution that has redefined the industry.

Despite the horror stories, more than 20,000 companies worldwide paid in excess of $ 10 billion to adopt ERP systems, in 1997 alone. Why do companies persist in trying? Some believe ERP systems will reduce the complexity inherent with using multiple-data sources and systems that plague growth in global enterprises. Others hope ERP systems will solve the problem of Legacy systems.

In fact, ERP systems have delivered for some companies. For example, use of such a system helped the Chevron Corporation cut purchasing costs by 15 percent and promised an additional 10 percent for the future. IBM Storage Products reduced the time required to update pricing data from as much as 80 days to 5 minutes. Autodesk Inc. saved enough from inventory reductions alone to pay for the entire implementation.

So what is the problem with ERP systems? Is it a question, as some academic observers suggest, of poor corporate organization? Or is it, as some technicians believe, due to a real corporate inability to make the tough decisions necessary for a profitable implementation?

Experience shows ERP difficulties stem from two issues.

- The company has not made the strategic choices needed to configure the systems and processes.
- The implementation process spins out of business control naturally. This is inherent in the ERP implementation process.

ERP Priority No. 1: Getting Strategic Choices Made

ERP systems integrate key data and communications on planning, scheduling, purchasing, forecasting and finance for companies across regions, products, divisions and functions. Popular extensions can broaden this reach to sales, marketing, human resources and other functions. Many of the examples we will use will draw from the core ERP functionality, but the issue of strategic choices becomes even more important for a more comprehensive system. The system can provide management detailed insight into the operations of the business. For example, for a manufacturing company, an ERP system can show how much inventory of raw material is on hand; how much it costs to manufacture each product, and where each order is placed on the shop floor.

While an ERP system can provide this information, the key question is, should it?

Stepping back from the ERP system—looking at the information, communication and control functions it can provide—it becomes clear that the amount of control over a company's operations that needs to be provided by the ERP system depends on the design of the flow of products and services in the company.

A complex flow requires a great deal of system control. A well-designed value chain (e.g. 'Product-Aligned Flow', in which the product flows using visual signals and well-defined routes) can embed many of the controls and other functions in the business process simply, and far less expensively than the ERP system possibly could.

The Legacy processes that are being replaced, by necessity, embedded much of the communication and control in the business processes, and years of learning made this set of business processes very efficient and effective. Most implementation do not recognize and therefore do not capture this organizational efficiency.

Another celebrated version of the information, communications and control choices that companies miss is exemplified by the famous

Japanese lean-production systems. In these, much of the communication and control are designed right into the production system and the computer has a very small role. There is a famous story of a Japanese visitor, after thoroughly examining a new ERP system in a US automobile company, said, 'This is a very impressive system. Of course, we'd have one too if we needed one.'

Lean-production systems deliver low cost, low overhead, highly effective communication and control. How? For example, when a production process using Japanese Kanban visual signals needs more raw materials from a supplier, production workers pull a card and send it to the supplier. No computers, no orders, no overhead needed. The communication and control are built into the process design. Yet US companies that are implementing ERP and lean-production techniques often put a firewall between the two, not recognizing that this undermines both. The right answer is to recognize the decision the company is facing and make the decision explicit for all the company's efforts.

The reality is that an ERP system locks itself in the operating principles and processes for the corporation. Once the ERP system is installed, the odds of being able or willing to pay for modifications are close to zero. The cost, complexity, investment of time and staff, implication and politics of untangling such an expensive investment prohibit most companies from tackling this issue. Consequently, it is important that ERP systems be implemented in a business-driven, cost-effective fashion from the start.

Management needs to translate the business strategy and key future competitive advantages into factors for implementation. This often requires non-system actions to develop physical or business resources to support the simpler system needs. For example, in a manufacturing company, lean manufacturing or alternative supplier relationship initiatives may be needed to eliminate the system-ordering functionality that adds considerably to the cost and complexity. The result, of course, is a more efficient overall-delivery process as the production or other delivery process embeds low-cost communication and control.

Fortunately, only a limited number of critical business decisions require continuing top-management ownership. For example, in a manufacturing environment, senior management only has to focus on the right key areas to determine what actions should be inside or outside the system.

ERP systems often provide a backbone of information, communication and control for a company, but managers seldom ask: 'Which information? What communication? Where should control reside?' Even if they do ask and answer these questions, it is sometimes difficult to keep the decisions intact because the implementation process takes over and the decisions get recast on the basis of the system, not the business.

ERP Priority No. 2: Keeping the Implementation Process under Control

The new ERP commandment for senior management is 'Put the chief executive officer in charge.' We hasten to add that we are not referring to the usual 'first commandment' of getting support from the top. Putting the CEO in charge signifies a different level of involvement in the implementation process.

The business case for implementing an ERP system is invariably built around significant cost reductions and improved capabilities. The cost savings are based on reduced Legacy information technology costs as well as decreased direct and indirect labor, and inventory costs. Improved capabilities often include world class processes, tighter control and reduced cycle-time.

Once the business case is closed, companies often focus on software and not business objectives—with an implicit assumption that the benefits will follow. At this time, senior executives typically relegate too much responsibility to technical experts. They mistakenly view the endeavor as an IT project, not a business one. Once management abdicates its responsibility for control, the working team is forced to make critical decisions by default.

Under this scenario, it is not long before the implementation begins to go off track. Well-intentioned people add 'nice to have' functionality that can exponentially increase the level of complexity. Just getting to the system cutover is a major accomplishment. Further complications are inevitable; it is common for an implementation to extend by many months beyond cutover because of unexpected problems such as missing data,

slow response time or poorly trained staff. Jim Johnson, Chairman of the Standish Group, estimates that at least 90 percent of ERP implementations end up late, overbudget or both. 'Once you hit $ 10 million, the chances of a project coming in on time and on budget are statistically zero'.

Project managers sensing that budgets and schedules will soon far exceed original estimates, try to get back on track by eliminating the redesign of certain businesses and physical processes. Implementation teams frantically tailor the new software to fit to existing business practices but this rarely works.

As a result, the organization, having lost sight of any business objective, implements a crippled system, or one that is overloaded with unnecessary functionality. Whether the ERP system does not have enough capability or has too much, the company now has a system that needs to be fixed. The process of upgrading or reworking is not only expensive; it is also almost too complicated to implement.

Only when management realizes that an ERP implementation is a complex undertaking, can management set out to make the right choices about what the company's ERP system should do and what it should not. Then, it can create a process of planning and implementation that will be effective. When the technologists make technological decisions and senior management makes the strategic and business ones, the implementation meets its objectives, budgets and schedules.

Involvement by the CEO on a small set of issues will greatly improve the likelihood of an implementation that is on budget and on schedule, and that has the capabilities that support the corporate vision. The CEO should get involved in three ways: by clearly outlining the organization's strategic priorities; by involving the organization at the appropriate level, and by linking management controls and incentives to project success.

CEO Agenda No. 1: Outline Strategic Priorities

The CEO must take charge of the planning step for the ERP system. It becomes the most important and the most neglected step in making sure

that the ERP system does what it is supposed to do. Without a strategic connection, the ERP system does what the technicians believe it should do and not what is necessarily best for the company.

The key is to translate the company's vision, and the strategy that results from that vision, into concrete priorities, and then decide exactly how the ERP implementation will help the company deliver some, but not all, of these priorities.

What are the top priorities? How do they fit in with the industry's evolution? How do they resolve competitive issues? Which measures of operating performance are expected to improve and at what rate?

This front-end process is time-consuming, and, in some respects, irritating to most managers who want to get on with the implementation. Yet, without it, no ERP system will work. Some senior executives counter this argument by saying, 'We did articulate strategic goals, yet the ERP implementation is still a nightmare.' When questioned more closely, we find that these goals, such as 'improve customer service' or 'standardize our processes,' are too generic. With such objectives, middle management and staff do not have a framework for making decisions, and they generally allow technologists to make them. As a result, system priorities remain out-of-line with corporate vision and senior managers complain that their ERP system has unnecessary capabilities, locked-in complexity and no strategic value. In a very successful ERP implementation, Bay Networks developed five strategic objectives to communicate to its organization and implementation team:

- **Growth**—Future business growth will not be hindered by information
- **System capacity**
- **Global order administration**—Accept customer orders from any location into one system; assign shipment dates to available products in real-time; schedule future shipment dates for products not in stock, and check order status at any time
- **Financial reporting**—Have the ability to run profit and loss queries at any time on any day
- **Process redesign**—Focus re-engineering efforts on processes in which Bay derives its competitive advantage. The key here is to focus on priorities

In two other very successful ERP implementations (at Owens Corning and Compaq Computer Corporation) senior managers made the decision to modify the basic ERP software to match strategic goals. Both the companies devoted significant time and expense to embed in the software key capabilities that were considered as competitive advantages. Owens Corning, for example, needed to incorporate individualized distribution costs in their quotes. Compaq changed its manufacturing strategy from 'build-to-stock', which calls for manufacturing to keep warehouses full, to 'build-to-order', which runs plants only to fill consumers' orders. Compaq adapted its production processes and modified the generic ERP software to make that shift happen.

By creating this framework of strategic priorities, the CEO focuses the implementation on exactly what is critical to the company's vision. In essence, this narrows the scope and prioritizes the business objectives within that scope; it creates absolute necessities. This alone simplifies the implementation and increases the likelihood of success. The CEO, who has the required strategic insight and vision, is the only person who can take control at this level. CEOs understand the industry's evolution, its competitive position and the next levers for growth.

CEO Agenda Item No. 2: Get the Organization Involved

Certainly, no one expects a CEO to design data entry screens, or a software developer to determine how the company should face the market. Yet, in a way, most companies' current approach to ERP implementation seem to require both. Companies need to establish guidelines for involvement—or 'rules of engagement' for different levels in the organization. So team members understand how and where their skills will be utilized and, more importantly, what issues they should resolve and what issues they need to raise to the next level of management. In most ERP implementation, these rules are not clearly defined. As a result, key strategic decisions are often made by the implementation team, those least equipped to make business decisions. A well-constructed

implementation allows people who best understand the issue to take the decision.

The CEO manages the inevitable trade-offs among strategic priorities. Top operating management is accountable for the operational/tactical trade-offs. The first-line managers and implementation teams make the detailed design and execution trade-offs.

In one company with multiple divisions making different airplane subsystems, a corporate growth strategy was to extend past the traditional, customers dealing in original equipment manufacturer and serve new markets in service and maintenance. This would require that the divisions work together in new ways to provide one face to the new airline customer. The ERP 'go' decision had been a division-level call, but the CEO recognized that local division ERP implementation would complicate the servicing of new markets. He mandated that ERP implementation for these aviation subsystem divisions be done in concert with the new-service strategy. This left the top operating management to make operational or tactical trade-offs and the implementation teams to focus on designing screens, data structures and detail steps.

Various levels of the organization engage in a series of dialogues, which help move the process along while aligning it with key strategic and operating priorities. The company translates the various choices that must be made during the implementation into the right language so dialogue can occur throughout the organization. Fortunately, setting up the process of dialogue is not difficult but unfortunately, most ERP methodologies never mention it.

A meaningful series of ongoing discussions has to start at the top, with the CEO and top management. The conversation should focus on implementation issues that affect the achievement of strategic goals. The CEO always keeps in mind the alignment between the implementation and the strategic vision, making certain that the top management team understands the strategic priorities in a very concrete way. They discuss the short and long term impact of each trade-off, and continually monitor how each will affect the way the company meets its priorities. This will only include the small set of critical issues.

Armed with a better understanding of the company's vision, top management then makes the tactical and operating decisions that will align the ERP system and processes and with these goals. In the same way, the top management has an ongoing dialogue with the CEO, it conducts discussions with the implementation teams, focusing on operational and tactical alternatives. The goal is to balance physical and business processes, as well as system roles. These decisions often drive where a new process or control will reside—inside or outside the system.

For example, the management of raw-material inventory can either be embedded in processes or designed into the system. If it is embedded in the physical process, visual cues such as empty bins can signal a need for more material. If it is controlled by ERP, the system tracks total available inventory. When the inventory levels reach the re-order point in the system, a purchase order is generated. The first alternative provides lower cost with control at an aggregate level, while the second provides detailed control, albeit at higher cost.

The pros and cons of each alternative must be weighed against the priorities of the business, and top managers are best informed to make these trade-offs. For example, if minimizing raw-material inventory is a strategic priority or if inventory costs must be tightly monitored because of fluctuating commodity prices, then the detailed control may be worth the higher cost. The cost or benefit trade is made specifically by those best qualified to make the decision, not by low-level systems implementers.

Within this overarching framework, the implementation teams and technologists make the detailed design decisions. Because they understand the system's technical aspects in great detail, as well as each unit's operating characteristics, they can design an optimal system. In a recent ERP implementation at Autodesk, for example, senior management decided that a rapidly changing business environment could make some of the ERP benefits disappear. As a result, management made speedy implementation a top priority. Aware of this goal, the implementation team focused solely on the core functionality the company needed, ignoring other 'nice to have' features. The result was an implementation completed in just six months. At the same time the company re-engineered 25 of its 40 business processes.

CEO Agenda Item No. 3: Link Management Controls, Incentives to Project Success

The CEO can control the implementation by expressly linking key control systems, performance measures and incentives to strategic priorities. In this way, the company:

- Prevents false declarations of success (the specific criteria are set up in advance)
- Helps implementation teams resist 'scope creep' and focus on delivering results
- Balances systems against business and physical processes, helping the company optimize overall business performance.

Following the successful Autodesk implementation, for example, Bill Kredel, the company's CEO, said, 'Developing specific metrics to gauge project success and then tying those metrics directly to each executive's compensation played a major role in our success. Ten percent of the executive management's bonus and 20 percent of the implementation team's salary was tied to the success of the project.' In a different approach, Bay Networks formed a risk-sharing partnership with the systems integrator, paying the integrator on the basis of the system's success.

To be on the Right Track

Once a company commits to an ERP investment, it spends a great deal of time and effort determining if the implementation is working. We have found that, a large-scale implementation has to take some senior management attention away from the business for a time. Problems always arise and organizational infighting can get out of hand.

Keeping the following in mind can assist in determining whether the implementation will succeed:

- Does top management understand the connection between system implementation and the achievement of strategic goals well enough to describe the system's priorities in strategic terms
- Is the implementation plan coherent, comprehensive and linked to corporate objectives and non- system-related capabilities
- Does the process include dialogue and discussion about the hard choices necessary between the systems and other sources of control
- Does the company buzz indicate the organization buys into the link between strategy and system implementation

These are key indicators that will help determine whether an ERP system will create a delivery system that runs like a dream, or a nightmare such as that faced by FoxMeyer.

CHAPTER 4

To ERP or not to ERP—ERP Strategy Options

Whether or Not to Use ERP

ERP is considered to be an infrastructure in today's age of global corporation. It is like electricity. It does not matter whether you are big or small. You need electricity, water and fuel. Similarly, you need an ERP foundation or architecture to build an integrated process model inside your enterprise. That will pave way for building an external-portal view for customer and partner collaboration.

So to ERP or not to ERP has a very simple answer to it. You need to be on ERP with the right ERP architecture and strategy. A leap-of-faith strategy is not good because hope is not a strategy. That will result in a situation where you are better off running your company than implementing an ERP.

According to a McKinsey article, city planners try to preserve viable old assets, replace outmoded assets, and add new assets—all in the context of an infrastructure linking them coherently. In McKinsey

Quarterly, essay Jürgen Laartz, Ernst Sonderegger, and Johan Vinckier said ERP deployments have a good deal to learn from that approach.

Companies gain a competitive edge by being the first into a market with new products or by launching a web store; they depend on IT architecture to achieve their objectives. In many cases, the IT architecture is a costly and an aging maze of application, hardware system, and network. Far from making it possible to achieve strategic goals, it can make a mockery of them. But by looking at the evolution of another complicated set of systems—those that make up a modern city—senior managers can begin to understand, more fully, how the controlled and rational development of an ERP architecture can enhance the ability to compete. One can learn that ERP can be built on top of what you have and you need not throw away all your legacy systems—akin to throwing the baby along with bathwater.

Stories about companies that stumbled because their ERP architecture couldn't accommodate rapid and drastic change are quite well known. High growth companies get paranoid when their architecture fail to expand quickly enough to serve new customers with cost-efficiency. Large established companies can lose market share, if their architecture lacks the flexibility to move products to market as quickly as their competitors do.

The Paris Architecture

In the 1850s, Baron Georges-Eugène Haussmann was commissioned by Napoléon III to create a new plan for parts of Paris, he cut boulevards through the existing pattern of streets to facilitate commerce and movement of troops. Since then, Paris has carefully planned the re-development of sections of the city, so that neighborhoods and districts have distinctive social or economic roles. Most office towers, for example, are located outside the historic borders. As a result, the Paris of today, with its Beaubourg and La Defense, is a modern and highly efficient but unmistakable patchwork of many eras. City planners try to preserve and renovate those old assets that are still viable, while replacing others and adding new ones in a coherent way. Finally, a city like Paris makes sure

that a good infrastructure binds all these assets together for the long term.

An ERP strategy may follow this model. It is not an ideal strategy to have a patchwork of many IT systems but it can be a coherent mix of old legacy and new ERP. That way you preserve your unique business process that worked for you for years. Many companies that do a rush ERP implementation fail to recognize this aspect and fail in the end. They end up with two legacies—old and new legacy, i.e the ERP system.

1. Structure a Long-term Plan

Most cities have postal zip and area codes that designate some areas as residential, some as industrial, and some as commercial. While mixed use (shops with apartments upstairs, for example) is permitted in some areas, certain functions are incompatible with each other: a responsible town planning organization would not, for example, permit a steel plant to be located next to a hospital or a school.

Similarly, good ERP architecture breaks down complicated applications components into coherent, manageable parts often known as process areas. Typically, each process area performs a discrete function. A finance company or a bank, for instance, would have process area such as product systems for retail and corporate, and channel systems for call centers or branches.

This scheme permits ERP functions to be built in one process area and then made available to other process areas that needs them. A product-pricing schema, for instance, could be built in the product systems' process area and then made available to all channels. But a call center and an e-commerce channel that each built its own product-pricing schema would be needlessly duplicating each other's IT effort. There would also be serious risk of inconsistencies—conflicting price quotations, for example—even if two channels sold the same product under the same brand.

ERP architecture that is opaque and tangled should be broken down into clearer process areas and modules. Within a financial institution, this effort might involve disaggregating a system providing both channel as well as product functions. By contrast, IT functions that are identical

but dispersed across architecture—databases containing different bits of information about the same customers, for example—should be grouped into a single process area or a process domain.

2. Build a Stable ERP Interface Infrastructure

To provide standard services such as power and water, a city needs a stable infrastructure. The infrastructure must serve prospective as well as existing needs and have uniform interfaces—including the same types of outlets, plugs, and voltages—so that business can be carried out not just among neighborhoods but across an entire country.

Similarly, the interface infrastructure of ERP architecture makes it possible for process domains to exchange information and instructions—what IT specialists refer to as 'services'—with middleware functioning as transporting technology. A customer information system, for example, should provide a standard service (name, address, customer number, birth date, and family members) regardless of whether it is requested by a salesperson's application or the company's account receivables system.

Ideally, all interface between process domain pass through a limited set of stable and standard services. If they should lack stability, a change to any one of them would require all domains using it to go through a maintenance cycle. When a database of customers gets migrated from an older mainframe to, say, a newer UNIX server, channel applications need not be affected as long as the customer's profile hasn't changed.

Services also drastically limit the number of access routes to a process domain. Once upon a time, all developers might have been able to blaze their own trails in search of the information they needed in other domains, but services force all developers to access domains in a standard way. Just as each resident in a city uses the same type of plug to draw a standard type of voltage, a channel system or a customer-billing system should retrieve a customer's profile, with a standard service.

3. Appoint an IT-Governance Board

Many cities have created city planning organizations to draw up and carry out long term plans that both reflect and help shape evolving

patterns of public use and general preferences of elected officials. Similarly, a company needs its own IT-Governance board, usually a separate group within the organization, to manage the evolution of ERP and IT architecture.

The ITG board's role is to define the discrete domains and the functionality belonging to each. Domains can be defined according to which kinds of functionality and data belong together, the de facto standards that software packages set for them, and which part of the business should manage them. To achieve IT efficiencies, the board should also identify technologies and software development tools to be used in domains. Finally, the ITG board must ensure that the company builds and manages a strong and highly-stable service infrastructure.

4. Make the Most of What You Have

Before making new investments, good municipal leaders ensure they have made the most of the existing assets. Cities, for example, would generally try to add bandwidth to existing copper wire before submitting themselves to the disruptions of laying fiber optic lines.

Likewise, however messy, companies that contemplate building new systems should first try to get what they can out of their current applications. Such companies might, for instance, be able to build adapters on to existing applications—a practice known as 'wrapping'—so that they can be hooked up to a standardized service infrastructure. Wrapping permits a company to deliver clean and stable customer profile service, for example, to a new and an important e-commerce domain even when the data are drawn from a variety of existing systems. A data warehouse that serves the purpose of supplying background for a CRM initiative could be added in the same way. Under this approach, new applications and domains such as e-commerce can be insulated from the problems of existing IT architecture even while it is being renovated or replaced.

If an ERP is implemented on this Paris Architecture Model, you are assured of reasonable success from a perspective of an IT infrastructure. This will ensure an ERP basis for reaping process benefits, the way you customize and run your ERP for business.

5. Get ERP Right First Time

There are few information systems whose design and implementation challenge a company like ERP. Done right, a new ERP implementation can dramatically improve business processes. But when an implementation fails—or takes a prolonged and arduous course—tens of millions of dollars could be mis-spent.

In spite of the risks and challenges, companies are increasingly redesigning the infrastructure systems that run their business. In most cases, they have no choice. To stay competitive, those companies must leverage IT in new ways.

Here are some ideas on how to get real value from an ERP effort, rather than have it become a sinkhole in which money, time, opportunity and careers are lost.

ERP Must be Driven by a Business Case

In other words, the work must be directed towards improving specific business metrics: improved cash flow, faster hiring, reduced costs and accelerated shipments.

Both line and IT managers must identify the processes that need improvement. According to James Champy[1], focusing on business process improvement is the only way to know whether you got your money's worth.

Active Executive Direction

Executive direction in this case means more than just oversight or support. People don't adapt to doing work in new ways without some inspiration from the top. ERP systems are huge, influencing thousands of people, processes, practices and policies. There are thousands of decisions to be made—both large and small. Someone at the top of the organization has to make the calls.

Some ERP projects get delayed for months as shop foremen argue about the form of a new report. If there isn't active executive management of an ERP implementation, the IT manager should stop the project. The project is doomed to fail.

Always Favor the Standard

Be prepared for people to argue that they need to customize a report—or tell you that the way your company pays invoices is not accommodated by the new software. However, you should always challenge those arguments aggressively. Most companies can live with standard business processes. When you over-customize an ERP installation, you not only add time and costs, you make installing the next release of the software increasingly difficult and costly.

Remember that there are very few business processes that truly differentiate your company or require customized software.

Make ERP-related Decisions Quickly

How about a rule that all decisions must be made within three days? This may seem arbitrary, but setting a fast and deliberate implementation pace is critical. Experience has shown that when an ERP project stretches for more than 10 months, it's at risk—mainly because key team members move on.

Put the best people on the implementation team. The natural tendency is to staff projects with people who are the most available. But these people may not have the skill or the process knowledge required to get the job done. This is complex stuff. An ERP project will require the best talent that you have. And if you assign only part-time talent, then work gets prolonged and the project is at risk.

ERP work is not just a project. It is the beginning of a continuous improvement process. There are at least five years of benefit to get out of any ERP implementation.

Although you should set an objective to have the technology platform up and running within 10 months, with demonstrable business results,

keep a team of people focused on continuously using the technology to improve business performance—lowering costs, increasing profits, improving customer satisfaction.

Top Ten Myths about ERP

There are many myths surrounding an ERP. The following are a few interesting ones.

1. ERP life cycles are getting shorter and shorter. This is not the case. ERP vendors add new functionality or extensions that require upgrades in 6–12 months. But the foundation remains the same.
2. We need an ERP to run business. ERPs do not run business—you run the business. ERP provides a unified truth of information.
3. We need to have ERP like Siemens or of some Fortune 500 companies. This is a good goal but should be practical as ERPs don't make an organization great—rather its results and customer success make an organization great.
4. ERP investment is a good indicator of management commitment. Not necessarily. If you look at Wal-Mart, they have no ERP. If you take ZARA—the Spanish retailer—they have no ERP.
5. Great consultants are usually egoistic mavericks. That may be true of a small percentage. Don't hire the mavericks. Screen their resumes and check references before hiring an ERP consultant. Do not hire for the consulting firm's great name—they may switch the consultant and deploy juniors.
6. ERP innovation is inherently complex. Not necessarily. Organizations complicate ERP systems.
7. It is good to innovate ERP processes. Yes, but it is good to differentiate on an attribute that drives customer-facing processes and use ERP as an enabler.
8. ERP implementation is a hardball game. What is hard is deploying innovation inside an ERP system.
9. When ERP project dies, it's because the organizational politics killed it. Yes, but think about execution. Most ERPs are killed by bad execution.

10. All ERPs fail in the end. ERPs don't fail in the end—they fail in the beginning—so choosing the right ERP solution is the key to success.

Controlling the ERP Elephant!

It is not a new phenomenon for IS researchers to determine a list of 'critical success factors' for IT-enabled project initiatives. IS scholars have focused on controlling implementation outcomes within organizations for over fifteen years Today. A number of researchers and consultants are working within this research area to identify similar factors specific to ERP implementation. There are many approaches to test the validity of these factors as truly necessary conditions for implementation success and then predict the affect of installed ERP technology on firm performance; few such approaches are discussed below.

The Critical Success Factors (CSF) Approach

Everything is amplified. 'If the chairman asks for a cup of coffee,' runs an old joke at General Electric, 'someone is liable to go out and buy Brazil.' a regular joke at GE USA. But in India if the CEO of Reliance Industries wants a cup of tea someone will rush out and buy Darjeeling. It is a well known joke in CIO circles that ERP introductions are also done because the CEO wanted an ERP like a toy or a trophy. He listened to a peer at the Golf course bragging about their companies' SAP or PeopleSoft implementation and decided that—we should have one! The CIO is asked to find an ERP or perish. But there are many scientific approaches and business drivers that answer this question—To ERP or not ERP?

Much research prioritizes critical success factors in order to advice managers about which of the factors are most critical for their organization. The saturation of the IS field with success factor research means that differentiating studies from one another in order to understand the value of one list of factors over another is becoming more

difficult. We can categorize the success factors in implementation in the following broad approaches:

- Identification of critical success factors
- Integration of CSF into a unified model
- CSF divided by ERP project phase
- CSF by phase—a cross-cultural study
- Unique ERP project-risk factors
- Critical issues affecting an ERP implementation
- Identification of variables that inhibit an ERP implementation
- Key issues to enable successful ERP implementation

This list is not exhaustive but we hope it exemplifies the extent to which the topics of success and failure are dominant. We view this detailed categorization as a result of topic saturation, where in order to make an original point, 'hairs must be split' to distinguish one study or approach from another.

Whilst critical success factors related to the implementation phase of an ERP project abound, studies have also been conducted to identify factors related to the selection of a package based on organizational size. Similar studies have modeled the decision-making process involved in the selection, implementation and evaluation of ERP, and mapped the selection process from a management perspective. These studies are not without benefit because they illuminate important issues for consideration and point to the complexity of software-project initiatives. Organizations will find consulting a list of *a priori* 'factors for success' beneficial, such items are not in themselves keys to a preferred outcome. Rather, they tend to focus attention on controlling and simplifying innately complex situations while implementing an ERP.

These prescriptive approaches have long been criticized for their attempts to predict success whilst disregarding issues of organizational context and process follow on from these criticisms and directly address ERP practitioners. It is not a good idea being solely influenced by previously published material on the topic. At this stage, the reputation of the technology has a tendency to precede itself and taking too much account of previous findings can be bad. An ERP framework to help

companies consider their theoretical and practical choices for studying issues surrounding ERP transition is essential and useful.

ERP Drivers

Technological change is one of the principal drivers of competition and ERP as a technology component plays a major role in industry, its structural changes as well as in creating competitive advantages. It is also a great equalizer, eroding the competitive advantage of even well-entrenched firms and propelling others to the forefront. This is due to the fact that the best practices of great companies are available as standard processes in an ERP. Many of contemporary great firms grew out of technological changes that they were able to exploit. Michael Porter in his book, *Competitive Advantage* says that of all the things that can change the rules of competition, technological change is among the most prominent one.

However ERP introduction if it tends to be viewed as valuable for its own sake—then it is doomed to failure. Change to ERP is not important for its own sake, but is important if it affects competitive advantage and the companies' position in the industry. Not all-technological change is strategically beneficial. Similarly, not all ERP introduction results in success. It may worsen a firm's competitive position and industry attractiveness. ERP does not guarantee profitability.

ERP pervades a firm's value chain and extends beyond those technologies associated directly with the product. There is a strong relationship between technology and competitive advantage, growing out of technology's role in the business value chain, and the resulting ability of a firm to achieve low-cost and/or differentiation through its value activities.

Business Process Value Chains (BPVC)

Any firm involves a number of business processes, technologies and sub-technologies forming part of the value chain. Everything the firm does

involves this BPVC despite the fact that one or more processes or technologies may appear to dominate the product or production system. The basic tool for understanding the role of technology in competitive advantage is the BPVC built into an ERP system. A firm is a collection of several business-process activities. Technology is embodied in every value activity in a firm and technological change can affect competition through its impact on virtually any activity.

Every value activity uses certain level of technology to combine purchase input and human resources to produce certain level of output. This technology may be as mundane as a simple set of procedure for personnel, plant maintenance, or may involve a number of scientific disciplines. The material handling technology used in logistics, for example, may involve disciplines as industrial engineering, electronics and materials technology.

Information-systems technology is particularly pervasive in the value chain, since every value activity creates and uses information. Information systems are used in scheduling, controlling, optimizing, measuring and otherwise accomplishing activities. Inbound logistics, for example, uses some kind of information system to control material handling, schedule deliveries, and manage raw material inventory. Similarly an information system is involved in order processing, managing suppliers and scheduling the service force. IS technology also has an important role in linkages among activities of all types because coordination and optimization requires information flow among activities. ERP with its integrated modules for every functional activity has a profound impact on the competitive advantage of the firm by providing valuable information as one single view of the truth. This was not available in Legacy systems.

A firm's ERP technology can also be configured to address the interdependence of points of contact between the supply chain of the firm, its supplier, and its customer. A firm's ERP technology influences the order-processing technology of the supplier. Some of the best practices of ERP are pervasive and some are industry-specific.

We all know that technology affects competitive advantage if it has a significant role in determining the relative cost position or differentiation.

Since technology is embodied in every value activity and is involved in achieving linkages among activities, it can have a powerful effect on both cost and differentiation.

Many important innovations for competitive advantage are mundane, operational, executional in nature, and involve no scientific earthshaking breakthroughs or discoveries except a few like internet, ERP systems. ERPs also require making mundane operational processes integrated and standardized but the real innovation in an ERP comes from process discoveries.

Formulating the Strategy for ERP Technology

The idea of spending millions of dollars in an ERP system is to turn the IS technology into a competitive weapon rather than a technical masterpiece.

The following aspects explain the key steps involved in framing a powerful ERP strategy.

- Identify all the distinct business processes, technologies and sub-technologies in the enterprise-process value chain.
- Identify potentially relevant enterprise processes, technologies and sub-technologies in other industries or underscientific development.
- Determine which best practices, technologies, sub-technologies in other industries as well as your own industry are most significant for competitive advantage and adopt them in your business blueprint.
- Assess your capabilities and select a technology strategy encompassing all important best-of-breed enterprise value chain, and use ERP to implement and realize it.

While selecting key components of BPVC, a few factors may be indicative of your firm's competitive advantage.

- Significant economies of scale
- A steep learning curve

- Proprietary product or process technology
- Few industry segments
- No distribution channels
- Multiple brands with low substitution
- Cooperative competitors

There are seven ERP class segmentation variables that one can observe across different industries.

1. **Product Segment**—discrete/continuous/process/project etc.
2. **Customer Segment**—the types of buyers i.e. OEMs, end user, consumer, integrator
3. **Channel Segment**—Alternative distribution channels employed, such as dealers and distributors to reach the end customers described above.
4. **Geographic Segment**—Buyer location defined by locality or region or country or language or a group of countries, etc.
5. **Logical Segments**—Business logic, seasonality, trends, make or buy
6. **Logistical Segments**—Supply chain, Made-to-Order, Lean, Kanban, Just in Time (JIT), Activity Based Costing (ABC).
7. **Analytical Segments**—financial, material, production, logistics, sales, HR

In an ERP system, a wide range of choice is available to configure a number of parameters for each class of segmentation referred above.

On Time on Budget ERP does not Spell 'Successful ERP'

Most ERP project managers view on-time/on-budget implementation as successful deployments. However, without a focus on business benefits, such projects will rightly be considered failures. It is very obvious that on-time, on-budget ERP does not in itself guarantee a great benefit package.

Avoiding 'Leaps of Faith'

Business application projects, such as ERP and CRM implementation and upgrades, are often sponsored by business organizations, but are led by IT departments. Typically, business groups own the project and the business case, including the definition of the goals and reasons for the project. At the same time, the IT organizations are typically needed to enable the business' vision with applications and technologies. The hands-off between the business and IT departments, at the point of project inception and at project completion, are critical junctions for overall project success. This represents the points at which the seeds of failure are most often planted.

The initial transition point occurs after the project has been justified and funded, when the focus shifts to project execution. Unfortunately, the measures of success for project execution tend toward traditional IT measures of success: that is, meeting user requirements, while being on-time and on-budget. Although these metrics are important for project managers, they do nothing to ensure that the business value articulated in the business case will actually be realized.

As a result, most application-enabled business initiatives suffer from a 'leap of faith' that assumes a defined business case will be achieved just because a project was launched. This is an invalid assumption, and it must be corrected to ensure project success.

One test that will indicate whether your project is suffering from this lack of focus on planned business benefits is to simply ask project team members to describe the high-level business case for the project and to specify what they're doing to achieve the desired results. If they can't articulate a view of planned benefits and an understanding of their role in the achievement of these benefits, you have a problem—the leap of faith is at work, and the seeds of failure have been planted.

Linking Planned Benefits with Specific Activities

The first step in a successful implementation should be to develop a believable and defensible business case. This analysis should include documentation of the current state metrics and associated performance so that improvements can be measured. Without this baseline, it will be difficult to quantify improvements. The business case can be generated purely internally or with the assistance of outside organizations that are skilled in this type of analysis.

If you're searching for a business-case development method, you should consider Gartner's[2] methodology, called the 'Total Value of Opportunity' (TVO), which is used to determine the overall business value expected from IT-enabled business initiatives. TVO is a quantitative and qualitative value methodology that applies a standard set of thought-leading concepts and models to answer key value questions about potential IT investments.

Next, project managers should identify the 'value path' for the project. The value path is the sequence of project activities that must be performed with an explicit purpose to change the status quo and deliver promised business value. Value path activities typically continue beyond the traditional project, because value achievement does not neatly coincide with 'go live'.

ERP Value Path

The value path is similar in concept to the traditional focus on the critical path by project management. The critical path enables the management to complete the sequence of activities on schedule, for the entire project. The critical path is the longest-duration path through the work plan. If an activity on the critical path is delayed by one day, the entire project will be delayed by one day. Similarly, if any activity in the value path fails to deliver the required change, the project will be unable to meet the expectations of the business case. You should identify and manage

the value path with emphasis that is equal to, or greater than, that of the critical path.

The most important aspect of project execution is training the project team and other key stakeholders on how their activities will enable them to generate the planned returns. This step provides awareness and sets expectations with the project team that they are 'on the hook' to deliver changes so that these changes can deliver value. It is important to reinforce the idea that the business must change to achieve the desired results, because simply enabling the current state will result in money being spent with little or no return.

IT does not Control Business

However, you cannot hold IT accountable for making changes to the business. IT does not control the business, it only controls the technology. The project team members from the business and the project sponsors, assisted by professional change management specialists, are most directly responsible for driving business change and delivering the corresponding value. Examples of this type of reinforcement of change include revisions to performance plans that include specific performance targets for individuals, as well as the organization.

Don't Lose Sight of Delivery

Project managers must keep improvement targets visible to the project team, as well as the stakeholders. When a project team's only focus is to deliver to specifications, while being on-time and on-budget, it can lose sight of what it's delivering. You can use posters and other visual images to keep improvement targets 'top of mind' for the project team. Make the achievement of planned value an important part of the project team culture—just as important as top-quality project execution. In addition to this team-centric awareness of value achievement, it is important to keep everyone in the business informed about the changes on the horizon. Use a thoroughly constructed communications plan that includes all

stakeholders to rally the company to accept the process changes the project will deliver.

After the processes have been designed, and conference room pilots are progressing, project teams should validate that planned improvements are part of the configured solution. As much as possible, you should use tests and other simulations to validate that planned improvements are possible within the newly enabled processes. If the results indicate that improvements are not progressing as planned, you should revisit fundamental design decisions, and consider resetting expectations of what will be delivered during the initial implementation.

Manage the Value Path

Process owners of areas responsible for delivering value should continue to manage value path activities after the traditional project activities have been completed. Full value will not necessarily coincide with go-live, so owners should continue to assess process capabilities and required staffing levels to align the organization with new processes and capabilities. Failure to manage the value path past the end of the traditional project will cause sub-optimal results and will not ensure the best opportunity to claim full project success—both in terms of the work plan and the business case. Furthermore, continuous process improvement should be used to continue the delivery of business value.

Tactical Guidelines

- Develop a believable, defensible business case that identifies critical metrics and includes, for each metric, current performance and planned future performance based on the changes resulting from the implementation.
- Link planned benefits to specific project activities.
- Train the project team and other key stakeholders to anticipate how the project will generate planned returns.
- Keep improvement targets and planned performance visible to the project team.

- Don't allow the business case to rest dormant on a shelf after the project is funded.
- Validate that planned improvements are part of the configured solution before going live.
- Use process-based testing and process simulation to validate planned improvements.

Bottom Line

Project teams tend to focus on application delivery with a goal of being both on-time and on-budget, while lacking a similar focus on the delivery of planned business benefits.

With continued emphasis on value, you must change your approach to justifying, planning and executing business application implementation by managing the value path with as much emphasis as you do the critical path.

Winning ERP Approach

Managing a large ERP implementation is challenging for any company, but the risks increase when the end users are external customers and the price of failure damages the bottom line. Careful planning of design and rollout is thus crucial. No one knows this better than software product companies, such as Microsoft and Oracle, which live or die by how well they introduce products that both meet their customers' needs and keep their cost base competitive. According to a Mckinsey[3] essay, they realize the importance of customer need, of market research and customer support, and of maximizing value by striking a balance between satisfying buyers and controlling costs.

In these respects, software product companies have much to teach internal IT organizations, whose project-management practices usually fall short when it comes to developing and executing customer-facing systems such as an ERP or a combination of ERP and CRM/SCM. Too

often IT organizations assume that someone in finance or sales has done the up-front market research or that budget-busting modifications to the features of systems are customer driven and absolutely essential. Such faulty assumptions can have serious consequences: whereas internal customers usually have no choice but to adopt a new solution—even a poorly designed one—external customers can go elsewhere. Failure of ERP can lead to major disasters like FoxMeyer which went bankrupt trying to implement an ERP with a wrong approach.

A Customer-oriented Approach

Traditional ERP project management focuses on prioritizing, scheduling, and deploying a well-defined set of system capabilities using standard processes and tools. These are vital steps, but they must be adapted to the special needs of customer-facing projects. This is very simple but most often this simple wisdom gets lost. It is the customer or the supplier who is going to use your ERP system or experience the ERP system. The customer-oriented approach of software product companies differs in two ways from traditional ERP approach.

- First, using market research and follow-up support these companies focus on customers, to ensure that users will like and adopt the new product because they find that it meets their needs.
- Second, the companies sell to highly competitive markets, so they must keep their costs in line. They therefore design products simple enough to ensure that development and maintenance costs can be controlled; yet sufficiently comprehensive to meet the customers' requirements. This balancing act ensures that products are not over-customized and that solutions target the highest-value buyers.

ERP Optimization

Ultimately, ERP optimization is about balance. On one side are the strategic objectives of the business and on the other are the constraints, including IT resources like IT budget, people, skills, and existing

technology assets, as well as risk. ERP optimization involves making the trade-offs based on these constraints.

Finding the Balance between Value, Efficiency, and Financial Return

Maximizing business value is the primary driver behind ERPs, but business value must be balanced against other criteria, such as IT efficiency—i.e., how well the initiative 'plays' within the existing IT architecture, standards, and infrastructure—and the ROI. Note that business value and financial return are not the same. For example, you may decide to invest heavily in an enterprise-wide ERP or CRM system to improve customer satisfaction (a business-value improvement), but ROI may be difficult to measure. A business unit may want to implement a new inventory management system that will produce a significant ROI; however, it may need to run on a non-standard platform (IT efficiency) that will require IT to add resources and skills to support.

A successful ERP program includes some of the following considerations:

- **Provide increased visibility**—ERPs should lead to more strategy-focused IT investments and improved operations management. ERPs can be used to reinforce the importance of asset lifecycle management and the need to refresh the infrastructure. That includes infrastructure upgradation and project re-appraisal within its portfolio. As a result this has increased the reliability and availability of its systems.
- **Provide increased transparency**—ERP implements a disciplined process and methodology for decision making, removing the veil from how projects get funded and prioritized. Decisions are made based on well-defined criteria backed by business cases with sound financial analysis, and are linked to strategic objectives. Each project is decided on its own merits and contribution to the business, and not on 'who makes the most noise' or has more political clout.
- **Reduce costs**—It is difficult to reduce costs when you don't have a complete understanding of where all the money is going. IT organizations implementing ERPs for the first time are surprised to discover how much waste and redundancy exists across the enterprise. It also allows for a rigorous and regular review process

that can be used to shut down ineffective projects, retire unused or obsolete assets, and consolidate applications, freeing-up budgets to be utilized elsewhere or returned to business as increased margins.

- **Manage risks**—Managing risks is a key element of ERP management. Each component in the portfolio can be assigned a risk index based on risk assessment criteria. The sum of the individual risk indices results in a risk beta for the entire portfolio and can then be benchmarked against an established threshold. An ERP pilot that exceeds the threshold requires an adjustment to the portfolio, typically removing a high-risk project. Likewise, an ERP pilot below the threshold may indicate a portfolio that is too conservative and not likely to lead to any breakthrough innovation. Risk can never be eliminated but it can be managed by balancing individual risks across the portfolio.
- **Facilitate agility**—ERP enhances an organization's agility and ability to respond quickly to change. When fully implemented, the entire IT portfolio—including budgets, assets, and resources—are all contained in an integrated database, so priorities can easily be changed or new projects can be initiated with an immediate understanding of the effect on other elements of the portfolio. New forecasts, budgets, and resource plans can be generated and communicated to key stakeholders quickly.

Development of Successful IT Organizations

The parameters for success are:

- An integrated process that ensures that individual projects are delivering on the ERP strategic plan
- The skills and experience for multiple roles within IT to work effectively with the business (e.g. senior management, relationship management, program office, internal consulting, architecture)

- The credibility to work with the business as peers on technology-related projects that impact business costs, revenue and/or service provided
- Techniques, tools and templates that can be used by both senior management and implementers within IT: the business units and finance
- The management discipline and culture that enables separate multiple functions to work effectively together toward the common objective of leveraging technology to generate significant business value
- Most IT organizations are working to improve their ERP strategic planning and IT value management processes, yet these efforts are typically on two separate tracks. Planning and IT value management need to be integrated to ensure that:
  - The projects that will have the greatest impact on the business goals of the company are selected for implementation
  - Changes to goals and commitments made as projects are implemented are reflected in and agreed to within the IT plan

ERP projects are implemented and managed so as to deliver the value identified in the strategic plan.

IT leaders should assess the current state of integration between their strategic planning and IT value-management processes and it should be based on the following criteria.

- Senior managers within IT and business, who will be responsible for a technology project and accountable for the results, understand and agree with the related components of the ERP strategic plan.
- Project managers and key sponsors of major strategic projects are involved in the planning process in order to get their input and buy-in.
- The business justification for each major investment includes a qualitative assessment of the alignment of the investment with the key business goals of the company, as either part of, or consistent with, the ERP strategic plan. Senior managers of business units that are significantly impacted agree with the assessment of alignment.

- A quantitative financial-impact analysis on key corporate business goals is part of the justification of a major ERP investment.
- The actual business results for key projects are measured. These results are fed back into the strategic planning process as part of the monitoring and execution of that plan.

The ERP value-management process, by contrast, is focused on the in-depth planning, justification, implementation, metric measurement, and value optimization of individual projects. IT value management should be tightly linked with strategic planning, sharing business goals, expected value and business metrics. While the overlap between the two processes should be managed, a certain amount of redundancy is required to ensure project-level plans are, in fact, linked with the overall strategic plan. The CIO needs to be the owner of IT value management with the relationship management function often taking operational leadership of the execution of the process.

Overall Approach

IT and the business work together to develop the ERP strategic plan based on the corporate and business unit plans. The IT value-management process is applied to major projects that have been identified as priorities by the strategic plan. While the individual project plans are being implemented, the strategic plan is maintained factoring in any major input from the corporate and business-unit strategic plans. A very important, yet often neglected, additional point of integration is feedback into the portfolio-management component of the strategic planning process, of the actual measurements of the value metrics for the major projects. This integrated process enables the IT team to maximize the value gained by continually assessing and improving the overall portfolio and individual project levels.

The following sections provide more detail regarding the IT strategic planning and value-management processes with an emphasis on the points of integration.

The ERP Strategic Planning

The following broad steps should take IT and the business work as a coherent whole to create a shared vision via the ERP strategic plan.

- **Determine ERP/IT investments:** IT investments should be derived and prioritized, based on business and IT factors identified above. The prioritization can be determined and communicated with spreadsheet and tools, such as scoring models. Examples of scoring characteristics include alignment with corporate and business-unit goals, financial assessment of costs and benefits, risk, likelihood of success, match with available internal and external skills and resources, compliance with corporate enterprise architecture and standards, impact on development and satisfaction of employees. In order to ensure the required integration between planning and execution, it is important that senior leaders of the business and IT be able to provide input and buy-in regarding the determination of these scoring characteristics.
- **Maintain the plan:** The maintenance of the plan occurs through structures such as investment committees. The IT Strategic Plan needs to be regularly updated to reflect any major changes to the corporate or business unit plans. A core part of the maintenance of the plan is the IT project portfolio management process which continually evaluates projects against value, alignment, and risk information on an ongoing basis, given feedback from IT value-management processes.

For example, components of the deliverable from the ERP strategic planning process would include:

- **Executive summary**—Should stand on its own
- **Business section**—Provides context and rationale for ERP investments
- **Vision and mission**—Provides a picture of the future
- **Business trends**—Provides justification and context
- **Drivers and goals—**Primary drivers of investments in ERP
- **Assumptions or dependencies**—Identifies constraints and links

- **IT section**—Identifies the IT investments
- **Executive summary**—May be eliminated if main executive summary is complete
- **Internal assessment**—Identifies internal strengths and weaknesses
- **External environment**—Identifies relevant external factors
- **Vision/mission**—Describes the future
- **Guiding principles and goals**—Guidelines for decision making
- **IT initiatives**—Prioritized list of ERP investments linked to business goals
- **Appendix**—Supporting material

With this process, IT and the business work together to achieve the following objectives.

- **Plan**—For each major project identified as a priority within the strategic plan, define a linked set of business goals, strategies for achieving these goals, IT tactics for implementing strategies and metrics that measure the effectiveness of the tactics in meeting the goals. The business goals used in this stage of the process should come directly from those identified in the IT strategic plan for this project, which in turn have come from corporate and business unit plans. Any changes to goals and commitments made during this phase should be reflected in the IT strategic plan and agreed to by those maintaining it.
- **Select**—Determine whether the project gets funding based upon a quantitative business case along with a qualitative assessment of strategic alignment and select vendors and technologies to be used. The IT strategic-planning process should be the source of qualitative assessment of alignment. The business case will be a more detailed version of any earlier ROI estimate done as part of strategic planning, and should be based on expected improvements to the priority metrics resulting from the project.
- **Develop and deploy metrics**—Deploy metric measurement capability along with the application. This is the key step in using metrics in a practical way on an ongoing basis. The focus should be on developing and executing a plan for the most important, three

to five metrics, addressing the following for each key metric: measurement data and mechanism, report format, accountable person, measurement and review process, baseline, target and data for drill-down analysis.

- **Measure**—Assess and communicate both the areas of current value and the areas of potential improvement to IT, the business units and senior management. These results will also be an important input to the ongoing monitoring and portfolio-management elements of the IT strategic plan.
- **Optimize**—Actively use the results of the metrics to determine the underlying causes for not meeting targets and to define and execute action plans. Updates to any of the metrics are also used in the ongoing monitoring and portfolio management elements of the IT strategic plan.

Evolve Capabilities in Parallel

Most organizations are faced with the challenge of integrating IT strategic planning and IT-value management at a time when both these processes themselves are being actively developed or evolved. Since work on these two processes will never be truly complete, it is necessary to integrate two 'moving targets'. One approach is to focus on one or two projects and track them through the two processes, proactively developing links along the way. Once these integration points have been identified, the skills, credibility and refined processes can be used for an enterprise-wide rollout.

The following criteria can be used to select the initial projects:

- Significant quantifiable impact on business and, therefore, solid business metrics to work with
- Considered a strategic priority so that it passes through the strategic planning filter
- Strong sponsorship from executives that have experience gaining business value from technology

- Cases in which business representatives are willing and able to work with IT to establish the business value of the IT initiative and follow through, with the use of metrics for measurement
- Improvement after deployment in order to exercise and gain experience with that component of the model

Action Plan Items

An ERP strategic plan is a living document that needs to be updated and refined on a regular basis. The planning horizon is generally three years with the greatest focus on the next 12 months. The costs and benefits of each project should generally be tracked for at least five years, unless they become irrelevant to the business and are, therefore, retired. The strategic plan itself should be reviewed and updated quarterly to reflect any major changes to business or project portfolio.

The integration of IT strategic planning and value management capabilities should be assessed by determining the following aspects.

- The current IT strategic plan includes a prioritized list of ERP initiatives that is agreed to by IT and the business, and identifies the investments that will be made during the course of at least the next year.
- Senior management representatives from the teams that will be responsible for implementing major ERP projects, and accountable for the value that results, have provided input into and support the conclusions of the strategic planning process.
- Business justifications for ERP investments are based on the impact of initiatives on the business goals.
- Actual business results are measured and fed back into the ongoing maintenance and monitoring f the ERP strategic plan.

Once the areas of improvement have been identified, IT should define a blueprint for the desired integrated process looking out a year or so. Processes and skills should be further developed by focusing on one or two initial projects, with lessons being fed back into the blueprint. Enterprise-wide capability can be built from the experience, credibility,

and momentum of the initial successes filling out the blueprint over time. The following criteria can be useful for selecting the initial projects to be used:

- Significant quantifiable impact on the business and therefore solid business metrics to work with.
- Considered a strategic priority so that it passes through the strategic planning filter.
- Strong sponsorship from executives that have experience gaining business value from technology.
- Cases in which business representatives are willing and able to work with IT to establish the business value of the IT initiative and follow through with the use of metrics for measurement and improvement after deployment. Challenging political situations should be dealt with during the second or third wave of projects, once the process and a critical mass of skills have been established.
- The level of effort invested in the value-management process for a project on an ongoing basis should be proportional to the potential value of the project as well as its scale and complexity.
- Cases with relatively large investments will have a significant business impact.
- Cases with expected business value will not be evident with current business and/or IT management processes.
- Complex implementation that require a combination of people, process and technology changes since metric measurement feedback will provide valuable insight regarding issues that need to be addressed.
- Significant benefit to be gained by going through the process of IT and business working together to define and use value metrics.

While ERP strategic planning and value-management processes need to focus on the technical aspects of initiatives, it is critical that people and process-improvement aspects of each initiative also be addressed by the business and the IT team that is implementing them. Technology alone is of no value without implementation of the necessary changes into the processes and adapted by the people. People and process-related issues are the some of the most common reasons for the failure of ERP projects.

As organizations execute strategic planning and value-management processes, it is important to maintain the explicit linkage between value metrics and business goals that the projects are meant to address. When business goals (e.g. increases in revenue or reductions in cost, enabled by ERP) are translated into IT-specific goals (e.g., effectively delivering technology) and then metrics are defined based on the IT goals. Operational metrics are useful, but should not be used in lieu of value metrics that tie directly back to business goals.

Notes

1. James Champy is the Chairman, Perot Systems Corp's consulting practice and head of strategy.
2. Research note by Edward Younker. Analytical source: Brian Zrimsek, Gartner Research Market and Vendors in 2004.
3. MacGibbon, Simon P. Jeffrey R. Schumacher, Ranjit S. Tinaikar 'When IT's customers are external', *McKinsey Quarterly Article*, January 2006.

PART 2

ERP Selection

CHAPTER 5

Identifying and Selecting the Right ERP

According to a study by Karl M. Kapp, Bloomsburg University and Gary A. Langenwalter of American Production and Inventory Control Association (APICS), 'the main reason companies were undertaking an ERP implementation process was not because they wanted to increase productivity or reduce inventory; it was because they wanted to integrate common business practices across the company and multiple business units'.

The study also found that many companies were viewing an ERP implementation simply as a 'cost of doing business'. The result of this finding is that not many organizations were performing an ROI analysis before purchasing an ERP system. This is probably the case of 'Blind ERP' implementation without adopting the best practices for choosing an ERP that fits the enterprise as different organizations have different capabilities in their business processes and to unlock value, choice of the right ERP becomes a critical and a challenging process.

But ERP has evolved just from a mere integration system and there are huge opportunities available for productivity, standardization, and innovations by selecting and implementing the right ERP solution.

ERP has Evolved

Traditional ERP implementation of the 90s have typically penetrated only 15–20 percent of an organization. The original vision that such a solution would touch all of the processes within an organization has turned out to be overly optimistic. Organizations have had to implement multiple solutions to store various data, and questions persist about how corporations can consolidate and use their storehouses of information to deliver better products and services, while maintaining profit margins. Integration has become the big issue. Knowledge within a majority of organizations currently resides in silos that are maintained by a select few, without the ability to be shared across the organization. Today's business leaders need readily accessible information. They want real-time views into their businesses so that quick decisions can be made, without additional time being spent on tracking data and generating reports. Managers want to monitor key metrics in real-time to actively track the health of their business.

ERP was a good start, but the market is currently demanding more. The one dominant conclusion is that ERP must now involve the entire enterprise, delivering consistent, measurable processes and up-to-the-second information that supports profitable decision making. So it is better to learn from this ERP evolution to make the right choice about the ERP that you may want to select for your organization. First let us recap a few fundamental principles.

The Rise of ERP and its Blind Spots

ERP solutions were developed to deliver automation across multiple units of an organization, to help facilitate the manufacturing process. ERP addressed the issues of raw materials, inventory, order entry and distribution, but it was unable to extend to other functional areas of the company such as sales, marketing and services. ERP also failed to provide value for non-transactional relationships with external partners and vendors, and other non-inventory, non-order operations.

ERP did not tie in any ERP capabilities that would allow organizations to capture customer-specific information, nor did it work with websites or portals used for customer service or order fulfilment. Call center or quality assurance staff could not tap into the ERP solution, nor could ERP handle document management, such as cataloging contracts and purchase orders.

The Evolution of ERP for Innovation

ERP has grown over the years to become part of the entire enterprise. From its beginning as a tool for materials planning, it has extended to warehousing, distribution and order entry. With its next evolution, ERP expands to the front office.

Now administrative, sales, marketing, and human resources staff can share a tool that is truly 'enterprise-wide'. ERP is not just about manufacturing—distribution, and accounting. Projects, workflow, sales, documentation, and employees play an important role in the enterprise and its day-to-day operations.

Table 5.1 Evolution of ERP

ERP 1990	Extended ERP 2000	ERP-II 2005
Materials	Scheduling	Project Management
Planning	Forecasting	Knowledge Management—(KM)
Order Entry	Capacity Planning	Workflow Management
Distribution	e-commerce	CRM
General Ledger	Warehousing	HRM
Accounting	Logistics	SCM
Shop Floor Control		Portal Capability
		Integrated Financials
		Analytics—Sales, Financial, HR

As the idea of the extended enterprise emerged, it raised serious questions about how to most effectively integrate partners, service vendors and the entire value cycle with documents and workflow driving the business and capturing all the information involved. Today's enterprise has evolved and expanded beyond internal influences and organizational borders. The reality is that businesses using a traditional ERP deployment, without full operational and informational integration, will continue to struggle. It is this reality that leads us to the materialization of ERP-II philosophy.

ERP-II—Bringing ERP to the Entire Enterprise

All technologies adapt to changing business climates if they are to survive and prosper. The ERP market is no exception. As businesses entered the 21st century, they began to tinker with the idea of extended ERP—bringing functionality that existed outside the ERP system into the mix. There were—and continue to be—issues with integrating such functionality, as businesses thus far have had to implement many 'middleware' solutions to solve specific IT problems.

ERP-II is the next step in extended ERP. It's a solution that includes the traditional materials planning, distribution, and order-entry functionality strengthened by capabilities like CRM, HRM, KM and workflow management. Such a system can quickly, accurately and consistently operate an entire organization. It delivers instant information, and manages its accessibility by establishing security roles and ratings that define which employees can use which piece of information. It also addresses the issue of multiple office locations by making the solution web-based, so employees can access the system no matter where they may be.

Businesses are utilizing the internet more than ever before. It is no longer just a tool for email, research and single-transaction commerce. It is quickly becoming a tool for globalizing a business—a tool that allows an organization to tie together its employees, its suppliers and its

customers. It enables the free flow of information, and also building the next generation of solutions.

The Enterprise-wide Solution

To compete on a functional level today, businesses must adopt an enterprise-wide approach to ERP that utilizes the internet and connects to every facet of the value chain. They must change their own internal processes and procedures to foster collaboration efforts both inside and outside the organization. They must also integrate technologies that allow their collaboration efforts to take full flight.

Changing internal processes isn't always easy. Corporations must abandon old methods that strived to preserve and protect data in individual fiefdoms. They need to allow data to be shared within an organization on a rules- and roles-based system. They must overhaul reporting structures that limit decision making to a select few. They must open lines of communication and collaboration within the organization and to outside partners, suppliers and customers. Without open processes, the extension of ERP throughout an enterprise will fail.

Systems that leverage advanced levels of ERP-II functionality integrate disparate software packages in a manner that is seamless and transparent to those using them. A single interface loads information from separate systems, allowing it to be modified and saved back. Actions can trigger events in individual systems, resulting in a chain of events across the enterprise and throughout the value chain.

Bringing the Organization Together

In most organizations, information has traditionally been isolated within specific departments, whether on an individual database, in a file cabinet, or on an employee's PC. ERP-II enables employees across the organization to share information across a single, centralized database. With extended portal capabilities, an organization can also involve its suppliers and

customers to participate in the workflow process, allowing ERP to penetrate the entire value chain, and help the organization achieve greater operational efficiency.

Software providers need to provide vehicles to connect traditional ERP capabilities with front-office processes. They need to present companies with the means to unify the people, processes and knowledge that matter most to a business. By linking traditional ERP with advanced tools that help run a business, customers can create an accurate, up-to-the-moment view of the extended enterprise to enhance decision-making, analysis, scenario planning, and ongoing management of the value cycle. This approach also provides companies with the unique ability to see where processes intersect, how they impact each other, and the workflow that drives them to produce a clear picture of the business. Consequently, this can lead to cost savings and operational efficiencies. Solutions that bridge the gap between the back and front office worlds give organizations the ability to exchange information with the ERP solution. They also tie in additional functionality, such as giving designated individuals inside and outside the company easy access to information critical to their job function, or role in the value cycle through a web-based interface. The result is a substantive competitive advantage. True enterprise-wide solutions create an environment in which companies can not only model, but effectively streamline workflow and automate manual, unsecured processes into a secure centralized environment. Access to information and documents should be based on roles and a rules-based schema, giving business managers the ability to control access to data. The data can be organized on a need-to-know and need-to-access basis for projects and outside-managed operations. This roles- and rules-based approach eliminates the 'data islands' outcome inherent in most, if not all, ERP deployments. Such a model also allows for the involvement of outside stakeholders with the use of portal capabilities. This enables all members of the value-chain to be included in processes.

Need for a Powerful Workflow Component

But most importantly, advanced ERP requires a powerful workflow component. Workflow that provides each member of the value chain, based on their roles and responsibilities, with a process-centric view of

the business. Workflow that does not depend upon a crude 'send'-only model like email, but on a business-rules system, which automates the flow of communication and tasks. Workflow that can ensure that assigned tasks are completed, or elevated, if need be. Workflow that can be used in conjunction with an advanced alert-management technology to make certain that potential problems in the production chain do not become crises. Because of the constant evolution of today's business requirements, workflow processes have to be updated as needs change. Some systems require customization, but that requires changing the code, which is an IT function. In certain cases businesses can define and modify their workflow functions through configuration rather than through a more complicated rewriting of the program code.

Summary

Business in the 21st century is complex, fluid and customer-centric. It requires stringent, yet flexible processes and communications systems that extend globally and respond instantaneously. The processes and systems must be integrated. No part of the enterprise can escape the pressure to deliver measurable results. Traditional ERP gave businesses a vehicle to manage information and use it to their advantage. It organized customer data in ways that helped individual departments operate more efficiently, and created streamlined processes that helped manufacturing operations cut costs and move products along more quickly. But traditional ERP systems failed to complete the task they ultimately set out to accomplish: to unify the enterprise and turn it into one smoothly-running machine.

ERP-II promises to bridge this gap. New software tools are available that link departmental communications, work processes, customer data and supplier capabilities into a centrally functioning system—all focused on driving the enterprise forward. Nevertheless, new challenges have emerged that need to be tackled. Companies will continue to face obstacles as they revise internal processes, open up communications to outside sources and integrate disparate technology functions. But the move towards the next technology frontier is under way, and enterprises have already begun to benefit from extending their ERP installations to

more of their organizations. ERP-1 was a giant step forward when first introduced, however, overtime it had reached a plateau in functionality and most products on the market offered similar functionality. The market then saw new buzz terms, such as 'lean manufacturing', that did not bring new functionality, but promised greater efficiencies, when in fact all it did was deliver what ERP was supposed to do in the manufacturing space. ERP-II in contrast, does offer advancements in functionality. It delivers on the original concept of ERP being for the entire enterprise, so that the whole organization can operate more efficiently. No longer does corporate information sit isolated in departmental silos, but it is housed with all corporate information and can be used for the benefit of the entire organization. That is the true initiative from ERP and it is an initiative whose time has finally arrived.

ERP Selection Options

One indication that the ERP software is in a transitional phase is reinforced by many research trends available for its future development. This is discussed in Chapter 14. Organizations have reached a level of maturity. They can apply changes to technology and are in the process of better controlling problematic ERP implementation. For example, studies have begun reporting on Application Service Provider (ASP) as a viable option for organizations interested in ERP architecture but not wanting to go through the pain of maintaining the ERP. Another alternative to purchasing software from a single ERP vendor is the adoption of the Best of Bread (BoB) strategy which argues that organizations considering ERP architecture should select modules based on their particular needs rather than being persuaded by a vendor to purchase their entire ERP suite.

BoB is expected to increase as a selection strategy through technological advances in componentization of the ERP software. Several ERP vendors offer component-based enterprise systems, which is expected to enable a more flexible, open and scalable architecture through innovation in internet technology and development methodologies. As claimed by ERP componentization is expected to improve upon application integration, which to date has been problematic in practice.

In addition, ERP software vendors are actively trying to reduce the complexity not only in their development of the next generation of ERP systems but also through community outreach. Software vendors are sponsoring conferences to discuss issues and generate ideas amongst practitioners, users, and developers, for example, SAP has a huge community thru SAP Developer Network (SDN). Business cases are published as pedagogical tools to aid understanding, and ERP is taught to students in many universities as part of information systems and MBA curricula.

It can be said that many companies are focused on future innovations. This means they are moving ahead without taking time to understand the nature of current ERP technology within an organizational context. This leads to the possibility of history repeating itself because we are too busy 'chasing the tail of advancement' to develop an in-depth understanding of the present. Not only does this have an implication for organizations hoping to learn from its predecessors but also for ERP user-organizations who are migrating to updated versions of the software. Similarly, ERP vendors and management consultants who focus on future innovations may be less equipped to help organizations manage the complexity of current ERP installations.

Understanding the ERP Catch 22

ERP technology continues to be sold in the boardrooms of organizations across the world and is touted by software vendors, management consultants and user organizations as the industry standard for business operations in this century. However, promises of integration and streamlined business practices are now being juxtaposed against the loss of unique organizational activities and business processes. One can define ERP as 'IT catch-22 with a vengeance' where organizations feel they must join the ERP-playing field to be on equal footing with their industry colleagues and competitors but have difficulty justifying the costs, implementing the system and achieving long term business advantages.

Ironically, the systems are becoming so popular that companies whose competitive advantage comes from their unique administrative activities

may be forced to seek innovation from ERP extensions such as SCM, CRM, as ERP systems proliferate their industry. In fact, Davenport's recent book on ERP entitled 'Mission Critical' and is based on the premise that there exists no viable alternative to ERP technology for organizations operating in a constantly changing, global marketplace. He advises practitioners on how to 'realize the promises of enterprise systems' despite pitfalls.

In order to resolve the gap between Legacy work practices with which the organization is familiar and standard ERP processes, project leaders must consider a spectrum of choices ranging from the modification of its work practices to suit ERP technology or customizing the packaged software to better fit organizational needs.

ERP technology embodies process templates that claim to represent the current 'best business practices' but which may be at odds with locally-embedded work practices. As Kremers and Dissel (2000) point out:

> "*ERP systems are supposedly based on the best practice generic business processes. Therefore, when buying an ERP system, off-the-shelf, organizations obtain these practices and subsequently are pushed into the direction of implementing them.*"

While the system can be customized to better meet the needs of the organization, the technology does not lend itself easily to this option. Changes to source code and the creation of add-on modules to the integrated suite of applications are complex and costly options that are likely to increase the project scope and budget.

However, successful ERP implementers focus on the adaptation of ERP technology rather than on organizational shifts toward the software. These organizations have 'tailored' their ERP software; a process they define as the range of activities from standard 'configuration' work of implementation to 'modification' where the organization radically changes the software code to fit local practices, at times, resulting in the loss of vendor support.

It is a well-known theory that the tailoring of standard ERP suites can hinder the project budget, schedule and system performance. In particular an organization's 'migration' to a new version of the software

might be impacted, depending on the type of tailoring embarked upon. ERP software upgrades are advantageous because newer versions have increased functionality and often embed tools for ensuring regulatory compliance. Aside from these benefits, ERP vendors often contractually require such migratory upgrade processes if organizations wish to receive continued support of technology. Together, these issues discourage local adaptations of technology.

The extent to which organizations tailor their ERP package reveal their ability to differentiate themselves from industry competition and create a local solution that is more easily accepted within the organization.

ERP Driven by Business Objectives

While preparing for Y2K, many companies engaged in rapid implementation of standard business software applications, particularly ERP and supply chain systems. Some of these systems solved the immediate problem of Y2K compliance. They were typically implemented with an emphasis on speed and the need to fix the Y2K bugs but without sufficient regard for existing, underlying business processes; let alone the need to optimize those processes for the capabilities of the software. Likewise, the need to begin re-engineering business processes for other powerful, technology-driven business dynamics, such as the implementation of e-business capabilities, received woefully insufficient attention during the Y2K rush.

As a result, many companies invested in expensive software applications, without receiving adequate ROI. In fact, it's well documented that most of implementations have either failed to meet the expected ROI; have cost much more money and time to implement than expected, or in some well-publicized cases have simply failed altogether.

ERP is no exception. There are many tales and horror stories of ERP implementation.

In addition to acquiring the ability to master the challenges of Y2K, e-business, etc., the following objectives have generally been of primary importance to companies that are implementing integrated systems:

- Reducing maintenance costs for old systems
- Replacing home grown applications that have proven too difficult and too expensive to maintain
- Reducing redundant data inventories
- Standardizing business requirements and related processes for multiple locations
- Integrating standard software to accelerate business processes

While the first two items have been accomplished by most companies (although, with varying degrees of success), the optimization of business processes cannot be automatically achieved merely by implementing a software system—even a system as comprehensive as ERP or SCM.

The ERP Selection Process: Laying the Foundation

Realization of the potential ROI of your ERP project should start during the selection process. Before you write an RFP or start talking to vendors, you need to do some homework to ensure that you're on the right track. The sound bites generated by marketing of ERP vendors should not cloud your decisions. It should not be a PowerPoint hijack. The best approach is to think about the potential ROI from the ERP rather than approach it from Requirements, Feature and Functionality-fit paradigm. You will get caught in a quagmire of who is better, who has more functionality, features, depth, domain experience and you cannot go wrong choosing SAP, Oracle train of thoughts.

Identify the Problem and the Solution

Before you start thinking about potential ERP vendors, you should define your problem in clear business terms. Do you need to improve management visibility into operations and sales pipeline? Reduce

customer support costs or improve customer support? Reduce Operations related administrative overhead? Making your ERP challenges specific will help you determine which technologies or components are most likely to deliver ROI and how you can prioritize your development and deployment plans. Most companies' ERP goals fall into a few main categories:

- Improved business performance
- Improved production planning and logistics
- Improved management visibility
- Improved sales and customer support
- Improved operations and productivity
- Integration benefits and standardized processes
- Dependable real-time numbers or reporting and analytics
- Reduced costs

If your ERP goals fall into more than two of these categories, you'll likely want to prioritize one over the other and plan a phased deployment. Depending on how interlinked the people impacted are, you may want to consider two different projects altogether. Now is the time to start thinking about the executive sponsor or project champion who can help you keep things on track if politics or budget issues get in the way. Getting feedback and support early in the process will save your time and energy down the road.

It's also a good idea to know at this point what your likely budget is, how flexible it is, and what your CEO or CFO will be looking for, in terms of business justification. If you know walking into the project, means that you need to show a six-month payback period, you can plan accordingly.

Make the Short List

Regardless of your relationship with existing vendors, previous experience, and technology environment, you should make a short list of potential vendors and give them a fair evaluation before you make a decision. Your short list easily define these factors.

- **Your ERP goals**. The vendors whose functionality meets your needs will depend on whether you're looking for improved production planning, order management, sales logistics, improved reporting and forecasting, improved support, improved marketing, or a combination of different ERP-related technology. The vendor profiles section of this report provides profiles of many leading vendors.
- **Your existing environment**. Do you have existing databases, order systems, or Master Data that will need to be integrated or migrated into your ERP solution? Do you expect to do your own development or use consultants, or systems integrators? Are you comfortable outsourcing your sales and marketing data in its entirety—or in part? Answering these questions will help you determine whether a large scale ERP infrastructure, a hosted solution, a point solution, or a broad solution is likely to deliver maximized ROI. In case of a hosted solution where your exposure level is high and someone else is having access to all your data, you may need to factor such critical issues and security, controls, regulatory issues.
- **Your user dynamics**. Are the employees you expect to use the solution, technology savvy and open to change, or are they the ones still using pencils and paper to track orders? The greater is the magnitude of the change you expect them to make, the greater is the risk in adoption. This will slow the ROI of your project. You'll want to explore the usability of different solutions based on your level of experience and comfort with technology, the potential cost of customizing them to better align with you current profile, and your ability to easily and quickly customize them with changing needs.
- **Your budget**. ERP solutions such as Oracle and SAP can cost millions of dollars to deploy and require a team for ongoing support and maintenance. On the other end of the spectrum, Microsoft ERP (for example) or a Lawson ERP can cost considerably less. You can expect a hosted solution to have a minimal upfront investment and from $500 to $1500 per user, per year.

Systematic Process for Selection

ERP systems offer pervasive business functionality—the applications encompass virtually all aspects of the business. Understanding and managing this pervasiveness will result in a successful and productive business application platform. Failing to appreciate the full business impact can lead to disaster, or at least a poor return on investment ROI. A systematic process for selecting ERP software is necessary for delivering results and managing the risk of implementation.

This process starts with assembling a competent cross-functional project team, composed of several full-time resources (including consultants, where appropriate). This team will document business needs, explore alternative scenarios, orchestrate vendor involvement, facilitate consensus, communicate progress and recommendations to senior management.

The team must initially develop a vision that encompasses both the business processes and software application environment. Articulating this vision is a necessary step for gaining solid executive sponsorship for the project. The vendor selection phase consists of screening, analysis and scenario-based demonstrations to reach a consensus on the solution. Finally, the team must transition the project expeditiously to an implementation mode. A thorough selection process will minimize risk and lay the foundation for a successful project.

This process will continue to be valid at least through 2007, as ERP solutions evolve to greater levels of industry verticalization, openness and granularity of components. Beyond this time frame, greater openness and componentization may alter the decision framework to the extent that more complex, multi-vendor solutions will be considered and a more evolutionary process will take place. This will be offset by a continued ERP market consolidation, where a few vendors will remain dominant.

The Selection Process

ERP selection follows a similar process whether for a single application, a suite of related modules or a comprehensive ERP solution. The typical

steps involve planning, analysis, vendor screening, in-depth evaluation and a decision. A full ERP evaluation has some significant differences that elevate the complexity of the overall process:

- **Scope**—An ERP system has both expansive breadth and depth. Its presence will be felt in virtually every aspect of the business.
- **Change**—No other system can bring as much change to the way a company does business.
- **Size**—An ERP system is often the largest system in a company and often replaces many existing systems.
- **Integration**—Since an ERP system is the transaction hub of the company, it will need to interact with almost every other system that has ancillary or related functionality.

At each successive stage, the project team leverages a previous decision and advances to a finer level of detail. The major activities within the ERP selection process include the following:

- Assemble a qualified, dedicated project team
- Define the business vision or objectives and obtain executive buy-in
- Define the business requirements
- Assess solution scenarios (i.e., build vs. buy, integrated package vs. best-of-breed)
- Execute the software selection process
- Transition to implementation

Assemble Project Team

Our review of ERP projects has revealed that there are three critical elements in a successful project:

1. **A strong executive sponsor**—A person who has a vested interest in the outcome of the project and the respect of the entire organization.
2. **A strong project team leader**—One who is a decisive leader and an excellent project manager.

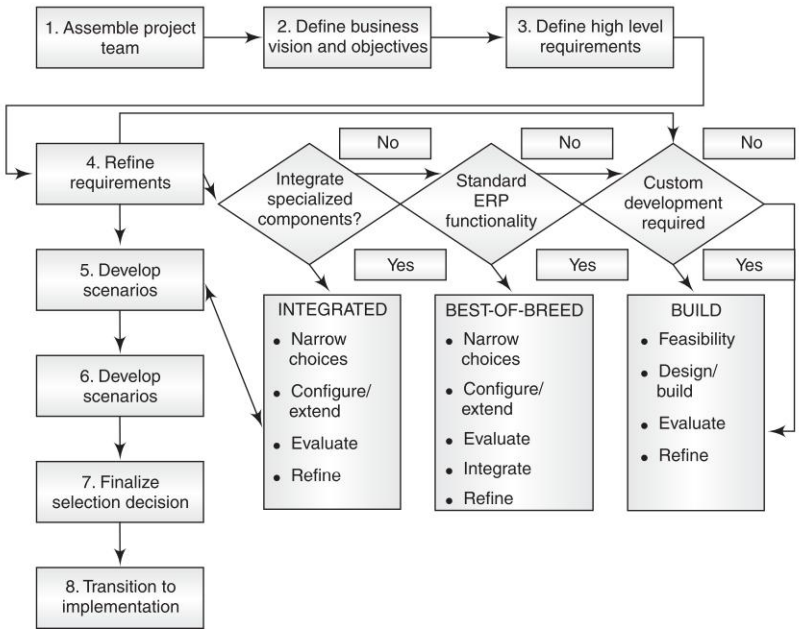

Fig. 5.1 ERP selection process

3. **Empowered project team members**—Functional experts who can make the critical decisions without extended consulting periods. The team will own and guide each step of the entire process.

One of the issues we frequently encounter in the ERP project staffing is the inability of organizations to commit a core team with full time resources to the project. This team is entrusted with the task of conducting a detailed analysis of requirements and software solutions, as well as the facilitation of the evaluation process, requiring the creation of numerous deliverables. Our experience indicates that part-time resource commitments fail to provide the continuity and level of effort necessary to meet the reasonable project deadlines. Part-time resources are useful for certain review-oriented tasks, but the core team members must be committed full time and relieved of other responsibilities. Even when resource availability is not an issue, experienced ERP consultants should be considered to supplement the project team as and when needed to provide project management and facilitation skills, business process knowledge and software vendor selection and implementation experience.

Define the Business Vision

The business rationale for acquiring the ERP system is of critical importance in the early stages of the project. The project team must be able to articulate a vision and set of objectives to build support and executive buy-in for the project, funds and resources are then easily available. The vision for the future ERP environment should describe the business process enhancements and strategies that will generate value from the investment. Every ERP system should be rooted in the business, since it often pervades the business, encompassing and changing almost every area. To the extent that the system will deliver only incremental improvements in system integration and maintenance, without fundamentally impacting the business, the project will lack the necessary business justification.

To achieve maximum benefit from an ERP system, an enterprise system architecture that encompasses a system application environment (SAE) should be developed. The SAE will define the overall application environment from a technical and functional perspective, including the ERP system. Initially, the SAE will be developed at a conceptual level to provide a statement of direction. Subsequently, it will be refined to indicate greater levels of detail.

Build or Buy

The question of build vs. buy for enterprise application is less of an issue, as packaged applications have evolved in terms of sophistication and flexibility. Core ERP components, such as financials, HRM, purchasing and inventory, are comprehensive in leading ERP packages to the extent that companies no longer attempt to build this functionality. Although packaged applications are designed to meet the needs of many types of businesses, they can usually be configured with minimal source code customization. In addition, they contain a rich set of best-practice functionality that can be adopted by most businesses in lieu of ingrained practices that evolved over many years. Nonetheless, there are situations where unique business needs dictate a significant level of customization or, alternatively, building certain business components from scratch. Building a customized system should be undertaken only when a

substantial set of unique needs exists and the organization has the development skills and resources to materialize the system. Even then, this development effort should be limited to highly specialized, mission-critical applications, for which established software does not exist.

Integrated vs. Best-of-Breed

Purchasing an integrated application package vs. assembling a best-of-breed solution is really a question of degree. There are very few, if any, companies that run all aspects of their business on a single integrated application. However, there are a significant number that take an integrated package as their starting point and then supplement the system with niche applications for such areas as supply chain optimization, capacity-based planning, transportation planning, budgeting, time and attendance, etc.

Initial Vendor Screening

A vendor screening process should be undertaken early on to eliminate vendors that clearly fail a set of suitability tests, with the goal of limiting the software selection process to two or three viable ERP vendors that are worthy of in-depth evaluation that follows. There are four primary areas that should be taken into account when narrowing the number of products to choose from:

- **Vendor Viability**—Due to current economic condition, vendor viability is an important issue that should be addressed in the initial screening process. While the large ERP vendors (**SAP, Oracle** and **PeopleSoft**) have strong financial viability, many second-tier vendors are struggling.
- **Functionality**—The functional fit should be addressed at this point in terms of critical business functions, modules and industry suitability.
- **Scalability**—Companies with more than $500 million in revenues should be cautious about considering mid-market ERP providers, because these vendors generally lack the technical and functional scalability required to support large, complex businesses.

- **Technology**—Technical screening factors should include compatibility (i.e., database and OS support), flexibility and extensibility. Products based on older, highly proprietary technical architectures are suspect in terms of long range viability and flexibility. Screening should favor more open, web-based architectures.

Requirements and Selection Criteria

Selecting a product involves sorting out three levels of functionality: expected, desirable and exciting. The expected level is the basic functionality that a user assumes to be present, such as managing routine business transactions. The desirable level is the functionality that one wants such as the ability to support business processes in a manner that significantly enhances productivity. An exciting element is extra functionality that enables a best-practice process transformation such as the ability to transact business with suppliers and customers in real-time. Using these three levels of functionality will add depth and prioritization to the requirements document that will be used to evaluate the shortlisted vendors.

We recommend that the requirements document be assembled from a business process view. An important aspect to this is the understanding of 'how the business processes should work' in the future ERP environment, not 'how the processes currently operate'. This business process orientation will enable the development of scripted scenarios that demonstrate how the software will support the manner in which the company intends to do business. The requirements document should also include a detailed list of technical criteria to ensure compatibility with the environment, flexibility, security, etc.

The shortlisted vendors should receive a copy of the prioritized requirements and be asked to respond in terms of their ability to meet these requirements. Responses will naturally be biased to the affirmative, but these responses will be further validated in the scripted demonstrations. The development of the detailed requirements document does not imply that the process must include a formal Request For Proposals (RFP).

Develop Scripted Demonstration Scenarios

Scenarios are a very good way of communicating the complex, integrated functionality found in ERP systems. Scenarios are detailed stories that describe a business function, such as production planning, procurement and revenue realization. The scenarios can then be divided into a series of use cases that detail what is to happen for every contingency. The scenarios emphasize the most important aspects of business and reflect the actual business processes that must be supported. These scenarios will guide the vendor's software demonstration, avoiding a standard demonstration of functionality that glosses over a vendor's weaknesses.

Scenario-based Demonstrations

Due to the in-depth nature of the scripted demonstrations, it is critical to limit the short list of candidate vendors to three or less. Three to five days for each vendor is often required to gain a thorough assessment of each solution. The core project team is responsible for organizing and facilitating the demonstrations to play out the scenarios in a consistent manner. Vendors should be coached and monitored during the demonstrations to make sure they adhere to the scenario requirements. Participation of a wider audience of subject matter experts for specific elements of the program is highly recommended to support the final decision. Participant feedback should be collected at the end of each session via questionnaire and compiled. One or more core team members should validate the vendor's responses to requirements as the demonstrations progress. Since the packages will likely meet the majority of the requirements, the team should make note of gaps in functionality and share this information in debriefings after each day of demonstrations.

Finalize Selection Decision

A quantitative framework is recommended to score the outcome of the software demonstrations. Several key inputs to the decision process are required, including the following:

- Fit to documented requirements, weighed based on the prioritization scheme

- Compilation of participant feedback from demonstrations
- Gap analysis to assess the extent to which software customization may be necessary
- Cost analysis for the software and related services (e.g. maintenance, training)
- Customer referenceability

The final decision should also take into account qualitative factors such as ease of use, flexibility and vendor support. A team limited to core team members and key stakeholders should make the final decision, with final approval by an executive steering committee.

Transition to Implementation

It is important to make a smooth and deliberate transition to the implementation of the selected ERP solution. Our experience indicates that valuable time and momentum is often lost when the company shifts to implementation mode. The potential stumbling blocks include software contract negotiation, resource availability, technical infrastructure and project facilities.

The software contract negotiation process often requires the involvement of legal counsel and skilled negotiators. Since the amount of money involved is substantial, it may require weeks or even a few months to complete this task. Team training and system design tasks will be delayed if this process is not brought to closure quickly.

The composition of the implementation project team is substantially different than the selection team. More resources will be required, with a greater variety of technical and functional skills. A detailed plan regarding the implementation of the project should be constructed to identify the project resource requirements and the time frame when specific resources will be deployed. Large ERP projects typically involve the substantial use of consultants with project management, business process and software implementation skills. To the extent that these resources need to be brought on board, vendor selection process may be required even if on a consulting basis. For continuity, resources that played key roles in the software selection phase should be retained for at least a transition period during implementation.

The acquisition and installation of the technical environment to support system development is another key task that must fall into place for the implementation process to move forward. This task involves finalizing the technical environment details to acquire, and install the hardware and infrastructure for the new system. It is important to keep in mind that only the development platform must be in place at this point, the production system environment can be put in place later on.

Implementation projects proceed more smoothly when proper work facilities are assembled for the project team. The transition team should secure appropriate project workspaces, conference rooms, software, printers, etc. Such a work environment will be more conducive to team interaction and collaboration.

An alternative view is that the ERP solution should be viewed as a more granular collection of components from multiple vendors. This view is supported by the continuing evolution of open architectural and integration standards, including Java 2 Enterprise Edition (J2EE) and Extensible Markup Language (XML), which are being embraced by major ERP vendors. Functional system components, or modules, are evolving toward increased granularity, and specialized vendors will increasingly provide such components in a manner that will allow for easier integration. The key implication of this architectural evolution is that an ERP application environment can be assembled incrementally over several years. The software selection process would be altered to provide for smaller teams focusing on individual components. These teams would work independently of one another, choosing components to plug into a multi-vendor application framework.

The Challenges Involved in ERP Selection

The typical steps of ERP selection involve planning, analysis, vendor screening, in-depth evaluation and decision finalization. In contrast to other software selections, a comprehensive ERP selection is made more complex by the scope of application functionality, change impact, size and integration requirements.

Most organizations struggle to commit a core team of full time resources to the project. Our experience indicates that part-time resource commitments fail to provide the continuity and level of effort necessary to meet the reasonable project deadlines.

The project team must articulate a vision and set of objectives to build support and executive buy-in for the project, enabling funding and resource availability. The vision for the future ERP application environment should describe the business process enhancements and strategies that will generate value from the investment. To the extent that the system will deliver only incremental improvements in system integration and maintenance without fundamentally impacting the business, the project will lack the necessary business justification.

Many companies begin with the assumption that an integrated package is their starting point and supplement the system with niche applications for such areas as supply chain optimization, capacity-based planning, transportation planning, budgeting, time and attendance, etc. ERP packages have evolved to a high degree of functionality to the extent that companies rarely attempt to build core components in-house.

Through an initial screening process, candidate vendors should be limited to three or less. This will allow for an in-depth evaluation of each vendor through scripted demonstration scenarios. In the final analysis, gaps in solution should be given priority in assessing suitability and determining the extent of implementation work that will be required to deploy the software.

Best Practices for ERP Selection

Experts recommend selecting a well-integrated ERP application. An integrated ERP solution is easier to install, configure, place into operation and support. In addition, since an integrated ERP system has a consistent user interface, it is easier to learn and use.

In addition to committing a core team of full-time internal resources to the ERP project, consider the use of experienced consultants to

supplement the team. These external resources should be used as needed to provide project management and facilitation skills, business process knowledge, and software vendor selection and implementation experience.

Use a quantitative framework to score the outcome of software demonstrations. Key inputs to the decision process include fit to business requirements, participant feedback from demonstrations, gap analysis, costs and customer references. The final decision should also take into account qualitative factors such as ease of use, flexibility and vendor support.

The project must make a smooth and deliberate transition to the implementation of the selected ERP solution. This is important to avoid the loss of valuable momentum built during selection.

Key Areas that Need Special Attention

Look for research papers by independent research firms. Once you've identified the likely vendors to deliver the best solution for you, you'll want to check their references—and this doesn't mean just reading case studies on their websites. Look to independently-developed case studies (Nucleus Research, Gartner, Forrester, AMR, BCG) and your own interviews with references to learn about their decision process, project successes and challenges, and whether or not their spending and benefits met expectations. Any vendor that won't give you names and numbers of references to call is sending up a red flag; it either doesn't have many customers or is not sure its customers are as happy as reported by the marketing.

Find a Partner: Check Resumes

In the ERP world, few companies will deploy a solution without some help from external consultants or systems integrators. Selecting and planning how you work with consultants is just as important to your project's success as the technology you choose. It is not enough to take the solution vendor's word for the ability of a partner or consulting firm—

you'll want to vet the service provider just as you evaluate the vendor. By checking references and carefully planning how you'll interact with both the vendor and the service provider, and agreeing in advance who takes the lead in taking responsibility for a successful deployment a vendor can be selected efficiently.

Avoid a Pitfall: Check References

Justify your Investment

Once you've identified your goals and selected a short list of vendors, you can use a structured evaluation of costs and benefits to determine the best solution in terms of ROI and build the business case for moving forward. On the costs side, you'll want to consider the initial and ongoing software, hardware, consulting, internal personnel, and training costs associated with the project. Here are a few guidelines to keep the ROI from your ERP project on track:

- You should spend less on software and consulting than 70 percent of expected annual direct benefits.
- You should be able to deploy and achieve some returns in fewer than six months (even if it's only a pilot).
- For a hosted solution, you should see benefits in fewer than 60 days.
- Consulting costs should not be more than twice your initial software investment.
- Training users should take fewer than four hours.

On the benefits side, you'll want to consider both direct and indirect benefits. Prioritize your expected benefits from most direct to most indirect, and then work on your estimates, using internal surveys, case study data, and reliable benchmarking information. It can be considered as a starting point for quantifying the expected benefits for your company.

Key Decision Factors

There's no such thing as a bad ERP solution. Most solutions deliver value when they're chosen based on clear business needs and deployed correctly. Once you've identified your ERP needs and your short list, there are a number of factors to consider to help you make the right decision.

User Adoption

In evaluating the type of ERP solution that will be best for your organization in terms of user adoption, you'll want to consider the following two key factors.

- **The willingness of users to adopt the application**—Adoption can often be as much about politics and culture as it is about technology. How do your users feel about the application? If there is a common perception that a solution is needed and that, it will make users' jobs easier, you'll have an easier time encouraging adoption. Successful adoption will also depend on how much users will have to change their normal way of doing work to use the solution. Lack of user enthusiasm, coupled with big changes in the way users are expected to process and share information, is often the single-most reason for the failure of an ERP project.
- **The technology ability of potential users**—Many ERP solutions are complex and difficult to use; others have a more intuitive look and feel. If you're looking to deploy ERP to a new customer support or sales staff with immense technology experience, you can likely select a more complex solution or introduce a lot of functionality quickly. If you're deploying ERP to a sales force that still uses pencils to track leads, you'll be more successful starting with something simpler than ERP. Once you've determined where your organization fits, you'll want to consider both the complexity of the solution and ease (or difficulty) involved in adding and evolving functionality. Over time needs change and users become more comfortable with the solution. Here are some red flags you should look out while evaluating solutions in terms of user adoption:
  - Plans for extensive customization

- Multiple components that will be integrated to meet your needs
- Lack of a track record supporting 'your kind' of sales representatives
- Functionality planned 'for the next release'
- An extensive training program
- Ongoing consulting requirements for any change or update.

Cost of an ERP

In ERP, "you get what you pay for" isn't always true. In fact, many companies in the past have overspent on ERP components and features that never delivered value to their users—if even they made it out of the box. You'll have maximum success with a measured approach that doesn't have to include a hefty initial license fee. Hosted solutions are typically priced around $1000 per year, per user; in competitive situations, there's often an opportunity for discounting. The initial license price for an in-house solution can be significantly more, but maintenance over time is less.

Existing Environment

What other solutions and data sources do your sales or customer support representatives use today, what solutions are they most comfortable using, and what will need to be integrated in some way into the ERP solution you choose to deliver value? How you integrate existing resources and applications into an ERP project should not be an afterthought. In selecting a vendor, you'll want to explore how it can integrate with your existing environment. You should demand to see a track record, with reference customers in a similar situation.

Best Practice: Make a Match

One company chose Microsoft ERP because it was of the view that it

would easily integrate with back-end office applications, because the sales force was already familiar with the Microsoft interface look and feel, and because the design of the application closely matched its existing business processes. It achieved a payback of five months.

Flexibility

In addition to the initial development, integration, and deployment, when selecting a solution, you should consider how easy it will be to make changes over time as your needs change. Can a business analyst tweak the workflows if your support hierarchy changes, or will have you have to call in the consultants? Can you add functionality as your sales representatives become more comfortable with the solution, or will it require a $500-a-day services fee? In all likelihood, the way you use ERP will change over time—and the flexibility of the application to enable you to support those changes can have a significant impact on the ongoing cost of the solution.

Best Practices

Once you've determined which solution is right for you and built the business case, you'll want to make sure you have the key checkpoints in place so that the project delivers on your ROI expectations.

Pricing and Purchasing

Before you sign on the dotted line, make sure you've studied your contract diligently with the vendor. Double-check the following:

- Is the initial license price, per user, in line with industry benchmarks?
- Are you paying less, more, or the average annual industry maintenance? If you decide to stop paying maintenance in the future, does your contact support that?
- If you're purchasing multiple modules at the same time, do you have a clear view of the cost of each item? Are you sure you should be buying them all now, or would a phased approach be better?

- What commitment has the vendor made to your deployment time line? If a third party is involved, how are the deployment risk and responsibility being shared?

Deployment

Piloting an ERP solution can be a great way to judge both whether or not the solution will work for you, and how flexible and agile the solution (and vendor) is responding to specific needs. Most hosted solution vendors offer a free or nearly-free pilot option today; depending on the level of customization and integration needed. A pilot of an internal solution before you buy may or may not be possible.

Best Practice: Pilot First

One company deploying an ERP solution used an initial pilot at one location to evaluate the application and get valuable feedback on how and when the software should be expanded to other locations.

Even after you've made the commitment, piloting to a select group of users before you complete customize is a good way to determine whether or not the solution will work. You can also gain valuable feedback on how and with what changes the solution should be rolled out to a broader population.

Fine Tuning your RoI

If you've picked the right vendor, planned a deployment with clear milestones, and acquired users on board, you've probably received 70 percent of the RoI you are expecting. The trick to a really successful ERP is continuing to evaluate and evolve your solution to deliver a greater value. Can you deliver value to more users, increase functionality to help them do their jobs better, or reduce ongoing management costs by learning to do some customization yourself?

All these factors can help you maximize ROI over time. You'll also want to keep track of potential upgrade opportunities and take a close look at the business case. Before you make a change study both the benefits of upgrading, and the time and pain associated with the upgrade. In many cases, the old adage about not fixing things that aren't broken is a good rule to follow when you're considering upgrades.

Conclusion

ERP doesn't have to be a scary or risky project if you've done your homework. No matter where you are on the ERP road today, a clear and structured understanding of costs and benefits of a project; coupled with knowledge of potential-user adoption and political issues, will help you draw a road map with clear milestones and risk red flags to deliver maximum returns.

In short, examine the total economic calculations composed of four main elements: cost, benefit, flexibility and risk. Individually, each provides only a piece of the decision-support puzzle for selecting the right ERP. Together, they provide an effective model for progressive IT–business analysis, management and decision-making when applied to a single project. They also provide the beginning of a potential portfolio analysis for IT expenditures as a whole. Most enterprises analyzing the four elements will find that a best-of-breed solution will provide benefits that exceed those of an ERP solution, but will need to do a thorough analysis to determine whether the greater benefits are worth the higher cost, a greater risk and a reduced flexibility of an ERP solution. Larger and service enterprises are more likely to be able to justify the cost of a BOB solution.

Closing Thoughts

- Start with current and projected future business requirements, and build an ERP application strategy designed to meet those requirements.

- When matching a vendor ERP solution to those requirements, consider vendor vision and ability to grow its solution to meet your evolving requirements.
- Do not choose a strategy overly dependent on 'vendor vision', as opposed to proven solutions already working in other enterprises. Many of the vendors are still completing their architecture and integration. The vision of a complete solution from a single vendor is best viewed as a long term projection rather than a promise of current capabilities.
- Be wary of vendors of functional suites that position their offering as a complete enterprise solution. Functional suites are typically strongest in the functional area from which they emerged (e.g., i2 in supply chain), and lack the ability to truly integrate transactions across the enterprise such as SAP.
- Use an IT value analysis methodology, such as TCO, to determine the best approach from a business perspective based on the cost, near-term and long-term expected business returns, and risk.
- Balance the degree of functional depth with the ease of implementation and integration, and cost of maintenance. Flexibility does matter, especially for rapidly changing customer- and partner-facing applications, which may also have more complex integration and process-coordination requirements.

Notes

1. Miller Byron and Paul Hamerman, GIGA Research, November 13, 2001.
2. Please refer to the Nucleus Research knowledge center at *www.NucleusResearch.com/tutorial* for more details on quantifying returns from indirect benefits.
3. Nucleus Research, *www.nucleusresearch.com*—RoI calculator.

CHAPTER 6

ERP Vendor Selection—Million-dollar Baby?

Do not trust any statistics you did not fake yourself.
—Winston Churchill

No One Gets Fired for Choosing IBM or SAP Syndrome

Choosing an ERP vendor can be a very challenging task. SAP, Oracle and many other ERP vendors are prone to making tall claims that their products bring competitive advantage or superior profitability to clients. We have yet to see any solid evidence on the validity of such claims. That doesn't mean that these products through integration and standardization of business processes don't bring real benefits such as increase in productivity. But according to Nick Carr such benefits don't bring strategic gains if they end up being broadly shared by competitors.

In February 2006 SAP ran a bold campaign in their website (*www.sap.com*) that said—companies that run SAP are 32% more profitable, according to results from a 2005 study by Stratascope Inc., which analyzed publicly available financial results of NASDAQ and NYSE companies. The study also found that these companies delivered 28% more return on capital. Clearly, SAP customers have a strong track record of outperforming their peers.

Nicholas Carr of *IT Doesn't Matter Fame* and former Executive Editor, HBR) ran a blog *(nicholasgcarr.com)* where he questioned the validity of such claims. He wrote 'That's an awfully big claim—associating significantly higher profits with the installation of a particular software package—but, as I've pointed out before, there's no way to validate it. SAP has spent millions on the ad campaign, but it hasn't made the research public. We get the tagline, not the facts'.

Around the same time in February 2006 Nucleus Research (*www.nucleusresearch.com*) conducted a study that showed that customers who run SAP are 20% less profitable than their peers.

- Nucleus Research analysts compiled a list of every publicly-traded company listed on SAP's own website to assess their actual return on equity (ROE). ROE is a standard textbook financial calculation for profitability that is commonly used in the valuation of companies. ROE is readily available and is published in most public companies' investor communications. Nucleus Research gathered and published the ROE data on these SAP customers from Bloomberg (*www.bloomberg.com*), and compared those customers' ROE with industry average ROE's from Hoovers (available through Yahoo! Finance—finance.yahoo.com).
- Based on its analysis of all 81 SAP customers, Nucleus found that SAP customers had an average ROE of 12.6 percent, compared to an industry average ROE of 15.7 percent.
- It is interesting to note that three areas of significant focus for SAP—CRM, ERP, and SCM, had customers who fared quite poorly. CRM customers achieved profitability 18 percent lower, ERP customers achieved 32 percent lower, and SCM achieved 40 percent lower than their peers.

There are numerous factors that impact profitability. However, the scale and scope of many SAP projects can have a significant impact on company performance, particularly if the deployment stretches to many years and costs millions of dollars. Companies that are expecting a SAP deployment to have a significant and positive impact on their profitability should undertake a factual analysis of expected returns and be extremely skeptical about SAP's marketing claims. To maximize ROI from an SAP deployment, Nucleus recommends the following to its customers.

1. Negotiate Aggressively on Initial License Price

Nucleus's current pricing data on SAP solutions shows significant variability in license pricing, suggesting that customers that negotiate very aggressively can reduce their initial investment. Customers that bring other competitors into the short-list and the price negotiation process can leverage greater discounts.

2. Carefully Evaluate License Maintenance

License maintenance fees can be a significant ongoing cost and companies that don't plan to upgrade or undertake significant customization may find one-off consulting to be a more effective support solution than an ongoing license maintenance.

There are many such pro-SAP and pro-Oracle campaigns and counter arguments. All of this is very confusing. So, how do you choose the right ERP vendor? It is indeed a million-dollar question! Just because the SAP advertisement states that their customers are 32% more profitable, it does not have to mean it is because of SAP implementation and usage. Could it be suggesting that these companies have smart management to make more money than other companies, and also have the good judgment to choose SAP? In other words, good management chooses SAP? Sounds like the no-one gets fired for choosing IBM or SAP' school of thought.

These are few steps that need to be followed.

Step 1—Screening ERP Application Vendors

What major factors should we consider in pre-qualifying suppliers of financial management and accounting software and other packaged applications? As companies begin the process of considering replacement options for financial and human resource management systems (HRMS), ERP and other applications, a screening process is useful in identifying the leading candidate. The screening process can accelerate the software selection process substantially, in comparison with a traditional Request for Proposals (RFP) process. Also, this screening process may avoid the possible scenario of having key vendors opt out of the selection, due to the complexity of an RFP.

The objective of the screening process is to determine, as efficiently as possible, which (at least two but no more than four) software vendors are worthy of serious consideration from a larger pool of candidates. The screening process should be constructed as a series of tests to determine the suitability of each vendor.

The screening criteria should generally include the following parameters.

- **Technology**—The minimum criteria for a technology fit solution should reflect database and hardware platforms, scalability requirements and architectural characteristics, such as web deployment.
- **Functionality**—The functional tests should be framed as high-level requirements, which should include key application modules and critical business requirements to be supported (e.g. international operations).
- **Vendor viability**—This test should be designed to eliminate vendors that are clearly at risk of failure as a going concern.
- **Customer base**—This set of screening criteria should determine vendor's suitability in terms of industry focus and maturity. Some vendors, such as Lawson Software and J.D. Edwards, for example, tend to focus on certain vertical segments and are less suitable for other companies. From a matured perspective, it should be

determined if the vendor has a minimum number of live and potentially referenceable customers using the product (and version) under consideration.

After establishing a set of agreed-upon screening criteria, the screening can often be applied using information that is readily available from vendor websites as well as from independent sources. The candidate vendors may be contacted directly, to the extent necessary. Ideally, this screening process should be executed without getting involved in a formal, time-consuming vendor solicitation. It is important that the results of the screening process be well documented to put to rest any potential questions later on about the elimination of specific vendors. Once this screening process has been applied, the process can move more quickly into a detailed evaluation of those vendors, passing the initial hurdles.

Governmental entities are more constrained by formal procurement procedures and regulations to the extent that such a screening process may not be feasible. However, it has been our experience that many governmental entities can also benefit from a similar vendor prequalification process. This may be structured, for example, as a Request for Information (RFI). This enables the establishment of a vendor short-list through an open and relatively quick process, which minimizes the risk of key vendors opting out due to complexity, and moves the overall selection process forward more rapidly. The detailed system requirements would subsequently be provided only to those vendors that met the prequalification criteria.

Screening application software vendors is essentially a process of elimination to find the two or three candidates that are worthy of serious consideration. Clients should use an intelligent screening process, as described above, to make the overall software selection process faster, more predictable and more effective.

Step 2—Understanding the Timeframe

Companies that install ERP do not have an easy time with it. Don't be fooled when ERP vendors tell you about a three or six month average-

implementation time. Even this, six months implementation has a catch of one kind or another: The company was small, or the implementation was limited to a small area of the company, or the company used only the financial module of the ERP system (in which case, the ERP system is nothing more than a very expensive accounting system). To do the ERP right, the ways you do business will need to change and the ways people do their jobs will need to change too. And that kind of change doesn't come without pain. Unless, of course, your ways of doing business are working extremely well (orders all shipped on time, productivity higher than all your competitors, customers completely satisfied), in which case there is no reason to even consider ERP.

The important thing is not to focus on how long it will take—real transformational ERP efforts usually run between one and three years, on average—but rather to understand why you need it and how you will use it to improve your business.

Step 3—Calculate the Cost of an ERP

The total cost of ERP ownership includes the costs of packaged software, hardware, professional services (for ongoing maintenance, upgrades and optimization) and internal costs. Based on the ERP survey conducted by the Meta Group in 2002, the average cost of ERP ownership was US$15 million ranging from half a million to US$ 300 millions. The average cost per user, per year, could be as high as US$20,000.

Costs of Software

The cost of packaged software depends on the scope of implementation (the number of ERP modules and the number of end-users), complexity of software and ERP vendors. ERP software that involves the integration with external business entities generally costs more. Vendors offer discount for organizations who invest in a suite of ERP software systems. Mid-sized organizations typically commit a few million dollars to packaged ERP software.

Costs of Hardware

Implementation of ERP systems routinely requires purchase of new computer hardware, systems software, network equipment and security software. The costs of hardware varies in a wide range dependent on the scope of implementation and platform. The hardware typically costs about half a million dollar for mid-sized organizations that implement these systems.

Costs of Professional Services

Customization. The big chunk of costs of professional services is customization. The cost of customization can easily out-run the cost of packaged ERP software, but it is the customization of the software that makes an ERP, a success or a failure.

Integrated ERP systems won't demonstrate its full potential unless they are properly integrated with other enterprise software applications

- The integration of various functional ERP modules
- The integration of ERP with other e-business software applications
- The integration of ERP with legacy systems

Step 4—Data Conversion

The cost of data conversion depends on the format and the media that store historical data. Data conversion from Legacy systems to RDBMS is a time-consuming process. Conversion may lead to further data gathering to fill the missing links in data requirements.

ERP systems are thoroughly tested before they go into production. Testing includes that of unit, component, regression, performance and user-acceptance testing.

Training workflow and UI design in ERP software is more complex than average business software. ERP training is expensive because workers almost, invariably, have to learn a new set of process of doing their daily tasks besides learning how to use the software. To reduce the

cost of training and to ease the transitions from old processes to new, organizations often seek the help from training companies, which are specialized in coaching workers on using software from particular vendors.

The Hidden Costs of ERP

Although different companies find different landmines in the budgeting process, those who have implemented the packages agree that certain costs are more commonly overlooked or underestimated than others. Armed with insight from across the business, ERP pros vote the following areas as most likely to result in budget overrun.

Training

Training is the near-unanimous choice of experienced ERP implementers as the most underestimated budget item. Training expenses are high because workers almost invariably have to learn a new set of processes, not just a new software interface. Worse, outside training companies may not be able to help you. They are focused on telling people how to use software, not on educating people about the particular ways you do business. Prepare to develop a curriculum yourself that identifies and explains the different business processes that will be affected by the ERP system. One enterprising CIO hired staff from a local business school to help him develop and teach the ERP business training course to employees. Remember that with ERP, financiars will be using the same software as warehouse people, and they will both be entering information that affects the other. To do this accurately, they have to have a much broader understanding of how others in the company do their jobs than they did, before ERP came along. Ultimately, it will be up to your IT and businessmen to provide that training. So take whatever you have budgeted for ERP training and double or triple it up-front. It will be the best ERP investment you ever make.

Integration and Testing

Testing the links between ERP packages and other corporate software links that have to be built on a case-by-case basis is another often underestimated cost. A typical manufacturing company may have add-on applications from the major—e-commerce and supply chain—to the minor—sales tax computation and bar coding. All require integration links to ERP. If you can buy add-ons from ERP vendors that are pre-integrated, you're better off. If you need to build the links yourself, expect things to get ugly. As with training, testing ERP integration has to be done from a process-oriented perspective. Veterans recommend that instead of plugging in dummy data and moving it from one application to the next, run a real purchase order through the system, from order-entry through shipping, and receipt of payment—the whole order-to-cash banana—preferably with the participation of employees who will eventually do those jobs.

Customization

Add-ons are only the beginning of the integration costs of ERP. Much more costly, and something to be avoided if at all possible, is actual customization of the core ERP software itself. This happens when the software can't handle one of your business processes and you decide to mess with the software to make it do what you want. You're playing with fire. The customization can affect every module of the up-front system because they are all so tightly linked together. Upgrading the ERP package—no walk in the park under the best of circumstances—becomes a nightmare because you'll have to do the customization all over again in the new version. Maybe it will work, maybe it won't. No matter what, the vendor will not be there to support you. You will have to hire extra staffers to do the customization work, and keep them on for good to maintain it.

Data Conversion

It costs money to move corporate information, such as customer and supplier records, product-design data and the like, from old systems to new ERP homes. Although few CIOs will admit it, most data in

most Legacy systems is of little use. Companies often deny their data is dirty until they actually have to move it to the new client/server setups that popular ERP packages require. Consequently, those companies are more likely to underestimate the cost of the move. But even clean data may demand some overhaul to match process modifications necessitated—or inspired—by the ERP implementation.

Data Analysis

Often, the data from the ERP system must be combined with data from external systems for analytical purposes. Users with heavy analysis needs should include the cost of a data warehouse in the ERP budget—and they should expect to do quite a bit of work to make it run smoothly. Users are in a pickle here: refreshing all the ERP data, every day, in a big corporate data warehouse is difficult, and the systems do a poor job of indicating which information has changed from day to day, making selective warehouse updates tough. One expensive solution is custom programming. The upshot is that the wise will check all their data analysis needs before signing off on the budget.

Consultant Fees

When users fail to plan for disengagement, consulting fees run wild. To avoid this, companies should identify objectives, for which, its consulting partners must aim when training internal staff. Include metrics in the consultants' contract; for example, a specific number of the user company's staff should be able to pass a project-management leadership test—similar to what Big Five consultants have to pass to lead an ERP engagement.

Replacing your Best and Brightest

It is accepted wisdom that ERP success depends on staffing the project with the best and brightest from business and IS divisions. The software is too complex and the business changes too dramatic to trust the project to just anyone. The bad news is a company must be prepared to replace many of those people when the project is over. Though the ERP market

is not as hot as it once was, consultancies and other companies that have lost their best people will be hounding yours with higher salaries and bonus offers than you can afford—or that your HR policies permit. Huddle with HR early on to develop a retention bonus program and create a new salary strata for ERP veterans. If you let them go, you'll wind up hiring them—or someone like them—back as consultants for twice what you paid them in salaries.

Implementation Teams can Never Stop

Most companies intend to treat their ERP implementation as they would any other software project. Once the software is installed, they figure the team will be scuttled and everyone will go back to his or her day job. But after ERP, you can't go home again. The implementers are too valuable. Because they have worked intimately with ERP, they know more about the sales process than the salespeople, and more about the manufacturing process than the manufacturing people. Companies can't afford to send their project people back into the business because there's so much to do after the ERP software is installed. Just writing reports to pull information out of the new ERP system will keep the project team busy for a year at least. And it is in analysis—and, one hopes, insight—that companies make their money back on an ERP implementation. Unfortunately, few IS departments plan for the frenzy of post-ERP installation activity, and fewer still, build it into their budgets when they start their ERP projects. Many are forced to beg for more money and staff immediately after the go-live date, long before the ERP project has demonstrated any benefit.

Waiting for ROI

One of the most misleading legacies of traditional software project management is that the company expects to gain value from the application as soon as it is installed, while the project team expects a break and maybe a pat on the back. Neither expectation applies to ERP. Most of the systems don't reveal their value until after companies have had them running for some time, and can concentrate on making improvements in the business processes that are affected by the system. And the project team is not going to be rewarded until their efforts pay off.

Post-ERP Depression

ERP systems often wreak cause havoc in companies that install them. In a recent Deloitte Consulting survey of 64 Fortune 500 companies, one in four admitted that they suffered a drop in performance when their ERP system went live. The true percentage is undoubtedly much higher. The most common reason for the performance problem is that everything looks and works differently from the way it did before. When people can't do their jobs in the familiar way and haven't yet mastered the new way, there is all round confusion that needs to be managed effectively.

Calculate the ROI on ERP Investments

Nucleus Research has made its quick reference guide for understanding and measuring the ROI from technology available to the general public. The guide provides a concise overview of the process of gathering and measuring costs and benefits, and explains the real uses of various metrics such as ROI, TCO and NPV. Additionally, it explains the steps you can take to maximize the ROI from a technology investment. The ROI quick reference guide is available at no charge from the Nucleus Research website *(www.NucleusResearch.com).*

ROI and payback period are the two most important metrics to use when evaluating the benefits of a technology decision, said Ian Campbell, Vice President of Research. *'Unfortunately we find many companies making decisions using metrics that do not correctly evaluate benefits such as TCO or NPV. More seriously, there are numerous false metrics such as cumulative ROI and return on opportunity that consultants often promote but that only serve to mislead the decision maker. We hope decision makers can use this quick reference guide to gain an unbiased understanding of the strengths and weaknesses of various technology metrics.'*

'Financial metrics such as ROI and payback period are commonly used by companies to calculate the viability of new projects or capital investments,' said Rebecca Wettemann, Research Director. 'Understanding how to apply those basic tools to evaluate technology

decisions enables companies to evaluate and justify their IT decisions in terms of the financial impact on the business.'

First Principles

First of all, finance officers cannot compare their planned investment in a factory, an airplane, or a new division to an identical project at another company to determine what their returns will be—nor can they 'baseline' the project before they start and then travel back in time with the data to justify the investment. What they can do is to identify what they expect the benefits and costs to be, assess the likelihood of their occurring, and determine how far they can diverge from expected costs and benefits without losing money. IT projects can and should be evaluated in exactly the same way. The following is a quick guide to completing an ROI analysis for an enterprise resource planning (ERP) investment based on the Nucleus ROI Model.

Assess the ROI Potential

Without opening a spreadsheet, you can use some of the following key criteria to assess a project and the likelihood of a positive ROI.

- **Breadth**—How many people will be helped by the application? The greater the number of people, the greater the potential ROI.
- **Repeatability**—How often will people use the application? The more often an application is used, the greater is the ROI.

Secondary factors to consider include:

- **Cost**—The more costly the task, the greater the benefit from automation or appropriate technology support.
- **Knowledge**—The greater the potential to reuse the information in the system, the greater the potential ROI.
- **Collaboration**—Communication between employees is costly, so the greater the collaboration component, the greater the potential ROI.

The Calculation

There are a number of financial metrics—and some are more useful than others. The following is a quick list of the primary calculations and their value to the decision-making process.

- ROI is the most important metric to use for choosing an application and prioritizing projects within a company during budgeting. ROI equals the average benefit over three years divided by the initial cost.
- Payback period is the time it takes for benefits returned to equal the initial cost of the project. This is a key measurement of risk; in the area of rapidly changing technology, look for payback periods of less than one year and don't be afraid to discard a solution in favor of a better one, once it's past its payback period.
- NPV is termed as the net present value—the value of the ongoing benefits discounted back to the present year. NPV tells you if the project should not be undertaken, but it doesn't tell you to proceed. If the calculation is less than 0, you shouldn't proceed with the project (you'd be better off putting the money in the bank). A project with a value greater than 0 can't be compared with other projects unless the time horizons and the magnitude of the investment are the same, so don't use that as your metric to proceed. It would be more appropriate to turn to ROI instead.
- TCO, provides a good metric for budgeting purposes but can't be used to judge the bottom line benefits of a project because it calculates only the lowest cost rather than the greatest return. Cost is a factor in the ROI analysis, so use ROI instead.
- IRR, or Internal Rate of Return, calculates the effective interest rate of a project but has a serious flaw: it assumes a reinvestment rate equal to the IRR. In most cases, the calculation is misleading, and it should never be used for evaluating technology. Use MIRR if you need to.
- cROI means cumulative ROI over a three-year period and is used by some research firms, but it is primarily a marketing metric because it dramatically overstates the ROI by using the sum of the benefits over three years. Do not use it as a metric.

A Good ERP Business Case—Internal ERP Proposal

When developing a project proposal or a business case, clarity and brevity are key elements. Without them, steering committees lack valuable information for selecting and prioritizing projects that bring the maximum value to an organization. Companies developing project proposal processes must focus on clear, concise and standard information as much as possible to create a level playing field for selection.

Much of the information here is taken from business justification document; when preparing proposals, look forward to anticipate future issues and expectations. Structured correctly, the proposal should describe goals, risks and predicted outcome of the project concisely, with supporting cost and risk information to facilitate the decision process. Be descriptive but not verbose, and include the following aspects.

1. **Project name and description**—State the objective of the project, how the business would achieve its goal, and how the project facilitates in reaching that goal. Include organizational and historical information to further support proposal.
2. **Benefit information**—Metrics, ROI, operational and financial information to support the objectives of the project. Includes market studies, productivity metrics, support metrics, etc. to demonstrate the need for the project.
3. **Statement of work foundation**—Expand the objectives into a scope document, including the deliverables and high-level requirements. Explain the systems, applications and processes required; be concise but not granular in your description. Include all non-person resource requirements.
4. **Constraints**—Critical for setting expectations, explain and prioritize the constraints of the project. Constraints usually fall into budgetary, time and performance criteria. Setting priorities around the constraints provides clearer insight to the expected performance of the project as well as providing a baseline for managing scope creep, once the project is approved.

5. **Key project participants**—Include project sponsors, project managers and, if possible, name the leading members of the team; if this is a strategic project, knowing the key players works as confidence building as well as in communicating the need for a specific resource.
6. **Budget**—A complete estimate won't be available at this time, but include as much financial information as possible, including internal labor, contractor cost, architecture and operational costs. Include process deliverables, expenditure reviews and, if applicable, invoicing and disbursement reviews.
7. **Risk analysis**—Include roles and responsibilities, organizational and stakeholder risk tolerance and high-level plans for risk management. For sizable projects, include alternative solutions. Information here should be a foundation for detailed risk planning during post-approval planning stages.
8. **Project management methodology**—Include practices and techniques planned for the project; including communication, activity and milestone deliverables.
9. **Assumptions**—Include factors presumed to be real that may affect the project; these are slightly different from constraints and can include stakeholder participation, expected funding, system refreshes, etc.
10. **Management mechanism**—If no existing tracking or management systems are in place, cite proposed tracking applications and methods. Include a description of communication methods and modes of delivery.

These criteria should be used for all projects outside normal maintenance efforts. The depth within each category will depend on specific project requirements; try not to exceed two pages—realize that subsequent documentation will fill out the detail.

What will ERP Fix

There are five major reasons why companies undertake ERP as we have

seen from Chapter 3—Users of ERP Systems. These can be summarized as follows.

1. **Integrate financial information**—As the CEO tries to understand the company's overall performance, he may find many different versions of the truth. Finance has its own set of revenue numbers, sales has another version, and the different business units may each have their own version of how much they contributed to revenues. ERP creates a single version of truth that cannot be questioned because everyone is using the same system.
2. **Integrate customer-order**—ERP systems can become the place where the customer order lives from the time a customer service representative receives it, until the loading dock ships the merchandise and the finance section sends an invoice. By having this information in one system, rather than scattered among many different systems that can't communicate with one another, companies can keep track of orders more easily, and coordinate manufacturing, inventory and shipping among many different locations at the same time.
3. **Standardize and speed up manufacturing**—Manufacturing companies—especially those with an appetite for mergers and acquisitions, often find that multiple business units across the company make the same widget using different methods and computer systems. ERP systems come with standard methods for automating some of the steps of a manufacturing process. Standardizing those processes and using a single, integrated system can save time, increase productivity and thereby reduce head count.
4. **Reduce inventory**—ERP helps the manufacturing process flow more smoothly, and it improves visibility of the order-fulfilment process inside the company. That can lead to a reduction in the inventories of the stuff used to make products (work-in-progress inventory). It can also help users better plan their deliveries to customers, reducing the finished good inventory at warehouses and shipping docks. To really improve the flow of your supply chain, you need supply chain software, but ERP helps too.

5. **Standardize HR information**—Especially in companies with multiple business units, HR may not have a unified, simple method for tracking employees' time and communicating with them about benefits and services. ERP can fix that.

In the race to fix these problems, companies often lose sight of the fact that the packages are nothing more than generic representations of the ways a typical company does business. While most packages are exhaustively comprehensive, each industry has its quirks that make it unique. Most ERP systems were designed to be used by discrete manufacturing companies (that make physical things that can be counted), which immediately left all the process manufacturers (oil, chemical and utility companies that measure their products by flow rather than individual units) out in the cold. Each of these industries has struggled with different ERP vendors to modify core ERP programs to their needs.

Will ERP Fit the Ways you do Business

It is critical for companies to figure out if their ways of doing business will fit within a standard ERP package before the checks are signed, and the implementation begins. The most common reason that companies walk away from multimillion-dollar projects is that they discover the software does not support one of their important business processes. At that point, there are two things they can do: they can change the business process to accommodate the software, which will mean deep changes in long-established ways of doing business (that often provide competitive advantage) and shake up important people's roles and responsibilities (something that few companies have the stomach for). Or, they can modify the software to fit the process, which will slow down the project, introduce dangerous bugs into the system and make upgrading the software to the next release excruciatingly difficult. This is mainly because customizations will need to be torn apart and rewritten to fit with the new version.

Needless to say, the move to ERP is a project of breathtaking scope, and the price tag on the front end are enough to make the most placid

CFO, a little twitchy. In addition to budgeting for software costs, financial executives should plan to write checks to cover consulting, process rework, integration testing and a long laundry list of other expenses before the benefits of ERP start to manifest themselves. Underestimating the price of teaching users their new job processes can lead to a rude shock down the line, and so can failure to consider data warehouse integration requirements and the cost of extra software to duplicate the old report formats. A mere oversight in budgeting and planning stage can send the costs spiraling out of control faster than oversight in planning almost any other information system undertaking. The following key points are useful in preparing the ground for ERP and relate to understanding things such as:

1. The importance of requirements
2. Avoiding scope-creep
3. The costs associated with scope-creep
4. The need for speedy client sign-off on deliverables
5. Change management procedures and their importance
6. The impact of a change request on a project
7. How to communicate and escalate grievances
8. The vendors' pricing methodology
9. Collaboration and communication techniques for client staff and consultants
10. The importance of client liaison/project manager (When the vendor has a problem, to whom does it escalate this to resolve immediately?)
11. The degree to which a vendor can or cannot proceed without client inputs (e.g., system documentation, source code, the final documents)

The Real Cost of ERP

Meta Group recently conducted a study looking at the TCO of ERP, including hardware, software, professional services and internal staff

costs. The TCO numbers include getting the software installed and the statistics two years afterward, which is when the real costs of maintaining, upgrading and optimizing the system for your business are felt. Among the 63 companies surveyed—including small, medium and large companies in a range of industries—the average TCO was $15 million (the highest was $300 million and lowest was $400,000). While it's hard to draw a solid number from that kind of range of companies and ERP efforts, Meta came up with one statistic that proves that ERP is expensive, no matter what kind of company is using it. The TCO for a 'heads-down' user over that period was a staggering $53,320.

To assess the real cost of ERP implementation and upgrade, Forrester surveyed 36 large companies about their projects' total cost of ownership. And with the average implementation costing $48 million dollars to date, on initiatives that are only 61% complete so far—ERP is no simple IT initiative at all.

Implementation and upgradation is dominated by labor. Labor for an original implementation averages 65% of the total project cost and increases to 76% for upgrades. Consultants' involvement in ERP projects drops by half as a percentage of the total project costs from implementation to upgrade as users become more reliant on the internal IT staff.

License and maintenance fees are an ongoing expense. License and maintenance costs for the first year of implementation average 22% of the total project cost and more than half of our respondents reported paying an ongoing annual maintenance fee of between 16% and 18% of the initial license fee. Also, about half of our respondents reported extending their original product footprint during project upgradation, so additional license fees were incurred for the new functionality.

Hardware investments are minimal. Relative to labor costs and license fees, hardware investments are small. For both implementation and upgradation, hardware investments were 16%–17% of the project cost. That means for a $5 million upgradation of the project, users report that hardware improvements run only about $850,000.

Meanwhile the internal support costs drag on. According to Forrester Research, assuming an annual total cost of salary and benefits of roughly

$100,000 per IT employee, a company with 750 end-users can expect to pay $1.8 million as support staff costs, annually.

ERP Vendor Selection—Key to Success

ERP vendor selection depends on industry, functionality, integration, features and solution depth and implementing of the company Business processes.

Many vendors offer pre-selection demos or training, and believe that an educated consumer is its best customer. Unfortunately, not all consulting firms feel this way, but prefer instead, to take advantage of uneducated clients. So, again, it is up to the client to ensure that its CIO/IT manager has been properly trained in selection of ERP keeping in mind several factors we discussed earlier. One of the most important selection criteria is ERP functionality and fit.

Major ERP Modules and Functionality

Many ERPs have based the functionality, features of its systems on the concept of business process. For an ERP, a business process is the complete functional chain involved in business practice for any software module working with it. This means that the chain might run across different modules. For instance, what travel expenses, sales orders, inventory, materials management and almost all types of functions have in common is most of them finally link to the finance modules. ERP systems are particularly noted for this type of comprehensive business functionality that underpins the systems' reputation as being highly integrated. For example, when SAP released R/3 4.6, it already had incorporated a library of more than 3,000 pre-defined business process maps across all functional modules so customers could select and adapt these maps as their own way of doing business.

Typically, ERP software consists of different modules, each of which handle particular functional aspects of the business processes. Each area of a business is handled by a separate module within the system, however, all modules feed into the central database server. This database forms

the heart of an ERP system and is controlled by a series of tables that validate and process data. The modules usually are categorized in terms of specific industry solutions or the following four core functional areas:

- Financial applications covering all the key accounting functions and includes: Cost Accounting and Controlling—Standard Costing, Cost Center Accounting, Profitability Analysis by a Segment, Profit Center Accounting
- Enterprise Information System
- Project Accounting System
- Capital Investment Management
- Treasury
- Fixed Asset Management
- Logistics Applications covering the supply chain as well as sales and support. This includes: General Logistics, Materials Management, Plant Maintenance, Production Planning, Project System, Quality Management, and Sales and Distribution.
- Human resource applications covering hiring and termination, through wage and salary payment, and includes: Personnel Administration and Personnel Development.
- Cross-applications covering all the ERP modules or components not directly related to a specific business process. These modules can be used in conjunction with any of the functional modules or as stand-alone, independent modules and include: ERP Business Workflow, ERP Office Productivity Tools, ERP Archive Functions, Computer Aided Design Integration, and Document Management System.

Many ERP vendors also offer industry vertical solutions, a set of programs developed for a specific industry, such as banking, that can be applied to the core ERP modules. Some of the ERP industry solutions are available for:

- **Banks:** risk management, statutory reporting and controlling
- **Insurance companies:** securities, loans and real estate
- **Publishers:** Subscription management and advertising management

- **Hospitals:** Patient administration and accounting and hospital controlling
- **Retail**: Product structure, distribution logistics and point-of-sales systems
- **Utilities:** Device management, house connections, meter-reading processing and billing
- **Oil industry:** Exploration, transportation and distribution
- **Public sector:** Budget planning and management
- Several others

The most commonly implemented modules include that of finance, costing, sales and distribution, materials management and production planning. This ERP core underlies all the ERP application modules and therefore must be implemented in its entirety. Communication layer of ERP application handles classification and document management, and interfaces with operating system, database, network and user presentation interfaces. Each of the commonly implemented modules is described in more detail below.

The ERP FI module is integrated into the logistical chain that begins with procurement, and ends in sales and distribution. The user can define the Chart of Accounts. The Chart of Accounts serves as the basis for all the automatic integrated postings. Business transactions are entered and stored in the database in the form of documents. The FI system supports the real-time generation of the income statement and balance sheet. FI includes the following sub-modules:

- General Ledger
- Accounts Receivable
- Accounts Payable
- Asset Accounting
- Special Ledgers
- Accounts Consolidation

The ERP costing and controlling module focuses on management of accounting functions such as cost accounting and profitability analysis. CO includes the following sub-modules:

- Profit Center Accounting
- Cost Center Accounting
- Product Cost Controlling
- Profitability Analysis
- Activity Based Costing
- Internal Orders

The Sales and Distribution module performs the functions of sale, distribution, transportation, pricing and invoicing. It automates the administrative work involved from the time a customer quote is created, through to distribution and invoicing of goods. This improves the capability to deliver products on a timely basis. The key sub-modules in SD include:

- Sales Support
- Sales
- Shipping
- Billing
- Transportation

The Materials Management module controls various functions related to inventory and purchasing including the purchase and receipt of goods, inventory management and valuation, and warehouse management. The MM sub-modules include:

- Inventory Management
- Warehouse Management
- Purchasing
- Invoice Verification

The Production Planning module controls various functions related to production planning and processing. It tracks the purchase, storage and transfer of materials and intermediate products. Important PP components are work centers, bills of material and routings. Sub-modules in PP include:

- Materials Requirement Planning
- Kanban/Just-in-Time

- Production Planning
- Production Orders
- Sales and Operations Planning

In addition to the above, the following ERP add-ons/extensions are available from leading ERP vendors:

- ERP SCM
- ERP CRM
- ERP E-Procurement
- ERP Product Lifecycle Management
- ERP Business Intelligence
- ERP Mobile Business
- ERP Marketplaces

ERP infrastructure and services (associated with building and hosting business portals in an open systems environment) include:

- ERP Consulting Services
- ERP Technology
- ERP Hosted Solutions

The ERP Vendor Selection

Request for Information (RFI) Process

The traditional method of selecting a business and accounting system was to prepare a detailed requirement specification and then include this alongside other operational requirements in a huge document known as the Invitation to Tender (ITT). Packaged software was not always available and the specification had to be comprehensive enough to be used for the selection of specialist developed or bespoke systems as well as packaged solutions. The emphasis on the ITT approach was for the buyer organization to accurately define requirements, and the vendor to accurately match its applications or development capability against those requirements.

In order to protect the customer's position, comprehensive legal contracts were entered into with the supplier to ensure that it delivered exactly as stated in the ITT. Unfortunately, IT requirements can often be interpreted in different ways and there are many examples where projects have failed due to misinterpretation of requirements. Even when disputes were taken to court, the courts found it very difficult to interpret the requirements.

New Business and Accounting Systems

Organizations no longer purchase bespoke accounting applications; they use established and proven packaged ERP applications. Today modern business systems are very flexible and therefore evaluating them against specific functional requirements is a long and cumbersome process. For the main part this is not required; it is a waste of time sending a detailed specification of requirements to modern application developers, as the answer to most requirements will be 'yes'. Modern applications are so flexible; they can be configured to meet most requirements. There are however some key elements that need to be specified and these need to be reviewed in detail. The days of the detailed 'Functionality Check List' are over.

The Request for Information (RFI) Approach

The most appropriate approach to suggest buyer organizations is that after collecting all of the detailed requirements from various departments, these are distilled down to a shortened 'summary of requirements'. Using the summary as the basis of an RFI, it is sent to a selection of up to 10 suppliers, but ideally only six, to see if their software fits the broad requirements, before embarking on detailed investigations. Once the responses have been evaluated short-listed, more detailed investigation into the requirements can be undertaken. After the detailed review, a preferred supplier is established and a detailed evaluation is undertaken of the product, including testing of the product

on the customer's premises. The initial work in establishing the detailed specification of requirements is now converted into a testing schedule and over a series of weeks, the product is tested against that specification to determine how accurately it fits the customer's specific requirements.

The process not only shortens the procurement cycle, it also allows more time with suppliers that can meet the requirements and, more importantly, it takes a significant amount of risk out of the selection process by undertaking the on site testing of the product before purchase. In our experience, the heavier the document, it is less likely that developers will respond. Initially, it is better to start with a brief document summarising the key requirements, and then home-in on the detailed requirements with suitable short-listed candidates.

Principles of the RFI Approach

The two basic principles of the RFI approach that differentiates it from traditional procurement processes are:

- The replacement of ITT with a shortened RFI
- Bringing forward the detailed product-testing to the evaluation phase, prior to purchase rather than after system installation.

The effect of these two basic principles is to reduce the procurement process and to make it significantly more reliable than the traditional ITT approach. We are able to show that using this approach a reduction of 45% in elapsed time can be achieved.

Benefits of RFI Approach

The ERP RFI approach has key benefits to buyers. They are as follows.

- Leading suppliers are more inclined to respond to RFI than ITT.
- The responses to RFI are much quicker and easier to evaluate.
- The selection and evaluation process has been speeded up considerably compared with the traditional ITT approach.

- The RFI approach does not eliminate the use of consultants, rather re-focuses their activities from preparing an ITT to preparing a detailed testing specification.
- Inappropriate packages are eliminated early in the evaluation cycle.

Buyer organizations concentrate on evaluating packages likely to fit their requirements.

Following the detailed testing of the preferred supplier's package, buyers have the confidence that the package selected will meet their key criteria. The risk and uncertainty in software selection package is significantly reduced by the RFI method.

RFI Method

Overall, there is a significant change in emphasis from ITT to the new RFI process. Instead of documenting a watertight contract with an accompanied detailed specification, the RFI enables the buyer organization to place its resources on the testing of the software prior to its purchase. It is this re-distribution of effort by focusing on three, and ultimately, one package that gives the greatest benefit in reducing the risk to the buyer.

ERP RFI Steps

The essential steps of the new approach are as follows:

Preparation Phase

- Determine business strategy for the buyer organization
- Collate the specification of requirements
- Highlight the key requirements for the RFI
- Prepare the RFI
- Send out the RFI to a selection of up to 10 vendors—ideally only six

Evaluation Phase

Evaluate the responses to RFI and prepare a short-list of three or, at the most, four vendors.

1. Attend initial the demonstrations of short-list offerings, reject unsuccessful vendors.
2. Provide in-house briefings to short-listed vendors to explain key requirements.
3. Follow-up calls to reference customers were provided.
4. Develop evaluation criteria and brief staff on assessment of demonstrations.
5. Attend detailed demonstrations to evaluate the short-list against the RFI specification.

Preferred Supplier Phase

- Select a preferred supplier, possibly entering into a non-disclosure agreement
- Place other short-listed suppliers on hold, pending a detailed evaluation of the preferred supplier
- Undertake detailed demonstrations to each department
- Undertake reference of site visits
- Develop specification for departmental test
- Undertake detailed department testing on site
- Prepare the evaluation report and decide to continue negotiations with preferred suppliers or not
- Or alternatively, go back to Stage 1 and re-evaluate one of the other short-list offerings.

Implementation-Planning Phase

- Prepare Implementation and project plan
- Review Vendor's Contract and Service Level agreement

- Review vendor's contract and finalize system requirements and associated costs
- Place contract with preferred supplier

The ERP Vendor Analysis

SAP—the Leader in ERP

Created in 1972 by five former IBM employees—Hans Werner Hector, Deitmar Hopp, Hasso Plattner, Klaus Tschira, Claus Wellenreuther; in Walldorf/Mannheim, Germany, SAP® states that it is the world's largest inter-enterprise software company and the world's fourth-largest independent software supplier. The original SAP idea was to provide customers with the ability to interact with a common corporate database for a comprehensive range of applications. Gradually, the applications have been assembled and today many corporations, including IBM and Microsoft, are using SAP products to run their own businesses. A recent R/3® version was provided for IBM's AS/400 platform. SAP is approaching the market with new offerings that may challenge the competition: xRPM, a cross-application ('cross-app') for resource and program management that is positioned as a product targeting internal R&D or IS organizations, and SAP professional services, a CRM solution.

SAP is the world's leading provider of business software solutions. Today, more than 32,000 customers in more than 120 countries run the SAP® software, from distinct solutions addressing the needs of small and mid-size enterprises, to suite offerings for global organizations. Powered by the SAP NetWeaver® platform to drive innovation and enable business change, SAP business solutions help enterprises of all sizes around the world improve customer relationships, enhance partner collaboration and create efficiencies across their supply chains and business operations. SAP industry solutions support the unique business processes of more than 25 industries, including high technology, healthcare, retail, public sector and financial services. With subsidiaries in more than 50 countries, the company is listed on several exchanges, including the Frankfurt Stock Exchange and NYSE under the symbol

'SAP.' Additional information is available at the SAP website *http://www.sap.com*

SAP defines business software solutions as comprising ERP and related software solutions such as SCM, CRM, product life cycle management and SRM.

Fortune magazine has ranked SAP AG (NYSE: SAP), the world's leading provider of business software solutions, as No. 3 in computer Software category in *Fortune's* annual ranking of America's Most Admired Companies. The entire list of rankings is posted on *www.fortune.com* and appears on the March 6, 2006, issue of the *Fortune* magazine.

According to *Fortune,* the most admired companies are those known for high quality products and services, driving innovation, effectively managing talent, delivering consistent returns to shareholders, and demonstrating social responsibility. With an overall score of 7.28, SAP achieved exceptionally high ratings in innovation, employee talent, social responsibility and quality of products and services.

SAP applications, built around the latest R/3 system, provide the capability to manage financial, asset and cost accounting; production operations and materials; personnel; plants and archived documents. The R/3 system runs on a number of platforms, including Windows 2000, and uses the client–server model. Client–server model describes the relationship between two computer programs in which one program, the client, makes a service request from another program, the server, which fulfills the request. Although programs within a single computer can use the client—server idea, it is a more important model within a network. In a network, the client–server model provides a convenient way to interconnect programs that are distributed efficiently across different locations. The latest version of R/3 includes a comprehensive internet-enabled package.

SAP has recently recast its product offerings under a comprehensive web interface, called mySAP.com and added new e-business applications, including CRM and SCM.

Assessment of SAP

SAP should be high on the list for large and sophisticated companies considering comprehensive enterprise applications that include ERP, financials, HR, SCM and planning applications and product development. The applications are also competitive on a stand-alone basis in financials, HR and portals, but less so for CRM. The SAP applications are generally feature-rich and scalable, and are best suited for companies with at least $1 billion and above revenue, although many companies with less than $1 billion in revenue use these products effectively as well. Companies in the service industry should ensure that the business process capabilities meet their needs.

SAP solutions for mid-market and smaller companies will become more attractive as strategies to address these market segments progress. Business One will be worth considering for smaller subsidiaries of SAP customers once localization and rollout efforts are completed, leveraging integration to SAP's flagship applications.

SAP CRM is an increasingly viable option for existing SAP customers, offering better out-of-box integration at the cost of some ease of use and advanced functionality. Limitations are most evident in technical support and high-end contact centers, as well as marketing execution (where SAP itself still relies on an e-marketing specialist product). On the other hand, product-centric companies focused on order volume rather than long term customer relationship may find it appealing. For CRM and other maturing applications, live customer references should be thoroughly explored. Be particularly careful to assess productivity and ease of use, especially for non-captive users (sales or partners), and expensive or time-critical customer interactions (contact center). Ask SAP to articulate the CRM products path to the new architecture and delay broad rollouts and heavy customization until you can be assured that work will be leveraged in future releases. Process alignment should be the first priority in purchasing and implementing complex enterprise applications, including SAP. The highest value for software investment will be realized when business processes are adapted to leverage software capabilities. Conversely, modifying the software to fit existing business processes will result in higher implementation and ongoing ownership costs.

PeopleSoft ERP

PeopleSoft now part of Oracle, is enjoying a strong momentum in the enterprise applications market after completing its transition to internet architecture in 2000, with a major new release, PeopleSoft 8. The company has diversified well beyond its historical competency in administrative applications to offer a comprehensive array of products and services. The acquisition of major CRM vendor, Vantive, in December 1999, was a bold move that has taken on added value with the CRM product's recent migration to PeopleSoft's technical architecture. Simultaneously, PeopleSoft expanded its portfolio of services beyond software support and training to include a large consulting organization and an Application Service Provider (ASP) business.

Products

PeopleSoft now offers a portfolio of 108 enterprise application products plus 59 'collaborative' applications. The products are organized into several major categories, or suites:

- HRM
- Finance
- CRM
- ESA
- SCM
- EPM
- Student Administration

Portals for employees, customers and suppliers complement the core applications. Although the company is best known as a supplier of HRMS, revenue is fairly evenly split across HRMS, financials and CRM. SCM accounts for approximately half as much as each of the three others. While PeopleSoft does not disclose revenues by product line, the company has indicated that the three largest product lines are growing at roughly the same rate.

The majority of PeopleSoft's products are used across a variety of industries. In addition to the SCM suite for manufacturing and Student Administration for higher education, PeopleSoft has made significant product extensions for government (for example, US federal agencies) and professional services.

Strengths

PeopleSoft is clearly the market leader in HR and payroll applications for larger companies, at least in North America. PeopleSoft's financial applications are also competitive in the upper end of the market. The recent integration 8 extends the value of the applications to a potentially large number of users through what PeopleSoft refer to as 'collaborative applications'. These collaborative applications are designed for non-core users, including employees, managers, applicants, customers, suppliers and business partners.

In addition to the extended application functionality, the internet architecture itself has given PeopleSoft a strong differentiator against SAP and Oracle, while these competitors retool their own architectures for better web deployability. The PeopleSoft internet architecture addresses key issues that are characteristic of client or server applications, including its own (prior to Release 8). This includes loading and maintaining software (that resides on the client workstation) and network performance. PeopleSoft elected to deploy its web client as thin HTML pages with no application code stored on PC, in contrast to Java-based approaches that load applets and cache application components. While this toolset allows customers to leverage significant flexibility for adapting the PeopleSoft applications to their needs, customers should carefully consider the implication of customization on future upgrade complexity and levels of ongoing support.

PeopleSoft provides a comprehensive array of applications that integrate with one another, but the product suites are often sold independently as best-of-breed solutions. In a nutshell, this is a strategy of selling integrated BOB applications. With this strategy, PeopleSoft is able to compete well at the functional level in most areas and has the

ability to compete for large enterprise deals as well. SAP has recently moved to a similar strategy emphasizing openness and heterogeneity in application architecture, in effect validating PeopleSoft's position. Oracle, in contrast, is currently emphasizing a fully integrated approach.

Oracle

Oracle is one of the largest players in the enterprise applications business, with a comprehensive product suite and a global customer base of more than 13,000 companies and government organizations. The applications business remains tightly coupled to Oracle's database business, leveraging both the company's technology platform and its considerable financial strength.

In 1977 Oracle was founded as a database technology company and by 1990, it had initially introduced a set of accounting applications. By the late 1990s, Oracle had become one of the largest players in enterprise application software and currently offers a comprehensive portfolio of applications: Oracle EBS. Oracle's applications business, including related services, represents 27 percent of the total company revenues (on a calendar year basis), and that has been fairly consistent during the past four years.

Oracle's EBS products span financial management, HRM, CRM, SCP, procurement, manufacturing, fulfilment, projects, maintenance management, product development, e-commerce and business intelligence. With a global customer base of more than 13,000, Oracle supports 30 languages in the EBS product.

Vision

Oracle's stated vision is 'Spend Less, Know More.' That works for a marketing message, but by its actions Oracle's vision is simple: to be the number one enterprise application vendor in the world by:

- Offering the most comprehensive suite

- Building the suite on its own world class infrastructure
- Having exactly one database for the entire suite
- Supporting a global enterprise on a single instance

The most unique aspect of this vision has been Oracle's tenacious commitment to deliver the entire suite on exactly one database. While its competitors have chosen to move toward components that are integrated with a messaging-based architecture, Oracle has not moved in that direction. However, as Oracle has moved forward with its Real Application Cluster (RAC) technology. RAC has so far been able to scale to enable its own ambitious plan to place its own internal e-business suite on a single instance. Oracle currently uses a three-processor RAC for the Americas, a two-processor RAC for Europe, a single-processor RAC for Japan, and a single processor for global CRM. To date, Oracle has only published data for a four-processor RAC system. In order for Oracle to move to a single global instance, it may have to have a seven-plus processor RAC system.

ERP Lifecycle Management

Software contracts between users and vendors are always complicated affairs. Recent trends, such as instance consolidation and supplier reduction, are shifting the balance of power toward the vendors. Before jumping into the vendor selection process, a user company should start by understanding its software lifecycle. Considerations should be made for defining a user company's usage rights carefully, addressing changing business conditions, and anticipating future housekeeping issues. Given the complexity of today's contracts, Forrester Research recommends that the company's legal advisor and/or trained procurement negotiators review these legal documents. Users must take action to avoid losing negotiation leverage with initial contracts, as well as renewals.

Understand the Software Lifecycle

Like other capital equipment purchases, enterprise software also has a lifecycle of its own. From the selection to the retirement of the asset, it is important to understand the requirements in each phase and the subsequent impact of each phase on software licenses. The ERP software lifecycle in five phases:

Selection The process of vendor selection includes criteria such as functionality, business process support, company strategy, product vision, implementation costs, and license terms. As the first phase, selection is the foundation for all other phases. This phase represents the time before implementation.

Implementation Once the software has been selected, implementation of the asset comes into play. Issues include areas such as integration, functionality-gap discovery, and bug and enhancement requests. Usually, these areas are managed by a PMO or competency center. Once the software is live, this can be considered as year zero or the beginning of year one.

Utilization During this phase, the software is in full usage. Business requirements are collected for future enhancement requests. Changes in business structure from mergers, acquisitions, product line introductions, and other events materially affect how the software is used. At this point, the lifecycle is approximately one to six years.

Maintenance If the software has not been upgraded to a newer version, then the implementation is in the maintenance phase. Some regulatory enhancements are provided, and the vendor at this point is most likely to decommission support or encourage upgradation. The lifecycle is now about seven to ten years.

Retirement Setting the system to complete rest is now considered. Full replacement of the software is required as customization renders any upgradation obsolete. It's time to go back to vendor selection or consider re-implementation if you have over-customized.

Table 6.1 The ERP lifecycle

		Time period (in years)
Selection	• Determine current state • Identify key process flows • Design future state • Process Mapping and Gap Analysis • Negotiate ERP software terms	Pre-cycle
Implementation	• Select ERP implementation partner • Identify executive sponsors • Build IT and business leader owners • Determine program management • Design ongoing knowledge management and transfer process	0–1
Utilization	• ERP Software is now in full usage • Business requirements are collected for future enhancement requests • Changes in business structure affects software usage	Years 1–5
Maintenance	• Some regulatory enhancements are provided • Vendor is likely to withdraw support or to encourage ERP upgrade	Years 6–10
Retirement	• Replacement of ERP software is now required as customization renders ERP upgrade obsolete. It is time to go back to the vendor selection phase.	10 Years through pre-cycle

ERP Vendor Selection Best Practices

Include Licensing Requirements in Selection Criteria

Vendor selection efforts typically begin with documents, mapping process flow, demo sessions, and proof-of-concept trials. While selection sessions typically result in a shortlist where one to three vendors are considered, Forrester Research recommends that companies include software licensing discussion as part of the selection framework. Many of the leading companies are succeeding by adopting a number of best practices.

- **Entering licensing discussions in parallel**—License agreement requirements should be included in the request, RFP's, or up-front discussions. End-users who have done so put vendors on alert that their enterprise is cognizant about licensing and pricing. Furthermore, they demonstrate up-front that licensing will be a significant factor in the selection criteria, in tandem with functionality.
- **Understanding their usage**—Determine beneficial metrics before engaging the vendor. Study the usage models and determine the metrics that are more advantageous to your enterprise, prior to negotiations, so you are prepared to provide options in discussions. Account for the impact that mergers and acquisitions will have on your model, as well as divestitures. In some cases, you'll have to determine your future process flows prior to metrics modeling.
- **Focusing on the total cost**—Many enterprises have jumped into deals where the license fees were heavily discounted, only to find that future maintenance and support fees were subsidizing the license fees. Assess the maintenance and support fees, and compare pricing in aggregate for three-year, five-year, and seven-year periods. Examine the aggregate cost, and assess how business expansion and contraction affects variable IT costs.
- **Engaging vendors early for an early commitment of the delivery**—As the vendor battle moves from breadth to depth, vendors are eager to claim victory or traction in select industries. Instead of customizing or configuring your software to meet your current needs, extract vendor commitment of delivering industry-specific

functionality. Instead of painful upgradation and re-implementation, a win-win situation is created. You gain full support, and they gain a new industry expertise.

- **Leveraging reference ability**—Your willingness to be a reference customer can assist your efforts in pushing for your software licensing positions. Vendors are looking for sales and marketing references, especially in new industries. Take advantage of reference ability clauses to create a balance in power.
- **Partnering with the vendor**—At the end of the day, your relationship with the vendor makes the key difference. Identify mutually beneficial wins up-front, and look to build trust in your interactions. A good partnership is more important in the long term than marginal license, maintenance, and support-cost differences.

What it Means

Users Must Shift the Balance of Power

Many vendors have publicized their efforts to capture the value that they are providing to their customers. Coupled with continued vendor consolidation among software providers and instance consolidation efforts by enterprises, users are at a disadvantage. Although this is beneficial to financial analysts and stock valuations, this code word for revenue share must be balanced with provisions that reduce license costs, if value should decline or business conditions change. In addition, users should not forgo the right to talk about their contract provisions and should leverage user groups to address changes in the license process that will lead to fixed costs in IT. It is never too late to apply strategies today in contract negotiations that will preserve future bargaining leverage.

PART 3

ERP Execution

CHAPTER 7

Executing ERP Programs

It is a very less known fact that ERP projects don't fail at the end, they fail at the beginning.

A good decision executed quickly beats a brilliant decision implemented slowly. ERP projects may take years but technology decisions and related processes need to be made quickly to reap the benefits fast. The true measure of success of an ERP system is its effective execution. Effective execution is not just 'on time—on Budget' but effective in delivering the desired results including ROI. Key decisions about which ERP capabilities to install, customize and develop, determines an organization's competitive advantage. In today's scenario, a quality ERP transaction foundation is a prerequisite for taking advantage of many of the new e-business opportunities that are placed high on the list of priorities of executives.

If you want to get a good argument going in IT circles, ask someone about the effectiveness and ROI of ERP software designed to integrate the scattered functions of a company onto a single computer system. It will start a storm! Nicholas T. Carr in a landmark article titled ' IT doesn't Matter' published in the May 2003 issue of the *Harvard Business Review,* argues that investments in IT, while profoundly important, are less and less likely to deliver a competitive edge to an individual company. 'No

one would dispute that information technology has become the backbone of commerce' Carr says. 'The point, however, is that the technology's potential for differentiating one company from the pack—its strategic potential—inexorably diminishes as it becomes accessible and affordable to all'. It is a very powerful and profound argument! You might be wondering then How an ERP can help you to steer ahead in terms of competence and competitive advantage as the title of this book suggests. The answer is execution. The answer is it is no trick or gimmick—ERP can be executed smartly to deliver competitive advantage

One of the ERP paradigms is do not over-customize. But what is not made clear is how to Customize smartly, as your organization needs it!

Do make changes, adopt Best of Bread (BOB) business processes, use Smart technologies and tools that are hidden in an ERP and never used. If you do not customize an ERP to deliver smart performance—then how can you expect outstanding results or be different from your competitor. Both Nike and Reebok implemented SAP ERP. But Reebok made smart customizations—in SAP retail—configuring color, size matrix in the merchandizing module that resulted in a clear competitive advantage, improvement in customer satisfaction and better demand management. *(Source:* Davenport, McKinsey). Nike also implemented SAP but completed its implementation several years later than Reebok. Reebok was the first to steer competence, using ERP better than Nike.

Consultants will probably tell you 'Hey, ERP is a very complex system—so, do not over-customize'. Do not make the configurations complex. But who knows what the right quantity of customization is? May be it is advantageous for consultants to quickly implement a vanilla ERP system and collect their payment checks and move on. The critical question is—Where is the competitive advantage for you? How to execute an ERP to unlock competitive advantage?

In many large organizations, managers end up buying commodity software for different applications and create IT spaghetti! If one explores an ERP, you might find most of the features or functionality of the new software that already exist in the ERP system but never used! This is a common mistake in IT circles.

Managers frequently deal with watershed events like internal reorganization, consolidation of multiple ERP systems, and organizational changes like mergers, acquisitions, and sell-offs. How do we deal with such complex events and still derive ERP synergy? In some cases, it makes sense to re-implement an ERP for maximum long term ROI than maintain a patchwork Legacy ERP and swim in status quo!

There are a number of features and functionality of an ERP waiting to be discovered. It is estimated that hardly 50% of an ERP's functionality is used—even in some top-of-the-line ERP implementations. Chances are that your consultant is too busy to inform you the depth of the chosen ERP functionality or, he may have his own idea of an implementation, or 'why rock the boat' approach—when I can run away with a simple ERP implementation.

We have all heard about a handful of high-profile implementations that have met with trouble. Hershey could not ship candy at Halloween, Nike lost shoe orders, and FoxMeyer could not process orders. Because of the size and scope of many implementations, failure can have spectacularly bad consequences.

In general, however, there is reason to be optimistic about the payoffs being received by firms out of ERP. Research is beginning to reveal the kinds of improvements that firms are seeing in operational measures such as order lead-time, collection period, and on-time shipping. Broader firm-level studies have demonstrated higher-level benefits in measures such as ROA, productivity, and even market capitalization. But ERP implementation is costly and time consuming, and very often exceeds the estimates of required resources. The key is to have a prepared organization, and an effective plan and execution for implementation.

Designing the Right ERP Execution

Today's competitive and economic landscape requires the efficient and proper allocation of resources —whether they are financial, technical, or human. Because of the overwhelming infusion of technology over the last decade, the IT organization has become one of the major integrators,

suppliers, and consumers of these resources. One of the major keys to the success of an IT organization is the ability to clearly align its ERP projects and investments with strategic and tactical goals of the company so that resources are used properly. To view the landscape and execute within the corporation, IT management requires defined goals, established processes, and structured project management.

In the face of escalating service demands placed on the IT organization, challenges continue to arise. How does a company create a framework that provides 100 percent visibility and centralized control of all IT service requests and work delivery, ranging from implementation of capital projects to routine activities like desktop support and helpdesk inquiries? How does an organization manage and prioritize those requests? What is the best way to route and recruit people with the necessary skills to the correct project? How does a company successfully align work against the budget to effectively report the results to the finance department?

According to Hackett Research, the ability of the IT organization to perform all of these tasks is an important factor in separating world class companies from average companies. Why? It allows them to stay focused and to execute. The following aspects are worth considering.

- World class companies complete 95 percent of their IT (including ERP) projects on time, on budget, and to specifications compared to 67 percent for average companies.
- 58 percent of the world class companies have a disciplined, continuous commitment to tracking strategic performance and integrating it with business performance reporting, compared to 41 percent of average companies.
- World class companies that have a centralized approach to sharing IT services show a 24 percent reduction in end-user costs compared to a decentralized IT structure.
- World class companies use a competency model approach for rationalizing, developing, and sourcing IT resources. For example, 75 percent of world class companies use a skills-definition model for project staffing as against 31 percent of average companies—a 142 percent difference.

So what steps does an IT organization need to take to execute its plans and increase its value within the enterprise? According to Hackett Research an excellent first step is to evaluate strategic and tactical processes—strategy and planning, enterprise architecture, managing of finance, demand, delivery, project, risk, resource and supplier, IT reporting, application development—to make sure that they adhere to a best practice framework.

As these processes are measured and adjusted against best practices, the designated changes then must be configured into enterprise applications. At this point, it is important that companies not only have an enterprise application that can be configured to these process changes but also allow the IT group to manage, prioritize, and report on financial, technical, and labor requirements of its service delivery.

The startling results of the (BCG)—Boston Consulting Group study conducted in 2000 is worth examining. The group set out to answer the many issues surrounding ERP and ROI, ERP's business value, etc. by interviewing more than 100 executives across North America who had taken the responsibility for enterprise initiatives between 1996–1999. Most of the executives either had primary responsibility for the decision to implement or had been closely involved in making the decision.

Against expectations, few companies reported that their initiatives had achieved significant value.

- Only 33 percent of outcomes were viewed as positive, based on respondents' judgments of value creation, cost-effectiveness, tangible financial impact, and attainment of goals.
- Many companies claimed success, but few met their objectives or realized significant financial impact.
- Despite their significant investments, only 60 percent of respondents said their initiatives had delivered sufficient value to justify the effort.
- Only 52 percent said they had achieved their business objectives.
- And only 37 percent could point to tangible financial impact.
- A significant segment of the companies could have achieved similar value for less money.

- Most respondents believed they could have saved at least 5–10 percent of their costs.
- Twenty percent of all ERP and SCM respondents said they could have achieved the same value for less than half the cost.
- Good execution did not guarantee improved business value.
- Only 58 percent of all positive outcomes were finished both on time and within budget.
- Of the cases with negative outcomes, 33 percent finished on time and within budget.

What companies can do to improve the chances of success?

- Begin with a strategic vision and clear business objectives.
- A strategic vision derives from a thorough up-front assessment of company needs and an analysis of evolving market conditions, competitive positioning, and customer needs.

Analyze the business capabilities required to attain the vision.

- A complete review of business capabilities must analyze existing processes and consider competitor and best-practice benchmarks.

Do enough up-front work to determine the best options.

- Simple software modifications, process redesign, and interim solutions are often overlooked as alternatives to large scale systems investments. Make decisions on the basis of business requirements, not the capabilities of ERP software packages.
- ERP Software packages provide specific solutions to a specific set of problems.
- ERP Software should not be used to justify radical change or as a general catalyst for improving processes.

Divide the initiative into focused, manageable modules with quick payback.

- Large projects become unmanageable. It is important to understand how to divide large scale initiatives into small, manageable pieces.
- A small portion of the investment often drives the greatest value.
- Choose vendors carefully and manage them vigorously.
- Realize that vendors will balance your best interests against the value of their billings.

- Remember that you understand your business and its needs better than your vendors do.

One should understand risks and manage them after considering some of the important aspects.

- FoxMeyer filed for bankruptcy, alleging that its new ERP system could not handle its transaction volume.
- Hershey Foods estimated that it lost $150 million to $200 million in sales owing in part to a new order-taking and distribution system.

Install strong, unbiased leadership to ensure that the scope of the initiative does not become too big.

- Secure the support of key executives.
- Grant the leadership the authority to filter recommendations from business users and IT implementers.

Know when to stop and re-evaluate the initiative.

- Figure out whether the next phase will add sufficient value.
- Establish metrics to track progress toward your objectives.

Two important findings of BCG.

- **Many companies could have achieved similar value for less money**

  In addition to those companies that failed to meet business objectives or achieve tangible financial impact, more than half of the companies incurred significant unnecessary costs. Of that group, some 20 percent of the organizations implementing either ERP or SCM reported that they could have achieved similar business value for 50–60 percent less. Many of their expenditures had gone toward false starts, non-essential features, and over-reliance on expensive external consultants.

- **Good execution did not ensure business value**

  Initiatives that were completed on-time and within budget garnered more positive outcomes than initiatives that were not. Nevertheless, BCG findings show that good execution did not guarantee value creation. In fact, 33 percent of the initiatives with negative outcome had been well executed.

Beginning with a Strategic Vision and Clear Objectives

Some companies selected an enterprise application before they had developed a strategy, but that approach proved detrimental. Companies that started with a strategic vision and a thorough strategic assessment of their business needs had positive outcome 53 percent of the time, in contrast, to a success rate of 22 percent for those that had no strategic vision and had not conducted a thorough strategic assessment.

A thorough strategic assessment performs three important functions. First, it helps executives understand the full scope of the enterprise initiative. This understanding helps them determine whether the company needs to undertake a large scale, multi-year investment program or a targeted initiative. It also pushes executives to make explicit trade-offs and establish clear priorities. Second, the strategic assessment helps generate the executive commitment necessary for an initiative to achieve success. And third, it provides a road map for reaching business objectives.

Two problems common among companies with disappointing implementation were a lack of commitment from key executives and an absence of strong leadership for the initiative.

Companies undertaking enterprise initiatives must have strong leadership that is prepared to make tough decisions with regard to scope and direction, and to communicate the project's objectives with authority throughout the organization. Only companies with well-defined strategic imperatives can determine which business capabilities are worth developing. With so much at stake, companies simply cannot afford to plow ahead with only the hope that everything will be fine after implementation.

While strategy is important for all types of initiatives, companies moving into uncertain or unfamiliar terrain were particularly emphatic about up-front strategic thinking. Companies involved in new e-commerce initiatives are prime examples.

Analysis the business capabilities required to attain the vision is the key. Once companies have defined their strategic objectives, they need to identify the specific capabilities that will promote value creation.

Enterprise initiatives should provide specific solutions to specific problems.

When they do not, new problems develop. Organizations have introduced big application initiatives as a way to stimulate radical change. Radical change may well be required, but it should be the result of careful analysis aimed at positioning the company to exploit its competitive advantage. It is important to realize that software packages alone do not lead to operational effectiveness.

Large Projects can be Unwieldy

Large initiatives can swamp an organization's staffing resources, forcing them to depend on integrators whose incentives may not be aligned with those of the client. (And the integrators may have staffing problems of their own.) Another reason for the higher success rates of smaller initiatives is that they are more likely to undergo strong analysis. Thorough up-front analysis becomes less manageable as the scope expands. In fact, some smaller initiatives begin as large initiatives, which, as the result of up-front analysis, are then redefined and narrowed. Managers must conduct a thorough analysis to determine how to modularize their initiatives and when to stop investing.

Using Strong Leadership to Limit the Scope

Experience shows that strong, unbiased leadership is crucial. Leadership should play a decisive role in controlling the scope of the initiative. Vendors may encourage additional spending out of self-interest. Within client companies, competing parties advocating for their full set of needs may lack a big picture understanding of what constitutes a good

investment. The design process can lead to value destruction if it relies too heavily on unfiltered user recommendations.

Successful initiatives have clear leadership structures and the support of top executives. The leaders have the authority to filter recommendations from business users and IT implementers, and to keep the initiative focused on value creation.

Know when to stop and re-evaluate enterprise initiatives. In order to divide an initiative into pieces and phase in implementation, you need to know at what points to stop and evaluate future efforts. To do this, it is helpful to establish metrics that define endpoints. Without endpoints it is easy to overspend and pursue low-value initiatives.

There is strong evidence that metrics provide guidelines for determining when to stop. Initiatives that lacked metrics were more likely to incur unnecessary costs and finish over-budget.

The Value of ERP Execution

Synonymous with well-managed businesses, best practices are proven techniques that deliver measurable improvements in either efficiency or effectiveness. Best practices identified by The Hackett Group, are based on its database of benchmark results derived from rigorous benchmark studies of over 2,000 organizations around the globe that address qualitative performance, functional alignment with corporate strategy, process design, level of technology leverage, ability/readiness to partner with customer and suppliers, and quantitative metrics like cost, cycle time, quality, and productivity.

The Hackett Group benchmark results show a strong correlation between the use of best practices and the delivery of greater business value and significantly lower IT costs. The integration of best practices into IT operations result in proven and quantifiable results.

- **Business and IT alignment**—In world-class organizations, the placement of top IT executive fosters business and IT connections, and strategically aligned organizations get more value from their ERP investments.

- **IT portfolio rationalization, simplification, and standardization**—World-class companies that are better aligned have a more simplified ERP application portfolio and business environment. They are also distinguished by their standards discipline, a critical component for a scaleable, flexible computing environment.
- **Holistic technology deployment**—World class companies achieve their business case only through a coordinated and aligned ERP/IT strategy in which business processes are first simplified.
- **Project discipline and execution**—World-class IT organizations far outperform the average in project delivery because they are significantly more disciplined in the ERP projects that they undertake.
- **Shared services for ERP service or IT delivery**—Top-performing IT organizations in world class companies are moving toward shared services like centralized IT procurement to achieve their efficiency gains.
- **Effective resource management**—World class companies utilize a competency model approach for mapping, developing, and sourcing ERP resources.

ERP Projects Organization—ERP Project Management Organization (PMO)

Different companies may install the same ERP software in totally different processes. The same company may implement different ERP software in the same approach. There are three commonly used methodologies for implementing ERP systems.

The Big Bang

Companies layout a grand plan for their ERP implementation. The installation of ERP systems of all modules happens across the entire organization at once. The big bang approach promised to reduce the integration cost in the condition of thorough and careful execution. This

method dominated early ERP implementation; it partially contributed to the higher rate of failure in ERP implementation. Today, not many companies dare to attempt it anymore. The premise of this implementation method is treating ERP implementation as the implementation of a large scale information system, which typically follows SDLC (Systems Development Life Cycle). But an ERP system is much more than a traditional information system in the fact that the implementation of ERP calls for the continuous realignment of business processes. Many parties involved in ERP software systems are not IT professionals. ERP more than automates existing business processes. ERP transforms the business processes.

Modular Implementation

The method of modular implementation goes after one ERP module at a time. This limits the scope of implementation usually to one functional department. This approach suits companies that do not share many common processes across departments or business units. Independent modules of ERP systems are installed in each unit, while integration of ERP modules takes place at the later stage of the project. This has been the most commonly used methodology of ERP implementation. Each business unit may have their own 'instances' of ERP and database. Modular implementation reduces the risk of installation, customization and operation of ERP systems by reducing the scope of implementation. The successful implementation of one module can benefit the overall success of an ERP project.

Pilot Implementation

ERP pilots are a good idea but it should be done at an enterprise level. That means with core ERP functionality. But please note things will not be the same if you go for the real thing. The things you do in a pilot are the exact opposite of what you need to do to get to enterprise scale. The shortcuts that seemed so expedient in the small picture are impossible to avoid when you take a serious corporate asset and put it up as a live service. If you don't have some reasonable architectural guidance in place as you go to enterprise scale, even starting small won't get you there.

So conference room Pilots have several limitations. But Pilots that mimic a full scale ERP for a division or a business unit is a good idea. This can be used later to rollout the ERP to other business units. A few large ERP vendors offer a CRP—Conference Room Prototype. They pre-configure ERP to reflect your organization's business processes and demonstrate the ERP capability in a prototype. This is a good strategy similar to pilots where limited scale testing can be done before a full scale ERP implementation kick-off.

Based on our observations, there are three commonly used ways of installing ERP.

The Big Bang

In this, the most ambitious and difficult of approaches to ERP implementation, companies cast off all their Legacy systems at once and install a single ERP system across the entire company. Though this method dominated early ERP implementation, few companies dare to attempt it anymore because it calls for the entire company to mobilize and change at once. Most of the ERP implementation horror stories from the late 90s warn us about companies that used this strategy. Getting everyone to cooperate and accept a new software system at the same time is a tremendous effort, largely because the new system will not have any advocates. No one within the company has any experience using it, so no one is sure whether it will work. Also, ERP inevitably involves compromises. Many departments have computer systems that have been honed to match the ways they work. In most cases, ERP offers neither the range of functionality nor the comfort of familiarity that a custom Legacy system can offer. In many cases, the speed of the new system may suffer because it is serving the entire company rather than a single department. ERP implementation requires a direct mandate from the CEO.

Franchising Strategy

This approach suits large or diverse companies that do not share many common processes across business units. Independent ERP systems are installed in each unit, while linking common processes, such as financial bookkeeping, across the enterprise. This has emerged as the most

common way of implementing ERP. In most cases, the business units each have their own 'instances' of ERP—that is, a separate system and a database. The systems link together only to share the information necessary for the corporation to get a performance-big picture across all the business units (business unit revenues, for example), or for processes that don't vary much from business unit to business unit (perhaps HR benefits). Usually, the implementation begins with a demonstration or pilot installation in a particularly open-minded and small business unit where the core business of the corporation will not be disrupted if something goes wrong. Once the project team gets the system up and running, and works out all the bugs, the team begins selling to other units on ERP, using the first implementation as a kind of in-house customer reference. A plan for this strategy would take a long time.

Process based Approach

ERP dictates the process design in this method, where the focus is on just a few key processes, such as those contained in an ERP system's financial module. This approach is generally suitable for smaller companies expecting to grow into ERP. The goal here is to get ERP up and running quickly and to ditch the fancy reengineering in favor of the ERP system's 'canned' processes. Few companies that have approached ERP this way can claim much payback from the new system. Most use it as an infrastructure to support more diligent installation efforts down the road. Yet many discover that a slammed-in ERP system is little better than a legacy system because it doesn't force employees to change any of their old habits. In fact, doing the hard work of process reengineering after the system is in can be more challenging than if there had been no system at all, because at that point few people in the company would have felt benefited.

Figure 7.1 illustrates that each ERP project is a volatile 'mixture' of systematic and dynamic parts—'B' is the most balanced ERP project. There is no magic formula for the right balance. Some will be 70 percent Systematic and 30 percent Dynamic; some will be 60 percent Systematic and 40 percent Dynamic; Success lies in finding the right balance.

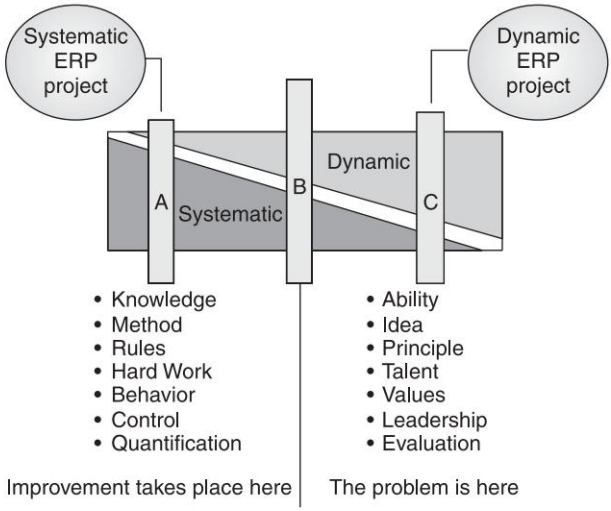

Fig. 7.1 Critical points for a balanced ERP implementation

Wait for solid-proof points. Success of ERP deployment is in prototyping phase, so customers should be cautious of technology hype until proven ERP system emerges.

Explicitly capture the design of the business itself. The ERP architecture must capture business designs as explicit definitions of process flow and business policy—better known as business metadata—that both human and IT infrastructure can access, understand, and manipulate.

Restructure and connect across technology silos. ERP is only useful when business units know what to do with it. The future ERP architecture must use business models to align technology silos, run business processes, and enforce business policies in a unified, consistent way.

From silos of functional applications to integrated business processes. Designing and building applications for end-to-end business processes, rather than for dedicated departments and functions, making it easier to innovate and optimize for industry-specific requirements.

How can the technology base facilitate flexible business? Actively embodying the design of your business in your technology, you can design your technology base to more easily adapt to new sourcing models, shifts in competitive direction, global competition, mergers, divestitures, and ongoing business change.

Configuring ERP Software

Even if a company installs ERP software for the so-called right reasons and everyone can agree on the optimal definition of a customer, the inherent difficulties of implementing something as complex as ERP is like, well, teaching an elephant to dance. The packages are built from database tables, thousands of them, that IS programmers and end users must set to match their business processes; each table has a decision 'switch' that leads the software down one decision path or another. By presenting only one way for the company to do each task—say, run the payroll or close the books—a company's individual operating units and far-flung divisions are integrated under one system. But figuring out precisely how to set all the switches on the tables requires a deep understanding of the existing processes being used to operate the business. As the table settings are decided, these business processes are re-engineered, ERP's way. Most ERP systems are not shipped as a shell system in which customers must determine at the minutiae level how all the functional procedures should be set, making thousands of decisions that affect how their system behaves in line with their own business activities. Most ERP systems are preconfigured, allowing just hundreds—rather than thousands—of procedural settings to be made by the customer.

Reasons for ERP Failure

At its simplest level, ERP is a set of best practices for performing different duties in your company, including finance, manufacturing and warehouse. To get the most from the software, you have to get people inside your company to adopt the work methods outlined in the software. If people in different departments that will use ERP don't agree that the work methods embedded in the software are better than the ones they currently use, they will resist using the software or will want IT to change the software to match the ways they currently do things. This is where ERP projects break down. Political fights break out over how—or even whether—the software will be installed. IT gets bogged down in long,

expensive customization efforts to modify the ERP software to fit with powerful business barons' wishes. Customizations make the software more unstable and harder to maintain when it finally does come to life. The horror stories you hear in the press about ERP can usually be traced to the changes the company made in the core ERP software to fit its own work methods. Because ERP covers so much of what a business does, a failure in the software can bring a company to a halt, literally.

But IT can fix the bugs pretty quickly in most cases, and besides, few big companies can avoid customizing ERP in some fashion—every business is different and is bound to have unique work methods that a vendor cannot account for when developing its software. The mistake companies make is assuming that changing people's habits will be easier than customizing software. It is not. Getting people inside your company to use software to improve the manner of working is by far the harder challenge. If your company is resistant to change, then your ERP project is more likely to fail.

Factors for Critical Success of ERP

Implementation of an ERP system is a major investment and commitment for any organization. The size and complexity of the ERP projects are the major factors that impact the cost of ERP implementation. Different companies may implement the same software in totally different approaches and the same company may integrate different software applications by following the same procedures. However, there are factors common to the success of ERP implementation regardless of the ERP systems they implement and the methodologies they use.

Project Planning

ERP implementation starts with project planning—setting project goals, identifying high level business requirements, establishing project teams and estimating project costs. The project planning offers the opportunity to re-evaluate the project at great detail. If the ERP project is not justified at the planning phase, organizations shouldn't hesitate to cancel the

project. For every successful ERP project, there are projects that are canceled before implementation.

Architectural Design

While high level architectural decision is made in the process of ERP vendor selection, it remains a critical successful factor in integrating ERP with other e-business applications, e-commerce applications or Legacy systems. Choice of middleware, interface software or programming languages drastically impact the implementation cost and release date.

Data Requirements

Unlike in-house e-business applications, much of the packaged ERP implementation involves the integration of ERP systems with existing e-business software (CRM, SCM and SFA) and Legacy information systems. Appropriate level of data requirements is critical for an ERP to interact with other applications. Data requirements usually reflect details of business requirements. It costs ten times to correct a mistake at a later phase of ERP implementation than the effort to correctly define requirements at analysis and design phase.

Phased Approach

It is important to break an ERP project down to manageable pieces by setting up pilot programs and short term milestones. Dependent on the IT experience, some organizations choose the easiest piece as the pilot project, while others may implement a mission-critical application first. The pilot project can both demonstrate the benefits of ERP and help gain hands-on implementation experience.

Data Conversion

Second generation ERP systems use Relational Database Management Systems (RDBMS) to store enterprise data. If a large amount of data is stored in other database systems or indifferent data formats, data conversion is a daunting task, which is often underestimated in ERP implementation. A two-hour data conversion task could be turned into

a two-month effort as the result of DBA group's lack of technical experience and management's incompetency or ignorance.

Commitments of the Organization

The involvement of ERP implementation goes far beyond IT department to many other functional areas. The commitment and smooth coordination from all parties is the key to the success of ERP project. The commitment come from the understanding of how ERP can benefit each functional department. For example, if the warehouse staff isn't completely sold on the inventory control module's benefits, they may not input the kind of usage data that is essential to the project's success.

The benefits of an ERP application is limited unless it is seamlessly integrated with other information systems. Organizations face many challenges in ERP integration:

- The challenges of integrating various functional ERP modules
- The challenge of integration with other e-business software applications
- The challenge of integration with Legacy systems

The Success of ERP Implementation

Integration of Modules

Packaged ERP software consists of many functional modules (production planning, inventory control, financial and HR). Organizations tend to install modules from the same ERP vendors in the initial ERP implementation, (SAP, Oracle, PeopleSoft etc.). The implementation of ERP systems could last many years. The integration of modules could be either the integration of modules from different vendors, or different versions of the modules from the same vendor.

Integration of E-Business Applications

E-business practice is the combination of strategies, technologies and processes to electronically coordinate both internal and external business

processes, and manage enterprise-wide resources. E-business software systems generally fall into four categories: ERP, CRM, SCM and KM. To get the most out of ERP systems, ERP should be tightly integrated with other e-business software—supply chain systems, CRM, knowledge management, B2B exchange and e-commerce storefront on the internet.

Integration with Legacy Systems

Over the years, Legacy systems have accumulated vast amount of data vital to the survival, operations, and expansion of corporations and non-profit organizations. Integration of ERP with Legacy systems is more complex than the integration of ERP modules and integration of e-business applications. It normally requires the installation of third-party interface software for the communication between ERP and Legacy systems. Second generation ERP systems use RDBMS to store enterprise data. Data conversion from Legacy systems to RDBMS is often a time-consuming and tedious process. While most interface software provides program interfaces API for ERP to access Legacy systems, some vendors offer integration module that automates or accelerates the transformation of Legacy application logic and data into reusable components with XML, SOAP, J2EE and .NET interfaces.

The users of ERP software are workers of an organization, while e-commerce applications are open to general public. The differences in end-users between the two types of applications have profound implications on systems integration. E-commerce applications have built into the new generation of web-based ERP systems, which may ease the integration.

Differences in User-Interface Design

ERP software automates complex business processes and transforms the way workers interact. ERP users often go through lengthy training sessions to learn how to use ERP systems. It is reasonable to design sophisticated workflow processes to best-fit organizations' business processes. The user-interface design of e-commerce systems, however,

has to be very intuitive and easy to use. Extensive training is not required for using e-commerce applications. While ERP users have no choice but to use their ERP systems, e-commerce users can go to your competitors in a few clicks.

Differences in Requirements of System Up-time

The complexity of ERP system demands routine maintenance. It is possible to shutdown an ERP system on weekends or holidays to perform periodical system maintenance and performance tuning since the primary users of ERP system are internal workers. E-commerce applications (such as online storefronts or B2B exchange), on the other hand, serve the general public and external partners, suppliers or distributors. They are required to be available 99.99% of time.

Differences in Security Requirements

ERP systems and e-commerce applications have very different security requirements. E-commerce applications are generally outside the firewall or DMZ though the databases that support the applications are usually behind the firewall. Organizations take many security measures to reduce the risk of exposing sensitive internal data to general public.

A Prescription for ERP Success

In the short term, managers need to focus on stabilizing new processes and technology and on providing an environment where people can learn to use them. Users need time to translate the training they have received to action in a live environment. This can be a difficult process for many. In order to help them, we would recommend the following:

Stay the Course

There are likely to be many things that you would have done differently had you only known better during the implementation. It will be tempting to try to address those things right away. I would resist that temptation for a couple of months if possible. Otherwise, the firm faces the risk of

creating a moving target when it comes to employees learning their new roles. Furthermore, understanding may still be imperfect. In trying to resolve an issue, you may unintentionally create others. Of course, this warning does not extend to technical or process issues that critically impact operations. The most severe problems may need to be addressed right away.

Deploy 'Super Users'

Super users are members of the user community that participated in the implementation project. These individuals represent important sources of credibility and vicarious knowledge that other employees will rely on during the first weeks following implementation. Shrewd managers will assemble implementation team with an eye towards how these valuable resources will be reintegrated back into the organization following deployment.

Consider Buffering Performance with Capital

It is natural to expect some difficulties right after implementation. Siemens, GE, Nike and many of our examples of successful implementation faced initial challenges. One way to support performance in the short term is to apply greater resources than would normally be used. This might mean building inventory prior to implementation in order to keep order lead-time down, or staffing up in accounting in order to close the books for the first couple of months. Of course this cannot be a long term strategy, but it may help get the firm through those first difficult months before people really get used to the new technology and process. In the long term, firms should look for opportunities to resolve post-implementation issues and to reduce the capital needs of the firm (if that is one of its goals). The post-implementation period can bring dramatic value to firms if they keep a couple of things in mind.

ERP is the Beginning

The Nike example illustrates the value that can be achieved when firms view their ERP implementation as laying a foundation for their infrastructure. Clearly, the firm benefited from the implementation of a stable transaction platform represented by ERP.

However, the explosive value they realized came from their ability to leverage the ERP investment in new directions. For example, supply chain initiatives such as direct fulfilment and dynamic replenishment were made possible for Dell only after they had used ERP to implement standard processes and data.

Protect the data in information systems that evolve over time in response to the demands of their environment. Managers presented with opportunities to expand an ERP solution or to provide targeted solutions for different constituencies across the firm must ensure that in executing these opportunities they do not allow IT infrastructure attributes to drift from the ERP-imposed standards that made them effective in the first place.

More specifically, managers should protect data standards and integration. Departure from data standards introduces inefficiencies in communication and understanding as different parts of the firm must, again, struggle to translate the information they obtain from elsewhere. Integration failures create repositories of information that may evolve along separate paths, serving different purposes. Eventually, the firm could find that, through a lack of discipline, its information systems architecture has once again evolved into a hodge-podge of non-integrated, non-communicating technology islands that hinder rather than support the business objectives of the firm.

We would note that alternatives do exist for maintaining links between data. If the firm finds that it must introduce special purpose data standards, it can at the very least make sure it retains the ability to map one standard to the other. Increasingly there are tools available to help with this.

Considerations in Implementing an ERP

First and foremost, recognize that 'successful' and 'painless' is not the same thing. A heart by-pass operation may be successful but it is a very painful process. ERP is no exception. Full-scale implementation of ERP represents, essentially, a total replacement of the firm's central nervous

system. This is like heart transplant. There are going to be lots of aches and pains along the way and things might not work perfectly right away. That said, if you adopt a determined and realistic approach, successful implementation is achievable. Among other things, following need to be kept in mind.

Know thyself

Make sure that you understand your business processes before you begin altering them through ERP implementation. Also, try to get a set of pre-implementation process performance metrics in place before you begin.

Know your 'Current-State'

This allows two things. First, it may help identify areas where process improvements can be undertaken immediately. Quick improvements can serve as morale boosters for the implementation team as well as a way to show the firm early payback for its investments. Second, knowing the current state gives the firm a basis for understanding whether or not it has actually improved following implementation. It is amazing how many firms get to the end of an implementation (months or years down the line) and find that they no longer have access to data that will help them understand how they have impacted business performance.

The Devil is in the Data

Get ready to battle over things that you never gave much thought to before, and expect that more of those battles will be over data than over functionality. Some of the basic assumptions about what data mean to different parts of the business may be challenged through implementation. Differences in commonly used data—customer and component information—may have historically been shielded by the existence of non-integrated applications. Those days may be over. Over the years we have witnessed pitched battles erupt over, for example, how to define units of measure. Project managers should develop an approach to resolving these issues and defining ownership of critical data elements.

Know the Difference between Understanding Something and Liking it

Decisions will need to be made that will create winners and losers—sometimes it's a zero-sum game. The key is to recognize when this is true and to have a fair and transparent process in place for making these decisions. People need to understand how and why a decision has been made and, importantly, that it will be adhered to.

Implementation gets bogged down when different constituencies within the firm stop believing that everyone is in it together. Importantly, they also get bogged down when project managers focus on finding a way to make everyone happy. Sometimes that way does not exist. Managers should recognize that and move on when needed.

Extracting value from ERP requires innovation in Business Processes and Practices. Companies that mechanically insert IT into their businesses without changing their practices and processes for exploiting the capability of ERP will only destroy its economic value.

McKinsey global institute published a study on the US productivity growth, 1995–2000. That study was the first disciplined attempt to look at the correlation between IT investments and productivity by the industry sector. The results were revealing. The study found a significant positive correlation between IT investments and productivity in only six out of 59 industries! The other 53 sectors, accounting for 70 percent of the economy, in aggregate saw only negligible productivity improvements as a result of IT investments.

Why only six industries? In each of these sectors, one or more companies introduced significant innovations in business practices to leverage their IT capabilities. This set into motion competitive pressure that forced other companies in the sector to implement comparable business practices.

The gap between ERP's potential and business realization of that potential has not narrowed. Over the past eight years, it has steadily widened. Why? In order to amplify the effect of ERPs ever changing new releases, new functionalities and add-ons—companies need to align themselves around a long term view of the ERP challenge to realize its

full potential. This long term view helps to focus and prioritize near-term innovations and benefits to build on a sustainable multiple wave of business initiative. Using ERP just like any other accounting package will not help. It is like using a battle tank to kill a cockroach. The trick lies in balancing near-term and long term initiatives so that incremental advantages are not lost in the name of lofty ideals and managerial initiatives.

Short term tactical advantages such as a reliable accounting system should be used to build on strategic systems—such as Balanced Score Card (BSC) and Activity Based Costing (ABC).

In an article, Prof. Warren McFarlan and Prof. Richard L Nolan of Harvard Business School highlight: 'Packages like ERP help remove commodity maintenance activities and allow firms to better analyze Customer information and provide service at the sharp end'.

Paul A Strassmann, Executive Advisor to NASA and former CIO of General Foods, Kraft and Xerox has written in HBR—'Corporations that adopt Generic applications, Business Processes will have uniform systems and therefore will be without competitive advantage! This assertion can be contradicted by anyone who has had experience with one-code-fits-all enterprise software suites that claim to deliver answers to most problems of business systems. Even the most tightly controlled generic application suite—ERP application, can deliver completely different results for look-alike firms.' That is a clear assertion based on research findings and industry responses. He also cautions ' Such applications have also been known to destroy firms that have attempted to squeeze unique company processes into generic moulds." That is exactly why we have suggested that one should customize ERP smartly around companies' unique business practices and processes to gain value multiplier advantage from ERP.

The cause for most of the failed ERP implementation is that the companies that implemented ERP did one of the following:

- They threw the baby with the bath water! That means they dumped their unique core business process or practice to adopt to ERP's generic template.

- They added ERP to their existing legacy—making ERP a new Legacy system along with old legacies!

The cure is to correct the above by smart customizing of ERP and replacing old ladies (old legacy systems) with ERP that will reduce maintenance as well as infrastructure costs.

ERP Project Management

Project management is the application of knowledge, skills, tools, and techniques to define, organize, oversee and control the various project processes. Project managers for ERP-business project require project management skills, understanding of business processes and broad knowledge, and experience of IT. Implementation of e-business projects, whether they're ERP, CRM, SCM or SFA, involves multimillion-dollar investment and years of commitment. E-business software, ERP or CRM, counts about 50% cost of e-business projects.

Define Project Scope

The scope of ERP projects describes major business processes the project will transform, the intended endusers the project will support, the relationship of the project with Legacy information systems and e-commerce applications, the high level technical architecture, funding availability, timeframe of application release and measures of the success of the project.

Develop Project Plan

Project planning is the process of detailing the project scope to look into the feasibility of the project from many aspects, and to plan for the details of project execution.

Vendor Selection

E-business software, ERP or CRM, counts about 50% cost of e-business projects. The project plan should detail the criteria of evaluating enterprise

software, processes of selecting vendors, and list the candidates for vendors.

Implementation plan

Implementation plan should involve breaking the project into phases horizontally and sub-systems vertically. Pay attention to the customization of e-business software. The company should outline the plans for customization.

Time and Cost Management

Create a project schedule, resources and budget plan. E-business projects may need the purchase of additional hardware and software, but the cost of software and implementation is most likely the major factor of overall cost.

Quality Management

Develop a quality plan and carry out quality assurance and control activities. Part of quality management at planning stage is the development of high-level test plan. Implementation team can run the test plan against high-level requirements to validate scope of the project.

Resource Management

Perform organizational planning, manage staff acquisitions and promote team development.

Risk Management

Identify risks; develop contingency plans for possible risks. The user-training plan should outline the steps, resources and time required for enduser training.

Monitor and Control Project Progress

Projects seldom proceed as planned. The progress of a project is impacted

by many factors—change of project requirements, unexpected technical challenges, and changes in resources availability. Project managers should closely monitor the progress of the project, identify the critical success factors and foresee the risks of project implementation, and adjust project plan and re-allocate resources. The project plan is continuously updated to keep track of what is happening rather than what is planned.

Post-Implementation Review

After the completion of the ERP project, the project team can learn from experience, identify the things that went well and the things that failed to work as planned.

The phases in a lifecycle of ERP project includes:

- Strategic Planning
- Requirements Gathering
- Customization
- Installation
- Integration
- Data Conversion
- Testing
- Training
- User Support

Strategic Planning

- Identify high-level business problems that ERP application will solve
- Choose a technical architecture that can smoothen the integration of ERP application with existing information systems
- Conduct feasibility study, and ROI analysis
- Prioritize sequence of implementation if the project is feasible

Requirements Gathering

- Breakdown of strategic business requirements into detailed functional requirements

- Design interview questions
- Interview domain experts and endusers within organization
- Document functional requirements

Customization

- Identify functional requirements that the standard enterprise software systems don't support
- Design the customized modules for your organization
- Custom development using API-Application Programming Interface
- Unit and component test the custom modules

Installation

- Prepare environment for installation, such as hardware acquisition, system initiation
- Install standard ERP application
- Install custom business module

Integration

- Prepare Legacy systems for integration
- Prepare ERP systems for integration
- Install interface software or middleware for integration

Data Conversion

- Define data requirements for new systems
- Prepare data for conversion
- Conversion of historic data into the format that the ERP systems can process
- Test ERP systems

Testing

- Perform unit testing
- Perform system testing for throughputs, scalability, stability, etc
- Perform user acceptance testing

Training

- Write user training manual
- Conduct end-user training

Post-Implementation Review

- Conduct post-implementation interview for all parties participated in the implementation
- Conduct end-user interview to collect user feedback
- Compare the original plan with the system actually implemented

User Support

- On-going user support—setup help desk
- Accumulate user-knowledge database

ERP Change Management

The ERP implementation has three distinct phases—change management, business process implementation and technical implementation. We will discuss change management in this part.

ERP System Adoption—The Challenge of Change Management

As the business environment is getting more and more competitive, companies frequently resort to IT to improve their bottom line or even to create competitive advantage. One of the broadly adopted technologies

is ERP system, which promises to integrate various divisions and functions within an organization, and thus creates a unified and cohesive information representation of the business. As frequently advertised by ERP system vendors, the integrated operation framework provided by their ERP systems enable standardization, visibility, traceability and controllability over the system adopter's business. No matter how attractive it looks in the advertisement, in reality, it was reported in a study by Deloitte Consulting that 30% of ERP implementation projects were judged 'unsuccessful' by the adopter. This was despite the fact that millions of dollars and several hundreds of man-years have been deployed into the project.

Rule No. 1: Change Creates Imbalance

The need for major change is often driven by an imbalance between a company's constituent stakeholders: shareholders, employees, customers, communities, and management. This basic law answers the question: 'Why change?, Why ERP? Why rock the boat?'

Nature consists of ecosystems in balance—structures in which different species live interdependently. When an enterprise ecosystem is knocked out of balance by a major ERP initiative, a period of often violent flux follows, during which scarce resources are dynamically redistributed and the system arrives at a new balance that better reflects the new environment. When constituent interests are out of balance in a large corporation, a power struggle erupts.

Where possible, this imbalance should be exploited to create the conditions for change. Some CEOs proactively create such imbalances to create a sense of urgency, like Jack Welsh. However, if a winning formula, once found, is to be sustained, the system must eventually be brought back into balance. High performance can be maintained only when a mentality of surplus has been restored post-ERP: when customers are satisfied, talent and investment flow in; and management, employees, and shareholders feel adequately rewarded. The evolution of constituent balance during the ERP change provides clues as to which forces can be harnessed, at different times to drive the change forward.

Rule No. 2: Leverage on Changing Things to have Maximum Impact

Maximize the ROI by changing the things that will produce the greatest results. This helps you understand what to change. Changing business processes that have greater impact on revenues and profits is a good way to leverage. For example, improving customer order management process may have positive impact with better customer service and increased revenue. Complete and clean customer master information (customer address, contact, preference, buying patterns, etc) will give cross-selling opportunities.

Doing something 60 percent of the way is often enough; doing something 40 percent of the way, on the other hand, is often better than doing nothing at all. That 20 percent swing makes all the difference. All this means you have to examine a company very broadly before determining what really needs changing and what merely needs intensifying. Your eventual path of action will be narrow, but to exploit the law of leverage, you must begin with a wide field of vision.

Rule No. 3: Liberate Energy to Drive Change

A frontline focus on customer satisfaction, directly exposing a company to the demands of its customers, will unleash a massive surge of energy across the whole organization. On the other hand, cost reduction, while it may be a critical ingredient of a change program, often consumes energy by arousing fear at the same time as it removes capacity. Focusing sharply and quickly on cost opportunities and avoiding enervating rounds of organizational downsizing can minimize the energy required, but the sort of spontaneous combustion that can be generated by customer satisfaction efforts, is unlikely to materialize.

Accomplishing a transformation from low to high performance can take several episodes over a number of years. To power these episodes, a company must discover a pattern of change that builds momentum within an episode and that promotes shared vision, confidence, leadership capacity, and capabilities that will make the next episode possible.

The particular strategy will vary with the situation. Eliminating a layer of change-resistant management and reorganizing into segment-focused business units can liberate the energy needed to engage new management in the task of improved performance.

Rule No. 4: Continuous Feedback and Adjustment

- Learn how your organization responds to change, and adjust the program accordingly.
- Acting on the bottlenecks to improvement will create new bottlenecks—and the forces driving change will ebb and flow.
- Leaders committed to change also establish other, less formal networks and processes to gauge progress and reset priorities for action. These make it possible to identify when an organization is running out of steam, or, conversely, when it has the confidence to take on a bigger challenge. Being dynamically responsive to change as it progresses also allows you to take advantage of timing. An obvious need to restructure work practices, for example, may be impossible to address in a tight market with an entrenched union leadership. If prices fall and union leadership changes, however, an opportunity may arise to broaden the change program mid-stream.

Rule No. 5: Effective Leadership

Leadership is the catalyst of change. Establish a small team at the top—think two to three, not one, not ten—to initiate and guide the change. These people must be role models for leaders down the line. Propel the vision, engaging down-the-line leaders in the process of change through targets and objectives. There are obviously many specifics that need to be considered in any change process—industry dynamics, functional knowledge, the characteristics of the organization in question—and particular strategies must be devised to exploit them. But no matter whether it is a resource or a consumer business, an Indian or a Canadian company, a total organizational change or a plant turnaround, these basic laws seem to hold. It is easy to get lost in the nuts and bolts of performance imperatives, personalities, and processes. By stepping back to first

principles, you can rise above minutiae to identify the crucial actions it will take to transform your company.

Strong Project Management

ERP system implementation is a complex project that involves six to eight months to several years of hard work. Research from Standish Group revealed that 90% of ERP system implementation end up late or over budget (Zimmerman, 1999). As a result, good project management practice is imperative in planning, executing and controlling the project. Right from the beginning, the project has to be given a clear mission and a set of objectives. A capable project manager should then be appointed to work out the balance among project scope, time and budget. These three dimensions interact with one another and must be set skillfully. It has to be realistic yet challenging enough to instill and maintain a sense of urgency.

Do not Outsource Project Management (PM)

If an organization does not have a suitable internal candidate with the necessary PM knowledge and skill, hire one well in advance. This is a full-time job and his reward has to be linked with the success of the project. Besides technical competence, an effective manager should be able to assess and correctly respond to the organization's cultural, social and political environment. Although steering committee does, in certain degree, shield the manager from those considerations, it is however significant.

A project plan is mandatory in coordinating efforts and resources. A detailed plan for activities that will be carried out within three months and gross plan for those that lie beyond. It is always a good practice to involve team members in the planning stage because the involvement increases their level of buy-in and commitment. Something is bound to go wrong in the project with this kind of scale, so practice risk management faithfully to contain the impact of unpleasant surprises. Research has shown that 65% of executives believe that ERP systems

have at least a moderate chance of hurting their business due to implementation problems. As a result, the business has to create contingency plan and a fallback strategy for possible disruptions.

Constantly monitor and control project progress to keep it on-time, on-cost and within scope. Keeping an ongoing pressure and a sense of urgency is the key. Once the pressure is released, the staff tends to give priority to the task they are most familiar with, which is usually their routine and not the implementation of project task.

Since many tasks involve joint effort among different functional areas, departments, subsidiaries and even business partners, precise coordination is critical in making sure that project tasks are carried out with required resources and issues are resolved promptly.

Communicate regularly with the steering committee and have it resolve situations that are beyond the authority and control of the project manager. A competent project manager doesn't solve everything himself; he/she gets the right person to solve it. Communicate frequently with project team members to acquire and disseminate the most updated information. Let the team members know as much as possible. Very often, they can make very constructive and innovative suggestions based on their thorough understanding of the day-to-day operations of the business.

As many of the project team members are brilliant in their department, they are usually confident in their own problem solving ability. They tend to report problems late, and this often leads to limited options and delay. To avoid this, team members should be encouraged to voice out potential difficulties well in advance so that they can be dealt with properly.

Keeping all other relevant current stakeholders on the project progress is also important because knowing what to expect reduces anxiety. Besides, their attitude toward the project is also a good indicator of future resistance.

Although e-mail is a great communication tool, serious problems are better to be discussed through phone or preferably, face to face.

Table 7.1 illustrates the level of maturity of a project management team based on the PMI-Project Management Institute model. Companies implementing ERP should insist on a Level 4 or Level 5 maturity from their own project management as well as from the implementation of the consulting company.

Table 7.1 ERP project management maturity model

Level 1 **Crisis Management**	• At this level, good crisis managers pass for project managers. • The quality of the finished project is entirely dependent on the character and experience of the project manager. • No formal procedures or plans exist for the project. There is no 'buy-in' process for the project team members. • Project estimating is done at a high level and is often broken down by accounting codes instead of, by project deliverables. • Most project schedules are 'pretty pictures' with no baseline contrasted against their current status. • Project controls for ongoing projects are weak and mainly consist of assessing the completed task for the project at very high level breakdown and reporting invoiced actual costs to date. • There are no project quality standards for the project management process itself • Overall project performance is highly erratic.
Level 2 **Reactive Management**	• At this level, formal requirements exist to produce schedules and cost reports for individual projects at initiation but Work Breakdown Structures (WBS) are not in general use. • Status reporting requirements on the project once it is under way are vague and largely left to the discretion of the project manager. • Project data that is provided to the team is not timely enough to allow for proactive analysis and is used mainly for historical/reporting purposes.

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	• The progress reporting method for project deliverables is normally 'percent complete' with no systematic use of metrics. • Planning of projects is encouraged by management, but no time or costs are allowed for it to be done properly. • Stakeholder involvement in the process may be minimal and significant 'scope creep' may occur. • The level of estimating and planning is entirely dependent on the knowledge and experience of the project manager. There is some collection of historical data for costs that can be used for repeat work. • This level of project manager is sufficient for setting up and reporting on individual projects but not for controlling the project or for any portfolio of projects or program.
Level 3 **Project Management**	• At Level 3, proactive project management at the individual project level is evident. Estimating is done using the same WBS for execution of the work. Costs and schedules are integrated through WBS, and proactively tracked, controlled, and forecasted. • All WBS Level 3 scope of work have 'buy in' from those who will perform the work. There is a formal change management system. The earned value is used to ascertain the progress of work via a set of pre-defined metrics. • Project reporting is done in a timely manner using current data that allows for management action to resolve problems. Risk identification is done during the early phases of the project and lessons learnt are captured for each project. • Significant communication and resource allocation problems may still exist between projects and/or portfolios and across functional boundaries. • Systematic processes related to management of multiple projects are informal at best.

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Level 4 **Program Management**	• The project management processes are formal and encompass methods and practices for planning and controlling multiple projects; they are well defined, quantitatively measured, understood and executed. • A master schedule of all projects with resources drawn from a common resource pool and cost reports are regularly used. This also incorporates summarized earned value-data that are regularly used by management to assess overall program status and resolve prioritization issues. • Level 4 organizations utilize the project management process (initiate, plan, execute, control, and closeout) for each phase of the project with particular emphasis on planning for which proper time and resources are allocated. • Data and collection of data is standardized across all projects to allow for trend analysis at the program level. • Management uses collected data to anticipate and prevent the impact of adverse productivity and quality. • Training in the use of project management process is provided to all core and secondary team members.
Level 5 **Managing Excellence**	• The focus of a Level 5 organization is on continuous improvement, training, coaching, and mentoring of the project management staff. Particular attention is given to identifying and addressing • Project management problems that cross organizational boundaries and require management action; emphasis is also given to the review of new and upgraded project management software that will improve the speed and efficiency of project data collection and analysis and to 'best-in-class' project management methodology.

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	• Management actively champions the project management process and ensures that project estimates incorporate appropriate stakeholder input, risk assessments and lessons learned from the PMBOK® Guide (PMI—Project Management Institute) elements for scope, schedule, cost, human resource, quality, procurement, risk, communication, and project integration.

ERP Project Management Tips

- **Power and politics for project managers**—No matter how much position power you have, a fact of life in organizations is that you have to influence and negotiate to achieve your objectives.
- Dealing with cultural differences is the key to success
- Defining success and failure is factual, not political
- **Defining realistic targets**—Unless targets are realistic to begin with, everyone associated with a project is getting set up.

The Need for Systems Thinking

- **Understanding systems thinking**—Any improvement in quality (reducing rework) is a direct improvement in performance (productivity).
- **Quantifying and managing risks**—It is not enough to identify and quantify risks. The idea is to manage them.
- **Improving decisions in projects**—Doing the right things first and doing the next things also right will improve project decisions.
- **Developing a shared understanding of a project**—The best 'tool' for identifying all of the attributes of a project outcome/deliverable is the mind share of CEO and business managers. Are they sharing their time with you? Or, are they missing your meetings on project review.

Identifying Customer Requirements—Understanding Customers and their Needs

Every project team has the same ultimate mission that an organization has to meet the needs of customers. Key elements are:

Managing Resources

- Scheduling uncertainty in projects
- Tracking progress to achieve project control
- **Defining project metrics**—'When you are doing work that has some tangible nature, you can measure progress fairly well, but when you are trying to measure knowledge-work progress, it gets more difficult'.
- Accounting and cost control
- **Change control in projects**—Any change made to a project during the implementation stage is likely to pose a threat to progress in some way.
- Managing vendors in projects
- **Conducting project reviews**—Throughout the life of a project, there are various reviews that should be conducted.

Managing Quality in Projects

- **Quality Management: Definition, Principles, and Practices**—Quality Management is the managing of all functions and activities necessary to determine and achieve quality (fitness for use).
- **Improving project management processes**—Project teams seldom stop to ask if they can improve. In fact, this is one of the major causes for project failure.
- **Operational definitions of problems**—Stress strongly enough how important it is that problems be defined correctly so that we solve the right problem.

Monitor and Control Progress

Great Implementation Team

Since ERP system implementation project cuts across many functional areas, the implementation team should be cross-functional, and consist of a balanced mix of the best technical and business people within the organization. Best people are not necessarily determined by their title or ranking.

They are those who are well respected in their territory. They often suggest operation routine improvements or come up with innovative ideas in rough situations. They are generally people whom the peers turn to for advice and suggestion.

They should not only be experts in the organization's processes but also be aware of the best business practices in the industry so that they can understand the overall needs of the company and guide the project effort in the right direction.

Besides internal talents, external consultants are usually hired to supplement the internal team. External consultants will not and cannot fully implement the ERP system for the host organization; they only help the organization to implement the system.

They help in constructing the ERP system model and setting the required system parameters but the bulk of the work has to be shared among the entire organization.

To focus effort, all team members ought to have a clear understanding of their roles, responsibilities, objectives and expectations right from the beginning of the project. They should know their position and how to fit in the overall picture.

The project team members have to be equipped with the necessary skill and knowledge through adequate training before they can perform effectively. The involvement of businessmen is particularly important because they understand their business practices much better than their technical counterpart; they know what can be compromised and what cannot.

Since there are inevitable differences between the existing and the to-be processes, the implementation team need to have not only access to talent who can evaluate these differences but also the authority to endorse new processes. Of course, major changes still need to be approved by higher level management or even the steering committee.

Leadership in ERP Projects

- **Leaders have bench strength**—Leadership involves activity that involves getting other people to do the right things. It is better to have some good bench strength, i.e. have a great team with some additional resources that will do what you say.
- **Change and the central task of leadership**—True leadership has two primary, and equally important, dimensions: alignment and adaptability.
- **Use communication and conviction to keep followers**—The task of a leader is to communicate clearly and repeatedly the organization's vision, strategy, goal, and objective, and to communicate the ERP project's values, mission, purpose, and principles.
- **Recognize the details by focusing on the big picture**—By focusing on the big picture, leaders know what the details should look like when they see them.
- **Leaders play the hand they're dealt**—Effective leaders understand that there are some things that every leader must do in order to create followers, and to create aligned and adaptive organizations.
- **Early or late leadership**—Which is Better?—Although every effective leader is sensitive to the importance of early wins, great leaders don't immediately realize their agendas.
- **Balance ego and enthusiasm**—A useful rule-of-thumb in all leadership situations is to underpromise and over deliver.

- **Realize Fear, focus and followership**—Leaders must both appreciate that followers have legitimate differences and, at the same time, transcend those differences by identifying a common end that all parties will view as desirable.
- **The end of hierarchies and the beginning of hope**—To be effective, today's leaders must forgo the self-satisfaction that comes from playing an autocratic role and learn the art of team leadership.
- **How to create followers**—Leaders understand that if you respect followers, they will respect you.
- **Leadership's metrics**—Because measures of this year's profits don't reveal much about such important long term considerations, sophisticated corporations also attempt to measure the quality of leadership.
- **The difference between the needs and wants of followers**—Leadership begins with listening and ends with creating the conditions under which followers can realize their true needs and highest aspirations.
- **Command is not power**—Leaders understand that their role is to achieve a goal through the efforts of other people.

Proven Implementation Methodology

An ERP system implementation involves numerous interrelated time-phased activities. A good methodology gives the project manager a practical framework in structuring the implementation project such that all important tasks are included in the correct sequence. Usually, these methodologies were based on years of ERP system implementation experience and there are many of them around. The following methodology is a synthesis of the model proposed by Bancroft (1998), Ross (1998) and Markus and Tanis (1999). The methodology as shown in Table 7.2 consists of three overleaping phases and there are several activities associated with each phase. Many of the activities are run concurrently and some of them are iterative. The presentation sequence basically corresponds to their occurrence in a typical ERP project.

Project Phase/Sub-phase

Table 7.2 Description of key activities

Visioning: This is essentially the investment justification and project incubation phase
1. Align IT strategy with corporate and business strategy
2. Develop business case for ERP system investment
3. Setup steering committee and appoint project sponsor
4. Select ERP package and associated IT platform
5. Assess corporate change readiness
6. Approve implementation approach (big-bang, mini-bang, phased, process oriented etc.)
7. Approve high-level project scope
8. Approve resource allocation (budget, HR, time)
9. Appoint Project Manager
Implementation: This phase is where the bulk implementation activities occur.
The phase is further divided into five sub-phases.
Set-up
1. Develop project plan
2. Fix project-guiding principles
3. Assemble project team
4. Establish project communication and reporting mechanism
5. Train project team

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Re-engineering
1. Analyze the existing and conceived business process
2. Create a cohesive business operation model using the future IT infrastructure as the operation backbone
Design
1. Translate business operation model into the ERP system model
2. Determine additional software development effort—customization, integration, interfacing, data cleaning and conversion etc.
3. Document operation procedures
Build
1. Construct the conceived IT infrastructure, which includes network, servers, desktops, communication and peripheral equipment, database, ERP package, development, reporting and analytical tools
2. Configure the ERP package
3. Create test environments using real-life business data
4. Develop additional programs and perform customization
5. Train end-users (system + operation)
Test
1. Perform system testing
2. Conduct integrated conference room pilot
Cut-Over
1. Perform data migration
2. Operate under the new environment

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Project Review and Evaluation
1. Assimilation to solidify, consolidate and make sense of the new operation environment
2. Tune system performance
3. Stabilize ERP processes
4. Fine tune operation procedure
5. Provide support and maintenance

Organization Structure

Because of the integrative nature of ERP system, departments that used to work independently have to collaborate after the ERP system is deployed.

Moreover, front line operators are required to make business decisions that were previously done by their supervisor. As a result, new organization, empowerment and control structure is required to support the new mode of operation.

Human Resource Pressure

The implementation project involves months of hard work and the organization has to be prepared to deploy extra human resource such as contract staff to absorb the extra load. Permanent staff should be given as much opportunity as possible to assume implementation-related activities so that they can learn the new skill and understand the new system. In general, the higher the potential of an employee, the heavier the involvement he/she will be given in the implementation project. After all, they are the ones who are going to use and operate the system after the completion of the project. Don't assume that all the team members can be released after the system is up and running. Stabilization and fine-tuning of the ERP system will probably tie them up for at least another eight to ten months.

Furthermore, the organization should also be prepared for losing its best people in the project team if a proper staff retention program is not in place. This is because capable ERP consultants are always in demand.

Employee Motivation

During implementation, employees are often required to perform unfamiliar ERP system implementation tasks, which they might not be eager to take on. In addition, there are bound to be difficulties and problems in using the new ERP system. Research has shown that it is normal to see performance decline after the new ERP system goes live. In many cases, performance improvement is not visible until eight to ten months after going live. Problems, difficulties and extra workload are usually what employees see in this stage.

Therefore, proper motivation measures have to be deployed to keep the organization in good spirit.

Decision Making in ERP Team

We believe in an approach called 'RAPID'—Recommend, Agree, Perform, Input, and Decide.

This approach will require a clear definition of roles—who recommends action, who has to agree, who has input and who actually makes the decision. Decision making comes into play on the perform item. What happens if the role 'perform' is not played by a person, but by a computer system, e.g. a website or an automated origination system? What happens if the decision must be performed when no one is available or must be performed by someone brand new to the organization and in a low-paying job like a clerk? In those circumstances, unless you are taking a decision making approach, the effective management of the other four roles will not help all that much. The failure to perform will undermine everything. Effective delegation gives you the framework you need to perform, even in these circumstances.

Some decisions matter more than others...the critical operating decisions that drive the business day-to-day and are vital to effective ERP execution.

The fact that operational decisions—individually small but large in number—matter as much or more as low-volume strategic decisions, is often overlooked. A lot is written about how to make better strategic decisions but it was very important to focus on the bread-and-butter decisions that drive a company's interactions with its customers, partners, suppliers, etc. ERP decision-making is focused on these decisions and on improving their precision, consistency and agility. Speed and adaptability are crucial.

Indeed. One of the key tenets of decision making is that it is not OK to sacrifice speed and agility (adaptability) to get better or more precise decisions. The modern business environment simply does not allow this. You must build decision-making processes, and decision-making systems, that deliver agility as well as precision. All this comes with experience—so it is better to let experienced consultants and key users to make key decisions about ERP deployment and processes.

ERP Implementation Methodology

A good ERP methodology enables

- Comprehensive methodology supporting all implementation areas and processes
- Supports a broad range of customer scenarios by having a highly flexible and configurable architecture
- Fast implementation by means of accelerators, templates, questionnaires to map business processes
- Leverages intellectual capital, insights, and experience from ERP consultants
- Provides an understanding of the linkages of work effort between the various teams successful planning and implementing a package-based solution

- Typical ERP phases and activity highlights at hi-level are captured in Table 7.3.

Table 7.3 ERP phases and activity highlights

ERP Phases	Activity Highlights
Project Preparation	• Defining project goals and objectives • Clarifying the scope of implementation • Defining implementation strategy • Defining the overall project schedule and implementation sequence • Establishing project organization and committees • Assigning resources
Business Blueprint	• Refine the original project goals and objectives • Define the baseline scope • Refine the overall project schedule and implementation sequence • Product training and baseline configuration
Realization	• Final implementation of the system • Training key users • Process modeling • Completion of baseline and final configuration
Final Preparation	• Integration testing • End-user training • End-user documentation • Hardware sizing • Data validation and migration • Hand-holding

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Go-Live and Support	• Go live on ERP system, organization-wide • Continuous support on system • Help desk • Evaluate project benefits • Fine tuning of discrepancies, if any • Change management

ERP Offshore Methodology

As shown in Table 7.3, there are five phases of implementation as defined in any ERP's methodology with offshore execution.

Project preparation: creating the project framework. The project definition includes the scope, the personnel, the structure, and the functions of the personnel within the structure. In the context of an offshore project, it is this phase that sets the rules for the entire project, and it's usually performed entirely at the client location and includes key-project management and the vendor's on-site consultants.

Business blueprint: developing process alignment. This includes specifying in detail the business scenarios, business processes, and process-steps required to configure the ERP system to conduct the business of the client company. The company's current processes must first be analyzed and subsequently clarified as to how they will work in the context of ERP. This can include business process re-engineering and/or some of ERP's best practices, which is typically done by consultants, such as Accenture, PWC(IBM) or Deloitte, that specialize in ERP and business process design. While it is hard to understand how this can be done offshore, many offshore vendors such as Satyam, Infosys, WIPRO actually highlight their ability to perform this work in their plans. If a client uses offshore consulting during this part of the process, the resulting blueprint must be carefully evaluated to ensure that it represents how the client company currently functions or wants to function in future.

Realization phase: getting the prep work done. Organizational change management and the training and documentation plan need to be done onsite. However, the bulk of the work, such as authorization, configuration, customization, and test setup in using computer aided testing tools can be done offshore.

Final preparation: getting end-users ready. Often overlooked, this step is necessary to ensure that end-user documentation is created and that end-users are prepared to work in the new environment. This is also the point at which the final data transfer occurs. Companies must ensure that if their offshore vendor is not comfortable or prepared to do the necessary documentation and training, a third-party vendor will be involved to complete this step.

Go live and support. If the offshore personnel will ultimately support the ERP system, this process will be fairly straightforward. Because offshore vendors excel at all levels of system ramp-up and support, they often aid or perform this step. While some offshore companies do provide level-one help-desk support, level-two and level-three are usually more appropriate.

The Project Organization Structure for ERP implementation normally follows the organization-chart depicted in Figure 7.2.

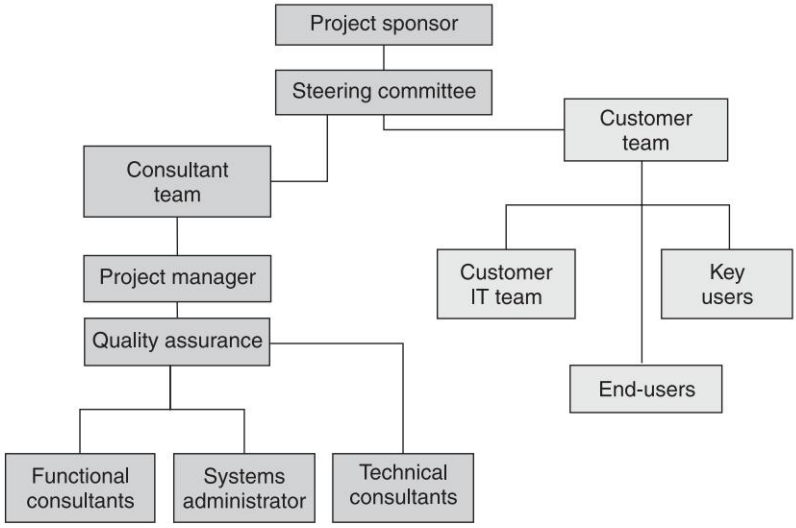

Fig. 7.2 Project organization structure for ERP implementation

The establishment of a project team with the proper combination of experienced users, decision-makers, data processing resources, and competent consultants is a critical factor for the success of the project. Top management should also ensure that the project is harmonized with other large projects currently underway within the company, since conflicting demands on scarce resources and inconsistencies in project objectives must be minimized.

In addition, it is important to choose project managers with the ability to carry out an effective and goal-oriented implementation. A structured organization should be put in place, as illustrated in the preceding chart.

Steering Committee

The steering committee functions as the highest decision-making authority for the project. As such, it represents ownership of the project, and is responsible for ensuring that the project delivers its goals and benefits.

The steering committee should be constituted as follows:

- Representatives from the top management of, customer and ERP implementer—project manager
- The chairman of the steering committee will be CEO of the customer, with overall responsibility for the project's success

Project Manager

The Project Manager is responsible for the day-to-day running of the ERP implementation project.

Team Members

The team members are allocated to the project according to the resource requirements. These participants should possess necessary skills within their areas of competence, whether in terms of knowledge of business processes and organization, or of existing systems and IT skills. It is very important that they are able to work as a team across the project. The team will comprise of participants who are experienced business users,

data processing personnel, and ERP implementer and ERP application (module) consultants.

Technical programmers will aid and assist the functional module team members in coding changes to the ERP system. A technical consultant from ERP implementer will also be part of the team to take care of training, application tuning, security management and other technical aspects.

Next Steps for ERP Execution

So what is the next ERP opportunity? Simply stated, it lies in fundamental change in business operations focused on the 'Core' of an enterprise: channel management, supply chain optimization, demand forecasting and other operations that can maximize customer service and minimize inventory levels and control other costs. These 'Core' applications can be dramatically changed by examining overall business processes: rethink organizational authority and responsibilities, and select and implement appropriate ERP applications to focus on these areas.

The end result of successful next-step ERP applications in the 'Core' of a business have been shown to generate very significant benefits, such as a 40 percent reduction in inventory with a 30 percent improvement in customer service levels.

These central or 'Core' ERP applications represent the real business value yet to be realized from larger ERP system investments.

Notes

1. Roger Dickhout, principal in McKinsey.
2. Business Process Implementation
3. Buckhout, Scott, Edward Frey and Joseph Nemec Jr., Strategy + Business.

CHAPTER 8

ERP Infrastructure Considerations

ERP Infrastructure Agility

Each enterprise has unique agility requirements influenced by business strategy, models, trends, and competitive pressures, as well as its regulatory and technology environments. Changes throughout the IT infrastructure and its management decisively influence business agility. The key to making the right changes—and making them quickly—is to determine where the pressure points exist. An organized, step-by-step approach to assessing, prioritizing, and implementing infrastructure improvements is essential.

In 2003, INSEAD, the internationally known school of management and HP, a world leading IT infrastructure services company partnered to develop industry-leading measures of business agility. The model evaluates agility across business and IT processes using three dimensions and the same can be applied to ERP infrastructure:

- **Time**—the speed at which organizations can promote, enable, and react to change
- **Range**—the breadth of change an organization can introduce and manage successfully, whether across processes, organizations, or technologies

- **Ease**—the level of effort required to introduce or support change

The Agility Assessment is based on three fundamental activities:

- **Profile**—examine IT strengths and weaknesses, and its overall ability to enable business agility.
- **Prioritize**—identify critical priorities for agility impact and investment optimization based on client priorities.
- **Prescribe**—recommend adaptive enterprise approaches and investments that address critical priorities, the assessment starts by addressing ERP's capability to support core business processes along the agility dimensions of time, range, and ease. To ensure the broadest possible perspective, several organizational groups are targeted—including the CIO, IT managers and technologists, and selected line-of-business managers. Analysis of the results clearly indicates impediments to agility, as well as areas where the need for change is minimal.

Everywhere you look today, change is occurring at a high velocity. Changes are endothermic and exothermic to borrow an engineering terminology. Endothermic changes consume energy and exothermic changes liberate energy. And nowhere is it happening faster than in the business world. Those of us who have ridden out the business cycles of the last two decades understand that change is a quick phenomenon. But, with the rise of the Internet, ERP and e-Business, change isn't something that you decide to do anymore: it is something that can be forced on you daily.

You hear a lot of talk about business agility, but what does this mean really? It certainly isn't the ability of the CEO to leap tall buildings in a single bound. Agility means being prepared for change at a moment's notice. It also means you must have the infrastructure in place to support change without throwing away everything and starting over each time because a completely new start takes too much time and is almost always, too expensive.

The reason organizations need an adaptive infrastructure is very simple: more changes happen in business. To cope with myriad unforeseen circumstances and competitive demands, businesses must create and possess a certain flexible, adaptive range.

To develop this flexibility requires an infrastructure planning process that makes it much easier to introduce new business initiatives and to grow initiatives that are already underway.

This chapter explains the fundamental approaches to adaptive infrastructure, so that you can start creating a more focused, organized way of dealing with changes in your organization. An adaptive infrastructure approach requires you to create deliverables in three areas—platforms, patterns, and services—and follow a six-step process for infrastructure planning. Concentrating on the delivery of solutions or 'infrastructure products' and reusable components will provide you with the keys to success.

In the physical world, the term infrastructure often refers to public utilities, such as water, electricity, gas, sewage, and telephone services. These utilities are mere layers of a total structure that includes IT and ERP infrastructure. Each layer of infrastructure has certain characteristics, including:

- Shared by a larger audience than the structure it supports.
- More static and permanent than the structures it supports.
- Considered a service, including people and processes involved in support, rather than just a physical structure or a device.
- Often physically connected to the structure it supports.
- Distinct from the structures it supports in terms of its lifecycle (plan, build, run, change, exit).
- Distinct from the structures it supports in terms of its ownership and people who execute the lifecycle. The notion of a separate ownership and lifecycle (especially the design and run phases) is fundamental to the concept of infrastructure set forth in this book. This concept contradicts an assumption implicit in many object-oriented application-development projects: that all reusable components should come from one set of designers, or that all designers should use a common framework such as J2EE. Discarding that assumption means you must design with a much looser coupling in mind. In contrast, those things already well understood as IT infrastructure (networks, servers, etc.) are already separate in ownership and lifecycle from application development. Expanding the notion of infrastructure is one key goal of an adaptive strategy.

Creating Own Definition

The previous section discusses one way to define infrastructure, but other definitions abound. For instance, some people define infrastructure as 'anything that is shared across multiple business units,' which includes large corporate applications, such as ERP, CRM, SCM, or even e-mail applications. Given the fact that these new developments treat these packages as infrastructure to be leveraged, this definition also shows that the job of actually keeping applications running has passed to a different group of people from those who originally designed or customized the application. Clearly, ownership of the solution is a key condition when defining layers of infrastructure.

Why Infrastructure Matters

As time goes by, more businesses are buying, commissioning, and even renting applications in one form or another. Meanwhile, fewer companies are building their applications internally from scratch. As a result, an adaptive infrastructure strategy becomes crucial to providing a versatile, flexible, and agile foundation for application deployment. As business units increasingly make the application selection for their companies, infrastructure becomes a key focus for IT personnel.

Therefore, an adaptive infrastructure should exhibit several key traits.

- **Efficiency**—The ability to provide reusable components that are priced reasonably and can be turned around quickly for the application of development projects.
- **Effectiveness**—The easy integration of all components in a way that supports their robust operation.
- **Agility**—Good planning and design processes that allow companies to develop new applications quickly, and to re-purpose or upgrade their existing infrastructure to support new requirements.

One reason infrastructure matters is that, as your organization turns to third parties for more of its application work, getting the infrastructure right is what is left for you to do. From a practical standpoint, if you are implementing a major ERP application package, what differentiates your effort is not the application itself, but how successfully or quickly you get it running and how well it works. In many cases, these problems are not application issues; they're infrastructure ones.

Most importantly, the internet has made application and infrastructure increasingly visible to customers and even to the general public. Today, much of your organization's reputation and brand identity depends on the quality of your IT infrastructure and operations, not just on your ERP applications.

Solution is Adaptive Infrastructure

What are the problems faced by your infrastructure? Is it based on technology, process, or people? What problems would your IT infrastructure customers identify with? You should have a good idea of the exact nature of the problems in your organization before you start suggesting solutions. Then, as you move toward solving problems, you can tie your solutions back to the problems they are meant to solve. What is the solution?

Even though your problems may seem unsolvable, in fact you have some very clear and workable solutions to your dilemma. You can stop the vicious cycle of problems in various ways.

- **Plan your infrastructure**—When you plan infrastructure, you just can't plan a piece at a time and hope it all works together. To be adaptive, your infrastructure planning efforts must become more extensive. They must consider all layers of the IT model and fit new components into a complete infrastructure solution that can service an entire application. This chapter provides a number of successful techniques, such as categorizing ERP infrastructure into two-tier, three-tier client/server architecture that can help you do a more thorough job of planning.

- **Design adaptive infrastructure**—Your infrastructure shouldn't just meet today's requirements; it should be ready to scale, adapt, change, or grow to deal with challenges already looming on the horizon. Once you identify these challenges, you must face them squarely and start designing for them immediately. This chapter explains the fundamental concept of adaptive infrastructure and explains how to identify the major challenges you face. Looking ahead, the answer to being more adaptive usually involves focusing more on people and processes instead of focusing only on infrastructure components.
- **Execute a reuse centric strategy**—A key reason for building an adaptive infrastructure is that many design standards and actual physical components of the infrastructure actually can be reused. Reinventing the wheel for every application only makes your infrastructure increasingly unmanageable and slows down its delivery. This chapter explains how to identify key infrastructure patterns within your organization and how to structure them to leverage a set of reusable adaptive services.
- **Overcome the tech-only focus**—Many IT people seem to focus on making product choices or architecture choices, while ignoring the people and the processes needed for successful operation. You can make great technology choices, but if you don't have the right people and processes, your technology choices will be useless and you won't get the success you need from them.
- **Choose the right technology and products**—Of course, striking a balance doesn't reduce the need to always select the best technologies and products for your infrastructure and application-delivery needs. The latest, best-of-breed solution might not always be the right one for your organization. The same holds true for IT infrastructure.
- **Balance immediate needs with long term goals**—Few people have the proverbial luxury of stopping the train to redesign railroad tracks. There isn't time to do that in today's fast-paced world, and the costs would be horrendous. To be successful, you must be able to change what you are doing while you are still doing it. This theme is repeated throughout this book. You must strike a balance

that helps you transform while you are performing. This chapter shows you how to make those balances work out correctly, and it gives you a few specific approaches that can work for you.

ERP Infrastructure

ERP software is a set of applications that automate finance and human resources departments and help manufacturers handle jobs such as order processing and production scheduling. ERP began as a term used to describe a sophisticated and integrated software system used for manufacturing. In its simplest sense, ERP systems create interactive environments designed to help companies manage and analyze the business processes associated with manufacturing goods, such as inventory control, order taking, accounting, and much more. Although this basic definition still holds true for ERP systems, today its definition is expanding. Savvy ERP users, increasing customer expectations, changes in manufacturing requirements, and technology's relentless pursuits for innovation are just some of the forces reshaping the definition of ERP. In today's dynamic and turbulent business environment, there is a strong need for organizations to become globally competitive. The survival guide to competitiveness is to be closer to the customer, and deliver value-added product and services in the shortest possible time. This, in turn, demands integration of the business processes of an enterprise, which is the stronghold of ERP.

ERP's Underlying Information Systems

It is impossible to devise an ERP system without sophisticated information technology (IT) infrastructure. ERP is the epitome of inseparability of business and information technology. Most IT-based descriptions of ERP systems state that these systems exhibit the following characteristics.

- **Based on distributed-open systems** or, in today's jargon, 'client/server'architecture. This is in marked contrast to yesterday's MRP

systems that were mainframe or minicomputer-based on proprietary computing architecture, or to stand-alone PC-based systems.

- **They are based on distributed, relational, and database technology**—This means the database software must support multiple copies of a production database that are transparent to the user anywhere around the globe. In addition, database access would be through 'standard' Structured Query Language (SQL) inquiries. Furthermore, the Database Management System (DBMS) should be an integrated design with the application software (e.g., manufacturing, distribution, order entry, procurement, etc.). Only high-end DBMSs can provide the demanding support needed by an ERP software. **IBM DB2**, **Oracle**, **Informix**, and **Microsoft SQL Server** can support most of ERP systems today. Certain DBMSs have 'row-level locking' and some ERP vendors demand that feature. Until recently, row-level locking has not been a feature of **Sybase**. Not all vendors have ported their software to be used on all of the most commonly used databases. The market is continuously changing in that regard. As a general guideline, Oracle and Informix have been a preferred choice at the high end of the ERP market, while SQL Server has been prevalent at the medium end.
- **They are based on fourth-generation** (4GL) software code, which is in contrast to the third-generation languages, like COBOL, which were used to program older MRP systems. Within the last three years, the object-oriented programming (OOP)/componentization has taken a transaction from 'nice to have, but not necessary' to 'highly desirable' feature.
- **They possess a Graphical User Interface (GUI),** which is the interface the computer terminal user sees and interacts with while utilizing an application program. GUI refers to an icon-based 'point and click' screen design as initially popularized by **Apple's Macintosh** and then made ubiquitous by **Microsoft's Windows**. This is in contrast to the character-based screen ('green screen') that has been the mainstay of the computer world for decades. GUIs provide the benefit of requiring much less training for the user to become proficient, and they have shown a great increase in user productivity over their predecessors.

- **They are enterprise-wide and support multi-plant global operations**—In addition, the integration is expected to continue its expansion to other vital functions within the enterprise (e.g., product data management, manufacturing execution system, etc.) as well as to the entire global supply chain ('customers and suppliers' systems).

ERP Hardware

Incremental improvements in IT and the drastic decline in computer prices have made it possible for smaller enterprises to consider acquiring an ERP system. ERP software applications are now-a-days possibly the most demanding software in terms of **hardware** requirements, being a high-end, mission-critical application that should provide exceptional scalability in order to address the needs of corporate giants (often with over US $100 billion in revenue). Typical RAM sizes would range from minimum 1 GB to several dozen GB for larger installations. The disk size requirements would be equally very large, often starting from several dozen GB—typically around 100 GB of disk space. The mission-critical nature of the application demands several log files to be maintained, which forces larger disk sizes. These large disks must be high-speed and 'highly available' by way of redundancy measures, such as Redundant Array of Independent Disks (RAID).

ERP Operating System (OS)

ERP applications also require a high-end **operating system** that supports multi-tasking, multi-user application and multi-threading to support high performance. To provide scalability, the operating system should support high-end processor features such as 32-bit support or higher, and Symmetric Multi-Processing (SMP) support. Leading edge operating systems that are now-a-days used in ERP applications are high-end **Unix** versions (**Sun Solaris**, **HP-UX**, **IBM AIX**), **Windows NT**, **IBM OS/400**, and **IBM MVS** (with **Linux** taking its first steps onto the ERP arena). Unfortunately, not every ERP vendor ports its software to every operating system. There is no hard-and-fast rule for identifying an optimal operating system for an ERP implementation. As a general guideline, high-end UNIX systems have been the preferred choice at the high end

of the ERP market, while Windows NT has been prevalent at the medium end (approximately 50 percent of the mid-market share). With continued enhancements Windows NT/2000 is expected to become a serious contender also in the high-end market segment in the future.

ERP Architecture

From an architecture standpoint, first ERP software packages were originally written in a mainframe computer environment. In that setup, the mainframe represents the brain, while so called 'dumb terminals' allow the user only to access and input data. Since a dumb terminal is a mere combination of a keyboard and a terminal, it cannot process information itself.

Personal computers are now-a-days powerful enough to take on some of the processing tasks that used to be performed solely by mainframes. When PCs are combined with larger computers—mainframes, minicomputers, or PC servers—the system is referred to as a client/server platform.

'Client/server' means that the processing of work is divided between two computers. The 'client' is the computer on the desktop, which performs display and some logic functions (e.g., the Windows GUI), while the 'server' is the central computer that contains the database and application programs.

Today client/server architecture, or distributed computing, is the prevalent choice of many companies today for several reasons. First, using PCs instead of dumb terminals creates an increase in the computing power. Graphic processing is highly CPU intensive, and is impractical to perform on a central computer. Hence, it became necessary to offload that processing to PCs. Second, overall system speed is increased due to the possibility of using distributed databases. Furthermore, hardware costs are considerably lower compared to using a mainframe system.

The primary strategies for implementing client/server are two-tier, three-tier/n-tier, and Internet/intranet. The concept of tiers provides a convenient way to group different classes of architecture. Figure 8.1 illustrates the difference between two-tier and three-tier.

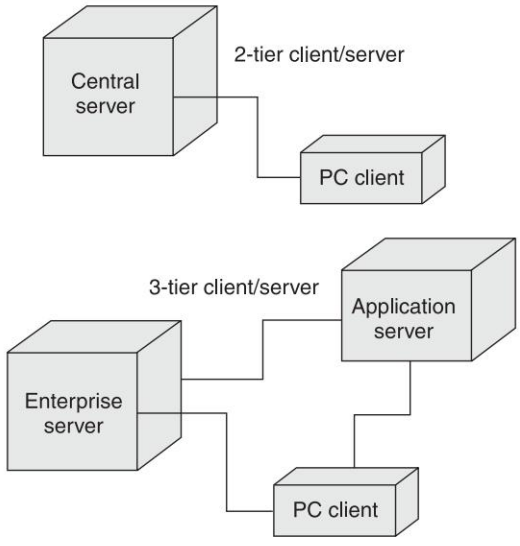

Fig. 8.1 Two- and three-tier client/server architecture approach

In a two-tier approach, the client machine connects to a single server machine. Usually the server controls the central database while the client controls the user interface. The main difference between the two is that the server responds to requests from many different clients, while the clients usually initiate the requests for information from a single server. Data is managed by a dedicated database to improve multi-user performance.

Two-tier designs usually mean business logic, with the data server trying to centralize control and management. The designer decides how much of the processing logic should be implemented at the client and how much at the server. If most of the work is done at the client PC, it is called a 'fat client' application. Conversely, a 'thin client' application means that most of work is done at the server.

A three-tier application adds a third program to the mix, usually a database, in which the server stores its data. The business logic can be split onto many computers to improve reliability and spread the processing load. In a three-tier approach, the client machine controls the user interface and some processing logic, an application server manages the enterprise business application processing, and one or more enterprise

servers manage the corporate database. This approach aids the management of version releases and the enterprise business rules. Most current leading ERP applications are built with three-tier architecture.

Three-tier is the fundamental n-tier architecture. N-tier architecture splits the processing load for large applications by distributing pieces of the program onto multiple servers. By definition, n-tier applications can be broken into modules on multiple computers. Once the modules are put onto different computers, each computer and module can be optimized for a specific use, i.e., database, business logic, or user interface. Then the networked computers can share components with other computers and applications to eliminate redundancy and further optimize performance. In some n-tier scenarios, modules can be relocated to improve network performance. This can be executed for remote locations without compromising application integrity.

N-tier architecture allows unlimited number of programs to run simultaneously, send information to one another, use different protocols to communicate, and interact concurrently. This allows for a much more powerful and scalable application, providing many different services to many different clients. It also contains a number of serious caveats that create complexity problems in design, implementation, performance, and load balancing. Many technologies exist that add to this complexity, including Common Object Request Broker Architecture (CORBA), Enterprise JavaBeans (EJB), Distributed Common Object Model (DCOM), and Remote Method Invocation (RMI).

Generally, if using distributed-object architecture allows a customer to write programs that are faster, larger, more powerful, and more robust, then it is definitely worth the effort. Customers are increasingly realizing that architecture plays a key role in how quickly vendors can implement, maintain, expand/customize, and integrate their products with other vendors' modules. ERP products developed or enhanced within the last three years incorporate object-oriented (componentized) development environments, as well as n-tiered architectures.

Latest Trend: Internet or Intranet Architecture

Client/server technology relies on robust communications between machines that are involved. Local Area Networks (LANs) and Wide Area Networks (WANs) become an expense and a management headache for most companies. Moreover, updating software versions, particularly on the numerous distributed PCs becomes an almost unsolvable problem. Many IT departments are considering moving toward internet/intranet technology as a solution.

In the internet/intranet approach, communications utilities provide the wide-area communications backbone. PCs merely communicate the Universal Resource Locators (URL) to reach servers they need help from. Software coded in the Java language that runs on the PC clients gets downloaded when needed, ensuring that it is always the latest version. With an internet-only ERP system in place, client-side software upgrades become unnecessary. Browser-based applications significantly simplify the training, and tie together far-flung locations of an enterprise with relative ease. Of the leading ERP vendors, SAP, PeopleSoft and Oracle are the biggest proponents of this architecture, while Lawson Software is leading the pack of mid-market players.

Miscellaneous Technologies

It is a common situation that companies implementing ERP solutions have multiple locations, of operation and control. Hence, the online data transfer has to be done across locations as well as between business partners in a supply chain. Enabling technologies for ERP systems such as workflow, workgroup, groupware, electronic data interchange (EDI), internet, intranet, data warehousing, etc. facilitate these transactions.

Today's ERP systems are required to address more than the processes taking place within the walls of an enterprise. They must be able to address the players and processes involved in extended enterprise—the people and partners that the manufacturers collaborate and coordinate

within their supply chains. In short, the E in ERP will no longer be representative of just the internal enterprise. Rather, it will transcend the walls of the traditional manufacturing environment to encompass the extended enterprise. Therefore, the product architecture is going to do much more than simply provide the functionality, the user interface, and the platform support; it is going to determine whether a product is going to endure, whether it will scale to large number of users, and whether it will be able to incorporate emerging technologies, all in order to accommodate increasing user requirements.

Consolidation as a Strategy

Despite signs of a recent comeback, corporate IT spending remains soft. After investing heavily in new technology and software in the 1990s, few companies have delivered investment returns that consistently exceed the cost of capital. The result: many companies are now saddled with under-utilized IT assets and high operating costs.

Today, most organizations expect IT to contribute its fair share to cost-cutting efforts—sometimes as much as 40% or more of overall cost savings. Chief Information Officers (CIOs) are under pressure to find new ways to reduce technology costs, while simultaneously supporting new application development to develop and sustain business strategies. In short, they are being asked to do more with less. Many companies according to Gartner are responding by streamlining technology environments through a host of initiatives we call 'architecture consolidation,' which reduces the size and complexity of everything from server networks to database instances to ERP applications. These companies are cutting waste and insuring that new IT investments, when such investments are made, align closely with actual business needs. ROI studies as reported by market researcher Gartner, show that consolidation efforts are gaining momentum. More than 69 percent of companies queried in the 2001 survey said they are trying to consolidate, up from 30 percent in 1998.

Why architecture consolidation? Simply put, consolidation reduces redundant layers of computing architecture, including multiple operating

environments, software vendors, development tools, and the dozens—and sometimes hundreds—of non-integrated applications found in many companies today. Consolidating the architecture enables organizations to accomplish the following objectives:

- Reduce the total cost of ownership (TCO)
- Reduce complexity
- Increase the return on investment (ROI)
- Improve business agility
- Improve service levels
- Increase workforce productivity

The companies achieved significant benefits in three well-defined areas.

- **Infrastructure consolidation**—Companies saved money and gained strategic benefits by reducing the number of vendors, shrinking their IT footprint through system co-location, sharing IT services across departments, and shifting to web services and device-independent systems.
- **Information consolidation**—By only entering and storing data once, companies boosted the speed and reliability of business processes, facilitated better data quality and accuracy, increased staff productivity and cut operating costs.
- **Application Considerations**—According to a study by Mainstay Partners, by migrating to integrated ERP suites companies reduced costs by 30 percent or more and benefited from easier implementation, upgradation, and maintenance.

Many Global Companies used IT consolidation as a means to simplify their computing environment, introduce more variable cost structures, lower operating expenses, and improve top and bottomlines.

Consolidation and Simplification

Many of the companies in the mainstay survey launched 'consolidation and simplification' programs as a central part of the firm's IT strategy, and many drafted SLAs (Service Level Agreements) to measure the success of their consolidation efforts. Most companies also made special

efforts to boost the visibility of consolidation programs—and improve the chances of success—by promoting stronger working relationships between IT and line-of-business managers. These companies typically established other management practices designed to make consolidation work. Noteworthy changes in these practices included:

- **Creating a formal set of architecture principles and a consolidation roadmap**
- **Minimizing 'local customization' of IT systems and services**
- **Establishing a clear process for adhering to the architecture roadmap, including offering incentives for achieving consolidation goals**

On average, companies that consolidated IT operations significantly lowered technology ownership costs at the same time that they delivered more and better services to the business itself. Consolidation also positioned these companies for future, establishing nimble IT organizations that can scale quickly to match fast business growth, without adding unnecessary costs.

Mainstay's analysis of more than 25 companies for this report found that infrastructure consolidation is occurring primarily in four areas:

- **Vendor consolidation**—Reducing the number of vendors is one way companies are consolidating and simplifying IT infrastructure—and the other is by curbing costs. Because Legacy systems from multiple vendors consume up to 70 percent of the IT budget, to the potential for consolidation savings in most companies is huge. Mainstay's study showed that companies that consolidated to one or a few core vendors increased their control over technology costs and service level agreements, and also reduced the risk of skills obsolescence.
- **Physical consolidation**—Reducing the size and number of computing hardware and facilities through co-location reduces costs associated with floor space, power, and administration. Many CIOs are also looking at consolidating the number of databases in an effort to lower management costs and minimize performance-sapping interfaces. A Forrester study also shows that an increasing number of businesses are moving to a more centralized IT model.

The upsurge is being fueled by the trend toward moving technology investment decisions higher up in the enterprise.

- **Shared infrastructure—**Moving toward physical consolidation is the concept increasingly popular among companies. The other concept is of sharing IT assets and services across departments and business units. Under the new approach, rather than managing separate sets of servers and databases for each department, companies deploy IT assets and spread costs across the enterprise. To prepare for shared-infrastructure initiatives, many companies are evaluating how and when employees use information systems, also calculating the feasibility of leveraging fewer systems, thereby boosting asset utilization.
- **Device independence—**Central to making a consolidation is the reality that widespread adoption of industry standards that let systems and devices work together regardless of the underlying hardware. CIOs in the study said they increasingly prefer to design 'platform neutral' infrastructure that accommodates all kinds of devices. Such standardization enables easy connectivity with customers and suppliers, and between headquarters and field offices.

Financial Benefits

Mainstay found that organizations that consolidated IT spending with a few key vendors cut technology acquisition and maintenance costs substantially. Most of these companies also experienced better service quality and system up-time, which led to 20 percent to 30 percent more savings. On average, companies that reduced the number of technology vendors experienced the following overall results:

- Reduced operating costs by 25 percent or more
- Received deeper vendor discounts and more favorable service-level agreements
- Streamlined implementation, upgrade, and support activities

Lessons and Experiences

In the past, organizations tended to build their IT systems piece by piece. As the years went by, they linked new applications into their Legacy systems, addressing new user needs and business functions. In the end, however, this cumulative, and piecemeal approach left companies with unwieldy IT infrastructures that were costly to operate and maintain. Worse, the grab bag of applications couldn't connect with each other easily, leaving managers with partial views of the organization and limited opportunities to share knowledge. After a point, the lack of consolidation presented serious impediments to innovation and growth.

Companies leveraged the model of single-global data to create information channels that populate multiple business functions at once, and provide a single, reliable source of information for the organization.

Best Practices

Although they hold out the promise of reducing complexity, consolidation programs are complex undertakings. The most successful implementation was backed by strong executive leadership, clear plans, and involvement that spanned IT as well as the lines of business. Successful companies set service-level targets and tracked key performance metrics related to consolidation. Other practices included:

- **Creating a formal consolidation roadmap that was communicated across the organization**
- **Being relentless in tracking consolidation and simplification of service-level agreements**
- **Linking incentives to achieving architecture simplification goals**
- **Minimizing 'local customization' of systems and applications**

Successful consolidation projects also were characterized by strong interrelationships between business and IT teams. The interplay of skills, mostly developed during the project design and implementation phase, created new collaborative relationships that laid the groundwork for future innovations.

ERP Instance Strategy

A confluence of forces, including process-centric standardizations like shared services, regulatory requirements like Sarbanes-Oxley and Basel II, and cost-cutting initiatives like consolidating IT spending drive enterprises toward the goal of single-instance ERP. Single instance is not for everyone. The advantages of cost reductions, standardized business processes, and analytical insight must be weighed against challenges to business-unit independence, process standardization, and existing data-model rigidity. For large multinational enterprises, consolidation from many instances to a handful of instances is a more realistic option to achieve compliance and cost goals without handicapping business units.

When enterprises began implementing ERP systems in the latter half of the 20th century, the vision was to reach a single ERP instance. Yet bandwidth availability, telecom costs, and enterprise database costs proved to be limiting factors. Today, those factors have been mitigated and a new combination of internal and external drivers is now influencing enterprises to reassess consolidation efforts.

Internal Drivers are Strategic

Concurrently, organizations are shifting from operational efficiency initiatives and moving forward with strategic initiatives that depend on a high degree of cross-functional coordination. Internal drivers include:

- **Process-centric initiatives**—Organizations have begun adopting best practices or standardizing on processes across business units, geographies, and functions. As IT provides enabling technologies to develop these synergies, consolidation of ERP instances becomes an obvious goal. Some examples include shared service organizations created in human resource, finance, accounting, help desk, and purchasing.
- **Analytical demands**—Companies require globally integrated information to support the requirements of internal management and to benchmark internal processes. Strategic planning and

operational refinement are dependent on factors such as consistent HR policies, performance management, customer or product profitability, global budgeting, regional and global sales account planning, and Product Life-cycle Management (PLM). Data allow companies to strategically plan for and continually improve areas like supply chain, customer satisfaction, and operating margins.

- **Infrastructure upgrades**—Consolidation of hardware and platform selection also drives decisions to move to fewer instances. In many cases, country-specific instances will be replaced by regional instances. In other cases, hardware platforms drive software decisions.
- **Mergers and Acquisitions**—As organizations look to M&A activity for growth, due diligence efforts factor pre-merger valuations, based on post-merger integration efforts and related IT synergy and benefits. Post-merger integration efforts are often a catalyst to application consolidation. Business process and IT costs must be planned with an eye toward return on shareholder value.

ERP Consolidation

Governance structures are a primary factor in determining whether your organization should take a single-ERP-instance approach or work toward consolidating to a handful of ERP instances. The level of consolidation will be dependent on your governance model. Here are the four most common scenarios:

- **Centralized**—Companies that have centralized governance drive decisions top-down to business units. Business processes are common, and shared services are integrated across the enterprise. Centralized governance enterprises compete in stable markets with limited mergers and acquisition activity. Procurement and deployment of software is often determined by corporate. Consolidated environments exist with a goal toward single-instance environment. Examples, include utility companies in non-regulated environments, and state and local municipalities.

- **Cooperative**—Cooperative governance structures rely on less hierarchical planning than centralized models. Business units have moderate input in decision-making and are grouped around common customers, suppliers, and even business models. Some shared services organizations are in place, like a common finance group. Cooperative governance enterprises compete in moderate growth markets. Procurement and deployment of software is often determined by corporate, with input from logical groupings of business units. Single instances exist among groupings of business units, with most of the enterprise in consolidated environments. Examples include multinational pharmaceutical companies, national telecommunication concerns, global consumer goods industries, and packaged delivery companies across several major geographies.
- **Federated**—Business units with federated governance have significant autonomy. Very little customer and supplier overlap exists. Minimal-shared service organizations like service support or telecom may be in place. Corporate is focused on reducing the overlap among business units. Enterprises characterized by federated governance compete in high-growth markets where acquisitions and divestitures can be frequent. Procurement and deployment of software is often determined by business units with suggestions from corporate. Shared and consolidated instances are infrequent across the enterprise. Examples include, wealth management companies, entertainment enterprises, and large industrial conglomerates.
- **Decentralized**—Complete autonomy is given to business units in differing markets and diminutive group synergies. Limited regard is given to customer and supplier overlap. Shared service organizations are non-existent. Business environments are extremely volatile, with frequent acquisitions or divestitures. Procurement and deployment of software is at the discretion of the business unit. Business units determine the number of instances. Examples include, large holding companies.

The Benefits

Whether your governance structure moves you toward a single-instance ERP or consolidates around a handful of ERP systems. The benefits include:

Reduced cost. Studies often cite a 20 percent to 45 percent savings in moves toward consolidation. The reduction in IT personnel, hardware, and software costs (i.e. license, maintenance, and support) is obvious.

Standardized processes. Consolidated instances force companies into standardization of processes. Common benefits include closing books faster, delivering consistent order experiences, and improving control over suppliers and costs. One specific example occurs when enterprises are empowered in Daily Sales Outstanding (DSO) by leveraging the single view of the customer to proactively improve the management of receivables.

Improved analytics. Accessible, consistent, and real-time data allow organizations to become more strategic. Consistent operational metrics add insight to strategic planning. Improved granularity of measurement drives operational performance. Enterprises benefit from consistent approaches to reporting and performance management across business units and geographies. Tangible results include more accurate budgeting and forecasting to improve insight on customer order status.

Expedited M&A and divestitures. Nearly two-thirds of all mergers fail to realize their value because of an inability to integrate and/or consolidate. Agreement on common business processes—the precursor to ERP standardization increases the assimilation of acquisitions. Successful execution is the difference between creating shareholder value and destroying the investment.

CHAPTER 9

ERP Upgrades—Upgrade or Perish!

ERP Application Upgrades require careful preparation. Upgrading ERP application packages to major new releases is a significant exercise and a challenge that most companies accept for the following reasons:

- **To retain ongoing vendor support that has been withdrawn for the older versions of ERP.**
- **To take advantage of significant improvements in software capabilities or functionalities and features**
- **To modify the ERP control features due to compliance related issues—legal, regulatory changes**

Many ERP vendors keep coming up with new releases with enhanced functionality and capability, and force existing ERP customers to upgrade. But most of the companies who are currently on ERP find the process of upgrades to be complex and costly. Major application-release upgrades require on an average three-to-six months to execute and two-to-four person-years of effort. Upgrades can be a simple technical upgrade—that is apple-to-apple upgrade without changing business processes. Complex upgrades will include additional customizations and changes to business processes by introducing new functionalities of the new ERP release.

Companies facing major release upgrades of ERP application packages should follow these best practices for planning and executing the upgrade process:

- **Planning**—Thoroughly plan the upgrade process to develop realistic costs and timeframes and to minimize system downtime. A complete inventory and analysis of application customization, interfaces, output and data conversion requirements should be performed as a basis for developing a detailed upgrade plan, and determining effort levels and resource requirements.
- **Business alignment**—Align the upgrade strategy to business objectives in order to highlight the business value that can be realized. Often, the costs of upgrades must be justified beyond the value of maintaining vendor support for problem resolution and regulatory/tax compliance. User input on the extent to which new application functionality can and will be used to improve processes is essential to build the case for upgrading the applications.
- **Release maturity**—Don't accept releases until sufficient maturity has been established. For most vendors, this usually means the issuance of the first major bundle (service pack) of cumulative fixes, six-to-nine months following initial release availability.
- **Outside help**—Use experienced upgrade consultants to accelerate the upgrade process, supplementing internal resources. In addition to getting the job done quicker, upgrade consultants can reduce the risks of cost overruns, business disruption and performance problems.
- **User impact**—Pay attention to the impact on application usability and provide extensive communication and delta training as required for effective assimilation of the new release.
- **Process opportunities**—Leverage advanced capabilities of new releases to improve inefficient business processes. Certain application upgrades (e.g., mySAP ERP, PeopleSoft 8, Oracle 11i) introduce new capabilities (e.g., e-business and self-service) that can positively impact business process, but the process impacts should be planned and introduced using the techniques of organizational-change management.

- **Performance and architecture**—System performance should be tested thoroughly to avoid production performance issues. New software versions may have significantly different performance characteristics from earlier versions due to architectural changes. For example, the PeopleSoft 8 internet architecture requires significantly more memory for application servers compared to earlier versions. This was learnt by some customers after experiencing performance issues. Augment the hardware setup based on vendor guidelines, consulting support and real-world customer experiences to optimize performance.
- **Testing**—Perform a full range of system tests to ensure system reliability before going live, including unit tests, user acceptance, usability, volume or performance and integration tests.
- **Upgrade tools**—Use upgrade management tools provided by the software vendor to control and expedite the process. Such tools are useful for comparing the customization to new functionality and for migrating data from one version to the next**.**
- **Customization reversal**—Eliminate customization during the upgrade process where such capabilities are available in the newer version. Subsequent upgrades will be easier to manage and the applications will be less costly to support when customizations are minimized.
- **Upgrade timing**—Arrange the timing of the upgrade to minimize the disruption to business (for example, avoid disruption of the year-end accounting cycle and the benefits-open enrolment). Also, orchestrate upgrades to avoid loss of vendor-version support, based on vendor-support guidelines.

Key Considerations for ERP Upgrade Decisions

Major ERP application vendors strongly encourage customers to upgrade to the latest release of their software, often imposing support deadlines on existing releases. Despite vendor pressure, many application

customers defer or decline new releases due to upgrade costs and other factors. It is an accepted fact that ERP application customers generally should plan for a major upgrade every three or four years and avoid the loss of vendor support. In evaluating specific upgrade opportunities, decisions should be based on upgrade costs vs benefits as well as future impact on software maintenance costs, support risks and flexibility.

ERP software vendors continuously enhance their products to incorporate improvements requested by customers as well as maintain competitiveness or competitive advantage in the marketplace to attract new customers. Incremental functional enhancements generally take the form of minor releases and may be combined with 'service pack' updates containing cumulative bug fixes. These minor releases require some effort to apply, but generally can be handled with existing internal resources. Major application releases, delivered by vendors every two years or so, require considerably more effort by customers to assimilate and usually meet with mixed reactions. Some customers are eager to deploy improved functionality and technical improvements, while others are reluctant to disrupt a stable application environment.

ERP Upgrade Impact Analysis

The four dimensions to be considered while upgrading the ERP are: cost, benefit, flexibility and risk. They are discussed below in relation to application upgrades.

1. **Cost**—The cost of upgrading to a new release depends on a number of factors, including the extent of customization, application scope and complexity, interface, skills and technical requirements. Large companies using leading ERP packages require on an average, three-to-six months to complete an upgrade for a suite of applications, with two-to-four man years of effort. The upgrade will have additional cost implications to the extent that business processes and user interfaces change significantly, requiring additional user training and assimilation of new processes. Hardware and technical environment changes may also be required. The cost of not upgrading will be limited to current support costs,

but these costs may increase substantially if the vendor no longer supports the version in use.

2. **Benefits**—Quantifying upgrade benefits is often difficult but the value is often most apparent to users of the system. Recent versions of enterprise software have extended some business processes to a wider group of users, enabling automation of processes that have historically been paper driven. Other potentially valuable enhancements include reporting and analysis improvements, international and other functionality improvements. If customization can be reversed by using standard functionality in a new release, a significant benefit is achievable in terms of maintainability. Technical improvements may provide better scalability, maintainability (e.g., web client) and compatibility. Determining the potential benefits of the upgrade requires a thorough analysis of changes, including vendor release notes and other information. Since certain enhancements benefit some customers more than others, it is possible that the upgrade will have very limited value and perhaps should be deferred.
3. **Flexibility**—Adopting a new release usually increases flexibility, because it allows a customer to move more easily to future versions. In addition, being on the latest release enables the customer to add new modules that generally work only with the latest version. Conversely, skipping a release will complicate future upgrades and restrict the adoption of additional modules.
4. **Risk**—Upgrading or not both involve certain risks. A significant risk factor for deferring the upgrade is the potential loss of vendor support for the older release. This is particularly important if the application depends on tax and government compliance updates, such as with payroll systems. In such cases, the scenario of self-maintenance is likely to increase support costs and introduce risks of non-compliance. The primary risk of upgrading to a major new release is software performance. New releases may be buggy and require technical architecture changes that require a significant learning curve. Many customers mitigate this risk by waiting a year or so to upgrade, after the release has stabilized.

Organizations should thoroughly analyze application-upgrade decisions, using the four dimensions discussed above. Although the costs of an upgrade may often seem higher than benefits, the implications of not upgrading may be very significant in terms of future support costs and flexibility. Major upgrades should be planned for every three or four years as a cost of enterprise application ownership, especially where a loss of vendor maintenance services is not an option (e.g. tax compliance). If the software vendor has good viability and the application is providing business value, the upgrade decision should be regarded only as a matter of timing. Organizations should be cautious about accepting major application upgrades too early, since new releases present software quality and performance risks. For complex, large enterprise applications, we recommend waiting at least nine to twelve months from the release date before upgrading, when the software will be more reliable and a reasonable level of customer-adoption experience has been gained.

Zero Downtime ERP Upgrade

Business as Usual

Many companies simply can't afford to shut down their IT systems during ERP upgrades or migrations. Unfortunately, they have been forced to factor in at least some downtime for these projects. But there are many ERP solution providers and consulting companies that offer a new upgrade procedure that virtually eliminates downtime.

Software upgrades and migrations usually have a negative side effect for companies: downtime. Applications and their business processes are simply unavailable for a certain period of time. IT personnel must consider these interruptions of ongoing operations when they schedule upgrades.

Many companies can perform upgrades and migrations on weekends when operations are shut down and no critical processes need to run. But the situation is quite different for production industries—chemical companies and firms that harvest raw materials that operate around the clock. Because a company's applications are unavailable during

downtime, critical processes also come to a standstill. For example, a company can't post orders or reorder materials.

In the case of just-in-time deliveries that are most prevalent in the automobile industry, these kinds of system outages can lead to a plant shutdown in the worst case, usually with significant financial losses. And a vendor must then generally put up with it. In the oil industry, gushing oil wells can't be shut off for a specific period. These industries, in particular, need to be able to perform upgrades or migrations without hampering their ongoing operations.

Critical Processes Handicapped

So far, only a few vendor specific procedures have been available for upgrades or migrations of ERP applications: a standard upgrade and a time-optimized upgrade. Both involve shutting down business processes.

System downtime for standard upgrades from ERP vendors usually lasted up to 24–72 hours, regardless of the type of application and the size of database. As a result, only a couple of dates a year make sense for system conversions. And the conversions run the risk of extended downtime if something doesn't go according to plan. In the worst case, a company has to perform a rollback—resetting the application to an earlier status. But that can also mean a failure of the entire project.

To limit downtime, many ERP vendors have developed a time-optimized upgrade procedure, the system-switch upgrade. This approach performs time-consuming upgrade steps, such as import phases, DDIC (data dictionary), and activation phases, including the comparison of changes during production to reduce downtime to a few hours. But this procedure requires additional system resources, which makes it unusable for many projects.

Downtime Equals Zero

Zero downtime is a procedure that can perform upgrades and migrations

without interrupting system operations. New technologies enable this new approach.

Before the upgrade, a copy of the productive ERP solution is created, Users work with the copy during conversion. Data can then be imported into the new system consistently, and users are switched back to the updated solution. The production system is unavailable only for two short moments: when users are directed to copy and back. They can continue their work as soon as they log-on again.

Upgrades without Limitations

Zero Downtime is not a standard solution; it is executed as an individual project at each company. Because production continues to run, the time and length of the upgrade or migration are unimportant.

Preparations for Zero Downtime begin upfront with a value scan that compares the costs of the procedure with those that would be caused by the unavailability of the production landscape. The consultants work with clients to identify critical business processes—those that could lead to a standstill of production, like SCM. The ERP transactions that must be available for specific users on the system copy can then be derived from business processes. The selections must be made carefully because implementation of each transaction involves a great deal of development effort.

To guarantee a seamless upgrade, the complete procedure—switching to the copy, recording data, and switching back to the original—is to be tested ahead of time, and the consistency of data in both systems is checked.

The productive system is copied by cloning the database with storage techniques. If the techniques are unavailable, users access the shadow database. Users execute all important transactions on the system copy during the upgrade or migration. All transaction data is recorded while the transactions are executed. Temporary intermediate storage of the data in the database (persistence) and mapping the new data structures occurs with a software interface manager.

The recorded data is imported when the network is switched back to the original system. Scheduling and comprehensive monitoring functions guarantee correct posting. The imported current data can be processed immediately.

With Zero Downtime, the required follow-up work can be performed after system optimization without interrupting the ongoing operations. This work includes creating upgrade path, importing new programs, and customizing. Extensive and qualitative tests of the new application are performed before users are switched back to the original applications.

Upcoming Updates

According to a current study by RAAD-Consult, this year about 70 percent of SAP customers are planning upgrades of their SAP applications. Other ERP vendors such as Oracle, MSFT Navision also force their customers to upgrade by withdrawing support for older versions of their ERP systems. Upgrade preparation would be much easier if critical business processes remained available during the conversion. Who would profit the most from such an approach? Everyone as companies today operate round the clock and that have to consider the financial effects of upgrades and migrations.

AMR Research studied costs, challenges, and added benefits of ERP Upgrades in 2004. Some of the findings throw good insights on the various important issues.

AMR Field Study shows that, with an average cost of $1.5 million, more than 50 percent of companies need to provide a compelling business case to management to justify an ERP Upgrade.

When initiating an ERP upgrade, most companies consider total cost and implementation time, as well as which vendors will sufficiently support their upgrade and provide ongoing maintenance. In order to proceed with an ERP upgrade, companies must provide satisfactory answers to these questions and make a compelling business case to senior management.

In the first of the two in-depth field studies, AMR Research details associated costs, added functionality, and difficult phases encountered

by endusers in the upgrade process. Eighty-five percent of respondents indicated that when implementing an upgrade, the primary goal was to add functionality that extends beyond traditional ERP, including portals, business intelligence, human resources, customer management, improved collaboration, and overall support of new architecture and technology. Survey results demonstrated that the main reasons for an upgrade do not necessarily match the benefits received.

"ERP upgrades are a core strategic asset and a necessity to stay ahead of the curve. Labeled as big-ticket projects, ERP upgrades require a compelling business case, and adding functionality is the easiest way to build that case," said Judy Bijesse, Research Director, AMR Labs. "Continual attention and investment is required to maximize the value of an ERP system and to ensure it keeps up with the ever-changing business environment."

Highlights of the AMR Survey

- The study showed that, of the half of respondents who implemented new functionality, 26 percent took an incremental approach by upgrading only certain functional areas—an approach that is revealed to be much more expensive due to the consistent effort required in Planning, installation, and data migration phases.
- 28 percent of field study respondents reported that data conversion or migration was the most difficult phase of their implementation, while an additional 29 percent reported difficulty with the testing phase.
- Results show that only 13 percent of respondents actually reduced their upgrade costs. On an average, overall project costs break down as follows:
  - People related costs accounted for 42 percent.
  - Additional software technology captured 25 percent.
  - 82 percent invested in additional hardware to support the latest release of their ERP upgrade, accounting for 31 percent of the overall project.

The study concluded that management must view the ERP system as a strategic asset that is essential for the company's overall success. Clear expectations and performance metrics need to be set prior to beginning the upgrade process, and the upgrade should be treated as a continuous undertaking with phases, rather than a one-time project.

Source: www.amrresearch.com © 2004 AMR Research, Inc.

ERP Maintenance and Support Challenges

ERP software changed the face of business over the last fifteen years. However, after years of aggressive ERP software buying, corporations are now saddled with a large portfolio of solutions that are expensive to upgrade and have become equally expensive to maintain and support. In many cases, the ERPs that were supposed to replace old Legacy systems have become new Legacy systems. Though most buyers did not realize it when they made the initial purchase, enterprise software installations have left them with a legacy of maintenance payments (e.g. annual vendor maintenance payments, frequent upgrades, etc.). These maintenance expenditures keep IT costs high as well as limit the options to efficiently focus on more valuable revenue-generating or cost-saving projects.

The average maintenance cost of an ERP could be 15%–25% on the total license fees. This is cost though not hidden but printed in very small letters in ERP license and maintenance contracts. Most of the CFOs/CEOs thought that it is not a big ticket item and never bothered to factor this cost to their future IT budgets.

Because of new market developments including a stabilization of enterprise functionality, low cost models for service delivery, and new maintenance options, ERP users can now reduce significant costs out of IT 'Maintenance' budgets. Key to this reduction is an yearly review of ERP software value and lifecycle as well as an active management of the maintenance budget to better understand how software should be supported and enhanced to best support corporate goals.

The Big ERP Rush

Technology purchases during the 1990s represented the business equivalent of a Cold War arms race with many corporations attempting to outdo each other in how much technology they could acquire and exploit within their companies. The buying spree was kicked off during the early part of the last decade by multiple catalysts.

Like other management manias, this one was funded from the highest levels of the corporation and led to excessive IT spending, and with different 'measures of success.' For example, projects that came in 30 percent overbudget were considered 'well-managed', companies in the *Fortune* 100 list were facing expenditures up to $1 billion over a period of ten years for global ERP installations according to Erik Keller of Wapiti LLC.

Most organizations believed they had no choice. The push to install ERP at first to meet the goals of BPR and then to fix Y2K problems rubbed off on other initiatives, accelerating spending in the areas of customer management, supply chain, logistics, etc. A rapidly growing economy and excessive capital spending also contributed to the growth. Later, ERP II functionalities such as SCM, CRM were added to the ERP foundation. As a result, IT management focus during the 1990s was centered on getting solutions up and working at any cost. These behaviors set the stage for long term costs and maintenance spending that few companies factored into their budgets when they initially acquired technology. But in the early days of enterprise applications, seller-provided maintenance was quite valuable and necessary.

The Value of Maintenance: Buyers vs Sellers

The ERP software purchased in the early 1990s was changing the business operations significantly and addressing needed corporate initiatives. Unfortunately, the ERP software had incomplete functionality, uneven stability and poor scalability. Thus, in the 1990s, buyers found high value

in maintaining and upgrading their software on a much more frequent basis than they had done in the past (when they had built it themselves) so that they could access needed functionality as well as run-less buggy versions of ERP software.

For ERP software sellers, the value of maintenance-based revenue streams was minimal in the 1990s as their growth was predicated on new software license sales. Product upgrades and maintenance releases were targeted to satisfy promises made to current customers and meet the needs of new ones. Maintenance revenue on these products was low but steadily growing quarter to quarter.

However, in the first few years of this century this value equation changed. Maintenance revenue streams have become the primary driver of profitability for software companies as growth in new software licenses has tumbled. Sellers realize that maintenance revenue has the highest margins and lowest incremental costs. It is also the most jealously guarded revenue stream, and is carefully managed and negotiated by sellers.

For buyers, the value equation has also flipped as enterprise software has become much more stable as well as functional. The need (either technological or business) to consider a major upgrade has decreased tremendously.

Thus the value from maintenance payments is decreasing constantly for many companies.

This change in view is due to the inherent value of software maintenance to buyers, which is a function of six key factors given in the order of priority.

- **ERP product quality**—Though few software sellers admit such problems, poor product quality is the number one value driver of maintenance. Issues including bug fixes, scalability and stability are areas that only the provider of software can typically address. Rare is the seller that has not had a significant problem in this area over the lifetime of its products. Once these issues become addressed, however, then quality is no longer relevant until (potentially) the next major release is made available. So a company planning a new ERP should look for a mature old version that is stable rather than rushing to implement a buggy new version.

Remember the adage—never be part of a strategy of an ERP company. Their strategic new products and innovations can be very costly for you. It is prudent to be one step behind the ERP vendor's strategy or vision. Quality issues tend to arise during major functional or technological product upgrades.

- **ERP functional completeness**—When software is initially released, most buyers' desire maintenance from the seller, as the functionality delivered is often very elementary. Unless the software's functionality is much bounded, a functional footprint that fulfills the needs of most buyers is not available for three to five years after initial product introduction. But today the situation is different. ERPs have attained a high level of functional maturity and completeness for different vertical industries such as retail, manufacturing, banking, utilities, oil and gas etc—the need to wait for a great functionality leap is greatly diminished. Therefore there is no need to agree to a ransom to an ERP vendor for maintenance and support.
- **ERP expansion potential**—Software products are used by differing buyer populations. Those companies wanting to expand their use (and population of users) of a given package find themselves in a better business position if they have an ongoing maintenance relationship with their software vendor.
- **ERP technological–functional timeliness**—One aspect of maintenance is to offer releases of software that can run on current, as well as future, technology platforms. This is important to customers that desire to run their packages on typical combinations of hardware and software. In addition, for functional initiatives such as Sarbanes-Oxley, Basel II or other regulatory requirements, maintenance can provide key updates for these unknowns that were not part of the original purchase criteria.
- **ERP buyer and ERP software seller interaction**—Certain buyers require more attention than others because of long global rollouts, complex integration needs, customization, participation in a vertical/functional special interest group, etc. Also some buyers consider certain sellers a strategic partner and want to have a direct say in product direction and focus.

- **ERP value enhancements**—This last area represents extra capabilities that are provided by the vendor and includes timely response and service implementation and debugging tools, training, etc. that ease the management and operations of a given software package.

These six key factors determine how often and how enthusiastically buyers will upgrade and find value from maintenance payments. But these factors became only the beginning consideration of maintenance value once customers started to discover the 'long-tail' of support and maintenance costs.

The Cost Challenge of ERP Upgrades

Many companies did not realize that for every dollar spent in software licensing anywhere from $3 to $20 could be spent for the initial installation of technology. That is the consulting fee charged by ERP implementation companies such as Accenture, EDS, Cap Gemini, TCS, PWC, Satyam, WIPRO, Infosys, etc. However, these costs were just the beginning as the initial enterprise of software installation typically represented only one-third of the total cost of ownership over the lifetime of the software package. While certain costs including the initial license fee were well understood, the overtly disproportional and large impact on future costs including internal and external consultants and overhead were not.

These factors forced companies to view maintenance payments and subsequent upgrades very differently than initially anticipated. Upgrades were not only consuming large resources but also became front page stories for companies who botched their ERP efforts. In fact, a recent survey stated that the number one reason that CIO's have been fired in the past few years was software upgrades.

The net result of this growth in budget and capital base has been a flattening of IT spending in growth today and for the foreseeable future. As IT has become a considerable operating expense within most corporations, its rate of growth is now governed less by fad and more by the installed base, business rationale, GDP and corporate growth. But

this era of IT build-out, particularly the issue of installed base, has had an unfortunate consequence: budgets that are increasingly locked into supporting the base of purchased capital.

The Maintenance Treadmill

As they were installed in corporations, each new initiative, ERP, SCM, CRM, etc., became a new 'Maintenance' that consumed IT resources and budget dollars. Every year an 18%–28% expense would need to be doled out to software companies regardless of benefit, or need to upgrade solutions. In addition, buyers were told by their software vendors that support for certain versions of software would last but a few years, forcing companies to upgrade regardless of the business need. Companies have now found themselves on a treadmill—constant change, forced upgrades, increasing annual maintenance and support cost. This treadmill is run by the need to maintain seller margins rather than by business value derived by customers.

These upgrades would not just include one piece of software but a wide variety of supporting and complementary systems. As a result, the maintenance cycle created two vicious spirals of change and cost that did not necessarily generate any benefits to the customer—upgrading the applications and dragging along the underlying hardware and software infrastructures. These actions forced companies to make painful business choices: upgrade to stay technologically updated or spend the money on a business initiative that could potentially improve margins.

Ironically, the purchase of enterprise applications was originally supposed to rid IT staff of the onerous tasks of maintaining software. While certain tasks were eliminated, they were more than compensated for by a maintenance focus and upgrade cycles that flipped from a user- or business-dictated schedule to one that was mandated by the sellers of the individual packages. This change has contributed to maintenance costs reaching their current plateau.

The 'New' Economics

Attention to details of maintenance is increasing as companies have quickly found themselves in a difficult position. Economic and IT rationalization conditions have caused most companies to limit yearly budget increases to three or four percent; more typically today they are lagging rather than leading individual company growth.

Added burdens of increased spending on security as well as regulatory compliance have given many corporations little wiggle or innovation room within their budgets. All are left asking, 'where is the value' in the IT spend?

A January 2006 spending priority survey of CIOs from Morgan Stanley paints a very tactical picture. Of the top 20 areas where CIOs plan to increase spending; only a few could be considered anything but tactical technology improvements. The top five—security (software), security (network equipment), storage area networks, wireless networks and storage software, do little to directly help corporate profitability or increase revenues.

Savvy Buyers Look to Slash the Maintenances

But CIOs are no longer turning a blind eye to this issue. They are considering a wide variety of means by which they can decrease their costs and increase the amount of attention paid to innovative initiatives. As software represents one of the largest portions of expense (and drives spending in other areas) buyers are seeking ways to decrease spending in this area. Current initiatives include:

- **Maintenance contract renegotiation**—A September 2005 Morgan Stanley survey of CIOs stated that 72 percent of those interviewed said that they would seek maintenance payment reductions in 2006. Both *The Wall Street Journal* and *Forbes* ran extensive articles in 2005 on the high price of software maintenance and how leading companies were looking to decrease spending.

- **Emphasis on inventory, portfolio management**—Realizing that there is a great deal of potential waste in their software assets, buyers have started to actively manage their solution suites. Over the last few years, Motorola has slashed its IT spending by over 40 percent using such techniques. Key to these cuts was inventory management techniques that let them better understand and bargain with their key software suppliers. Such actions may gain traction as AMR Research recently stated that nearly half of ERP license seats remain unused. Such realization and inventory management can let customers dramatically cut support costs as well as the need for future license upgrade purchases.
- **Upgrade slowdowns**—After many years of painful and expensive upgrades, buyers have started slowing down the pace of enterprise software upgrades. With software that is now stable, scalable and containing the needed functionality, buyers no longer see the need to use the latest release offered by current vendors. By extending the life of a release that is working well and serving the needs of a company, companies can redirect upgrade costs to initiatives that have a greater impact on corporate profitability. In response, software vendors have been forced by buyers to offer long-term support for older software releases. In the 1990s, vendors typically supported releases for three to four years. Today, such support has been doubled or tripled in time to accommodate the needs of buyers as well as insure a steady stream of maintenance payments.
- **Use of third-party maintenance providers**—Until recently, software buyers have had little opportunity to purchase maintenance from third parties and needed to rely upon the selling software vendor to provide such services or look to manage the software themselves (if permitted by the terms of the contract.) Companies are offering services that permit customers to maintain their current solution set at a lower maintenance price point. Such offerings represent a maturing of the software industry, as there are very few industries that hold 'exclusive' control over the maintenance and support of their products. This ranges from simple washing machines to complex and expensive industrial equipment including CAT scanners and jet engines. As in all areas when competition comes to the fore, this opening of markets has the customer effect of lower prices and higher quality that enhances value.

In fact, buyers should evaluate their entire portfolio of software every year using this methodology. In doing so, they can save significant maintenance revenue as well as the associated technology change and support costs. It permits buyers to best spend monies where they will have the largest impact rather than just merely paying maintenance year after year.

Responding with New Economic Models

As buyers make changes in the ways in which they manage their software spend, it is being felt by all sellers.

It is generally agreed that the heady days of traditional software license growth is over. According to AMR Research, in 2004, application software maintenance represented 35 percent of total revenues to all the ERP vendors compared with 31 percent for software license fees and 32 percent for services. This is a typical revenue spread in the software industry for 'mature' markets and companies. What is not typical, however, is how new offerings and technology on the horizon are changing the economic basis and model for software companies.

For example:

Software license discounting. The market for enterprise software has gone from a sellers' to a buyers' market. As a result, the price points for older packages such as ERP have fallen sharply. Pricing of $3,000 per user in the mid-1990s for a functionally-limited suite has dropped to less than $2,000 for a greatly expanded one. One of the more damaging (to software sellers) pieces of information that arose from the Oracle-Department of Justice trial was the large discounts—in excess of 70 percent off list—given to buyers regardless of seller. In December 2004, the Meta Group (since acquired by Gartner Inc.) predicted that prices for packaged software will slide for three to five years.

- **Use of India and other low-cost, high-quality labor pools are slashing internal costs**—Not surprisingly, technology and service providers are leading the charge to redeploy service, maintenance and R&D resources outside of expensive North American and Northern European locations. This is leading to huge labor savings for technology sellers, though such savings have yet to be reflected

in price changes of maintenance and services offered by software providers. The magnitude of savings was reflected by internal IBM documents that were acquired by *The Wall Street Journal* in early 2004. The document showed that a four-to-one cost advantage was possible for a Chinese outsourced work over a U.S.-based workforce. While recent wage inflation has shrunk this advantage, global labor arbitrage is being aggressively used by software providers to maintain and increase margins.

- **Open-source components are being substituted for 'for-profit' ones**—Many open-source infrastructure components are becoming well-used within enterprise software offerings. Vendors are substituting open-source components for ones that used to be included, and paid for, as part of a standard software license. This has permitted sellers to decrease the cost of current licenses as well as the cost basis of past licenses sold.
- **Software as a Service (SaaS) offers licensing alternative for enterprise software**—The success of mostly CRM-oriented sellers with a SaaS licensing model is leading the change among buyers to revisit how software is acquired and managed. Regardless of its current suitability across the board for all enterprise applications, the ability of SaaS sellers to guarantee delivery of sales-force automation, call center, financial management, etc. process has great appeal to buyers and will gain in use and acceptance. It is attracting new customers who do not have enterprise software as well as customers that are dissatisfied with their current enterprise software vendor.
- **Emergence of non-traditional platforms**—There is a groundswell of interest occurring in non-traditional commerce platforms in two areas. Traditional small-business providers such as Intuit are aggressively moving into the space of enterprise software. The emergence of Amazon.com, eBay, FedEx and others as a business-process platform that supports distributed selling and fulfillment have started to supplement (and supplant) traditional enterprise software packages. In addition, nearly every vendor is stating that within the next two or three years they will be offering a services-oriented architecture-based offering that will both increase the flexibility of software as well as contribute to lower costs.

These changes in perspective by both buyers and sellers are leading the market to explore new options in how software is installed, maintained and retired over time.

Summary

As companies seek to take the maintenance out of their enterprise software they should start with the following steps:

- **Inventory assets and review contracts**—Companies cannot manage what they do not know. An inventory of licenses used as well as the supporting contracts permits companies to create a base line of assets that they can link to the business processes and benefits derived from them. In particular, contracts should be reviewed every year and examined for value delivered and potential for savings.
- **Review use and corporate impact**—Next, the use and usefulness of software should be considered. Many companies have portfolios of unused licenses that they are fully maintaining. This should be compared against the corporate impact and value derived from the software so a cost–benefit analysis can be determined.
- **Examine stability and future plans for software packages**—After inventory is counted and value determined, buyers should then consider how packages are supported and whether new options are appropriate. This can entail negotiating with current providers or comparing and contrasting new market offerings.

Enterprise software has huge value for corporations. However, it must be managed as would any asset so that its care, feeding and expansion is actively managed against other corporate initiatives and the need to deliver value to the corporation. One of the best ways to do this is to eliminate as much of the maintenance of enterprise software as is reasonably possible.

CHAPTER 10

Managing ERP Transition

"One of the most common sources of corporate failure is the inability to adapt to a new technological paradigm. Change is not a 'natural' condition in business. Businesses are designed to work, not to change."

—John Pendlebury

In many ERP projects, transition from Legacy to ERP is not smooth because of the exclusion of end-user input from the initial decision making phase of requirements, a crucial part of an ERP initiative where the configuration and business process strategy is articulated. Though the users were questioned by ERP analysts/consultants during requirements: analysis, interviews, their responses were often discounted by analysts because the users tended to respond by telling stories about their Legacy work practices. These stories were considered by analysts to be subjective, useless and irrelevant to the configuration of the ERP system. This is at the core of the ERP transition problem.

Despite the rhetoric of ERP and its precursor, BPR being technologies of increased control, their implementation within organizations actually reduces this state of order. This occurs because the enterprise systems act like 'runaway engines' influenced by various complex situations, events, and processes but controlled fully by none. So what is required is a shift away from the mindset of control to an integrated ERP culture.

The agile, aligned and standardized IT infrastructure is facilitated by ERP in rapidly changing industries. However, management of ERP transition will depend on the dynamics involved in reaching a desirable project outcome.

ERP is particularly problematic to implement within many organizations because the culture is fundamentally at odds with the design of integrated and standardized software. Through stories of 'power, politics, and resistance' from multiple business units, they interpret ERP as a threat imposed by CEO or CIO. In some cases the values of integrated system inscribed within ERP are in conflict with the ideals such as loosely coupled organizational form, semi-autonomous reporting structures, and ad-hoc IS development tradition, etc. ERP tries to centralize, standardize and integrate the whole enterprise. This is the biggest challenge in managing ERP transition.

Destructive ERP Environments

There are many symptoms of a destructive ERP environment. If not diagnosed and treated early on during the ERP execution, the following ERP diseases might kill the project.

- **Theatrical behavior**—Two partners, who have to get along (e.g. project leader and process owner), solve this problem by mutually tolerating one another's 'bad performance'. For example, the project leader distorts the figures and the process owner pretends that he hasn't noticed—a vast waste of resources.

  Cure: Fix the responsibility on one person and measure performance at each milestone.

- **Hard work**—Projects that are suffering from a lack of ideas work exceptionally hard and try this way to protect them from criticism. Hard work to implement ideas is positive, hard work to substitute them is not.

  Cure: Check if someone is working very hard but unable to deliver. It could be a knowledge or skills issue that can be fixed by training.

- **Hustle and bustle**—Hectic behavior is a form of lost control. Many company cultures allow hustle and bustle to go through as a status symbol.

  Cure: Anyone who stays beyond 7.00 PM everyday is either incompetent or needs training or counseling

- **Quantification**—Quantification is a result of trivialization. Limiting something to quantification is limiting to trivialities. In the dynamic context many important things are not trivial and thus not quantifiable. Evaluations have to be made with high risks.

  Cure: Not all things need to be quantified. ERP has several non-quantifiable processes and activities. So in order to quantify—meaningless numbers should not be generated and monitored. It is a time waster.

- **Democracy**—Democracy is a viable organizational form for politics. It is of no value to the business of a company. It delegates responsibility to the majority and is thus an 'internal reference point'. Top performance requires external references, i.e. the verdict of the customer and the external benchmark.

  Cure: Project manager's decision is final. Even if the project is democratic.

- **Incentives through rewards**—Offering rewards as a form of motivation reduces potential performance to average. Top performance requires top motivation. This is only achieved through the opportunity to use and develop individual talents.

  Cure: Be generous with praise, appreciation letters and mails and select a Man of the Week and a Golden Circle/Top Performer club member, and reward them with goodies such as a paid vacation, dinner at a great restaurant etc.

- **Obesity**—Projects have a tendency to solve ERP problems with 'Do-it-yourself' solutions. The responsibilities of a project are then expected and extended until the overview is completely lost (obesity).

  Cure: Put the project on a diet. The responsibilities of a project are to be correctly defined when no further expansions/reductions are possible in time or scope or cost.

- **Interfaces**—Communication is difficult and arduous. Replacing interfaces with overlaps makes it easier. But communication then collapses, as it requires separation to function. If high quality communication is necessary then overlaps must be replaced by interfaces. This means, for example, that there should be no representatives from affected organizational units in the project. They will bloc the progress.

  Cure: The CEO/PM should remove such road blocs.

- **Ostentatious behavior**—Insistence to all 'Nice to have' features and functionalities.

  Cure: The CEO should strike a balance and ensure only 'need to have' features and functionalities are enabled in the ERP system.

ERP Transition Model

ERP transition model has three phases—operationalize ERP processes, professionalize ERP services and stabilize ERP system.

Operationalize ERP processes. First, the current state of the processes is analyzed. A process expert then redesigns the process based on what would work best in the new ERP operating environment. This is followed by migration of the software systems. Once the systems have migrated and are operational, the Process Transition Roadmap is written and agreed upon. This is followed by the Actual Transition Process that may or may not involve migration of all legacy systems.

Professionalize ERP services. Once the number of process transitioned crosses a certain threshold number it becomes important to institute proper controls and processes around them. This begins with the institution of the governance model (CoBIT, ITIL) and the formulation of IT and process standards around ERP Services. As the service permeates across the entire organization, the formulation of an enterprise-wide service model becomes an imperative. By such time sufficient data would have been collected on cost, performance, quality, and turn-around time. This forms the basis for service-level determination and the institution of formal Service Level Agreements (SLAs). Once the SLAs

run over a period of time they lend themselves to further improvement and process optimization.

Stabilize ERP. Once the ERP process model has been running for some time, the understanding of skills in the new operating model become very clear and a formal skills development plan can be laid out. Over set timeperiods, the service levels are assessed and so is the engagement in its entirety. Further, the available metrics help us build the scalability model for further service aggregation, i.e. horizontal or vertical scaling—such as rollouts to other business units or subsidiaries.

Hiring Consultants According to Role

Most, if not all, first-time ERP implementation and major functional extensions need outside consulting. However, consultants should be hired on the basis of the role they will play.

ERP projects are often very hard to manage because of their scope. ERP projects tend to change the way companies do business. Most are very process oriented and cross-functional. From the start careful planning and execution is required. Many organizations simply don't have the large project management skills to execute the implementation successfully. Most ERP system integrators do this very well.

Another issue to consider is the amount of business re-engineering that is involved in the project. If there is a significant amount, you want a consultant that really knows your vertical and its best practices. They should be able to give you several high level references where they have demonstrated significant value. You should be wary, however, of doing a lot of re-engineering inside of an ERP project. Re-engineering is one of the major reasons for implementation time and cost overruns, and the blame falls on the ERP software. Decide how your company wants to operate before you purchase a ERP package.

During the ERP selection process you are primarily trying to find a package that is well aligned with the way you do business. Consultants are often useful in gathering system requirements and ordering them into useful information. They also tend to know what is available from

ERP vendors. If you are going to use a consultant in the process of selecting the package, make sure you get more than one opinion. Most consultants have a bias toward an ERP vendor with which they have an especially good relationship. You could also hire a consultant that does not do implementation. As with the ERP consultant, you want one that really knows your vertical.

During implementation, there are two primary consulting roles.

- The first role is getting the most out of the ERP package. Most consultants have broad industry and technology exposure, but make sure they know your industry. They are valuable for exposing possibilities and introducing new ways of accomplishing tasks. However, during this phase the opportunities should be aligned with using the selected ERP package with no major modification to the core ERP.
- The second role is focused on the product. Deep functional understanding of the selected product is the key. The consultant should be able to give you several references where they have installed all the modules that you want to use. Often the second role is staffed with consultants from the vendor's consulting services.

Best Practices for using Consultants

- **Defined boundaries for consultants**—When the project is going to use outside help, the role and boundaries need to be carefully defined. The authority should follow the responsibility, and both need to remain with the customer. This is true even when a consultant is used for project management. Projects that have been detached seldom fulfil the desires of the customer.
- **Always use more than one consultant**—It is a good idea to use more than one consulting firm on a project. It helps to keep them honest. You will generally get better people. You will get the benefit of multiple opinion.

- **Avoid bait and switch**—Be aware that many consultants tend to use a bait-and-switch paradigm for staffing. Consulting firms often present you with highly qualified people. Make sure that they deliver the same. Put criteria into your contract that specifies the experience of those presented or even specific names of individuals. This especially applies to the partner in charge and the associate partner or manager on the job.
- **Always establish hurdle rates**—To maintain a scope consistent with return, decide at the beginning of the project on an acceptable rate of return. Judge each incremental scope change on its ROI.

ERP Transition Golden Rule—Communicate, Communicate and Communicate

When ERP projects spawn rumors, communication becomes critical for smooth transition without suspicion and stress in the company. ERP generates rumors floated from frontlines and sidelines about everything, from layoffs to unwelcome changes in employees' responsibilities.

It is natural to be suspicious of change. And nothing short of bankruptcy or acquisition creates more organizational change and stress than implementing a new ERP system. Stress is understandable when you're worried about losing your job.

Part of ERP project manager's job is to communicate to front line users that the ERP will make their job easier, and that their roles are new and improved. Part of our job is not just to throw words over the email but to market change by communicating in small groups.

- Structure the ERP campaign around frequent communications, interactive tools and and ensure that content is brief, positive and informative.
- All written communication should contain senior-executive commitment. (CEO or CFO or CIO), recognition of front line ERP team members or examples of how the new ERP system would make the work-life of the staffers better.

- Publishing a biweekly e-mail co-branded with your project name and logo (and that of ERP partner), and by writing a column in your monthly newsletter,
- Highlight positive outcomes and address front line concerns.
- Use surveys, whose links and results can be published in biweekly e-mail newsletters, to get employees involved.
- Repetition, staying on message, making the unfamiliar familiar: these practices make franchise operations and political campaigns thrive, and they help ERP campaigns too.
- Building inter-company, biweekly e-mail newsletter with regular sections such as 'Recognition Corner', 'Project News', 'Survey Says' and 'Did You Know?' keeps people informed, even after going live with the new system. Linking back to an intranet site that includes screenshots is a great way to prepare for training through repetition.
- During training sessions, ensure that fear, uncertainty and doubts are squelched for good. Beginning with your first class, with content honed to address those free-floating rumors. Highlight survey results, you are striving to create evangelists and buy-in from ERP haters. We want them to walk away with a story about how the new system will help them do their work.

If it is big, like a new ERP system, it is worth the marketing effort as well. After all you are spending millions of dollars (or any other currency), you can spend a little more to market ERP smartly to ensure smooth transition.

CHAPTER 11

Managing ERP Vendor/Implementation Partners

Protecting Your Company from ERP Consultants

The large number of stakeholders involved in ERP projects adds complexity to communication and coordination efforts. ERP projects are organized as complex matrix structures comprised of multiple stakeholders who must be able to articulate their perspectives to a diverse group of team members ranging from ERP programmers, management consultants, local technical and functional experts, and end-users. The core competencies of these team members often do not overlap, creating a 'knowledge gap' between understanding the detailed functionality of the ERP system versus the intricacies of organizational business processes. A great deal of time is spent articulating and translating expertise across expert domains.

Since ERP system is usually very complex, an organization seldom has adequate in-house expertise to do the implementation. Hiring external expertise in the form of contract staff or consultant is common.

Depending on the complexity, the cost can be huge. Organizations spend up to three times as much on consultants as they do on the ERP system itself according to the research conducted by the Computer Technology Research Corporation in 1999. ERP consultants are like locomotives. Once they start chugging down an organization's tracks, they begin to pick up speed. Sooner or later, no one can stop the trains, and they wind up running over everything and everyone in their path.

It is amazingly easy for organizations to get hooked on consultants, particularly, when times are good, the company is growing, money is abundant and a decision is made to implement ERP. Consultants are smart, they bring an outsider's perspective, and they're free of the baggage of politics of internal organization. They offer services you think you can't do without, or that you don't have time to perform yourself. Pretty soon, you find yourself relying on them more and more.

Remember the fish story? Give a man a fish and you feed him for the day. Teach a man how to fish—he no longer needs you! This may seem like an archaic thought but many are convinced that ERP consultants do not share knowledge fully or impart proper training, or give you all the pros and cons for a given ERP functionality.

Many CEOs believe that is right to call these expensive consultants to help in implementation. He's probably spent his first two months at the company taking a good, hard look at the business fundamentals. In his closed-door meetings with the CFO, he's seen an enormous amount of company money go into the project budget. But a CEO will be considered irresponsible if he didn't ask tough questions.

Realizing real business results through an ERP implementation is not an easy task. The following best practices will help.

- Using a proven methodology, experience and industry-specific solutions, one can accelerate your ERP implementation. One can potentially increase your ROI by incorporating e-business, CRM and SCM extensions.
- The people from ERP implementation should understand your industry and need to be well versed in the current ERP offerings.

They must help you take advantage of ERP features to best meet your business objectives.

- The consultants must be experienced in delivering cross-functional solutions, managing conversions and creating interfaces to Legacy systems. To expand the functional capabilities of your enterprise applications, consider using—
  - Business intelligence
  - Change integration and deployment
  - Training
- Companies usually wish to buy something that has worked elsewhere. What they should buy is someone who has worked elsewhere. In other words, the key benefit is the insight, and the working method of the ERP consultant—and the particular ERP package.
- The consulting skill is less in deciding the specific mechanism which should be used (there are so many options here)—but more in recognizing the need to do something 'outside of the box'.
- The consultants' role is to highlight the current picture in an open, authentic fashion. The user decides what to do about this—including 'doing nothing,' if they do not accept the diagnosis or its implication.
- It will be helpful if the consultant develops a change 'roadmap' and shows the client the route being followed.

Dos and Don'ts in Hiring Consultants

Did you ever think who a senior consultant is, whenever you needed one?

There is not a clear definition, what a senior consultant really means. Different persons have different opinions what a senior consultant might be, but there is at least this minimum consensus: the number of years working on a certain topic is positively correlated with years of experiences. In other words, to become an expert on an issue needs time!

To know the best way and avoid repetition of mistakes is therefore also very much correlated with age and life experience of a consultant.

But how is it possible, that young and dynamic university graduates are already called and sold as seniors after two years of working in a consulting company?

The answer is easy: because customers are buying the name of the consultancy company (trademark effect of the big), and not the best and experienced of the consultants itself. Please keep in mind, that the capabilities and the experience of a person you hire are much more interesting for you, than the reputation of the consulting company offering you the person!

Our understanding of a senior consultant is someone who is able to listen and is able to understand the specific requirement of his/her customers. The senior is a fair (sparring) partner of the customer, has a clear opinion in the area of his/her competence and stands for it also in inconvenient situations. A senior is self-confident and honest as well to inform the customer immediately in cases of risks and gaps. A senior consultant is always self-motivated to achieve the best possible solution.

Deciding on a Vendor

The most important analysis to be performed before you decide on a vendor or an implementation partner is to analyze the core and context relationship of your business process. This is a model propounded by Geoffrey Moore.

Core Business Process

- Anything that creates sustainable differentiation resulting in competitive advantage in target markets
- Core allows you to win purchase decisions and still maintain a reasonable profit margin, this is not core competence. Nor is it core business.

Context Business Process

- All other processes required to fulfil commitments made to one or more of your stakeholders.
- Context includes all work done to comply with regulations, meet market standards, and match competitor innovation.

The next step involved in this analysis is to break the core and context business process into—mission critical and enabling business process.

Once this is done—it is easy to point that enabling context business process is a candidate for outsourcing and the Core Mission Critical Process is a candidate for specific ERP process that needs immediate focus.

By doing this simple but very important classification of business processes, it will be easy to target the right vendor or implementation partner who has the right experience and expertise in the context-enabling business process that is specific to your industry. Many vendors claim experience and expertise in many industry verticals and processes but that is of no use to you if there is no specificity with respect to your core and context. You are not looking for a vendor who can support your core—that is your specific competitive advantage or differentiator. You are looking for an ERP implementation partner who can bring value to your context-enabling business process.

The highly proprietary technical character of nearly all ERP packages has presented companies with an ongoing maintenance and integration challenge. For the next few years, the migration of ERP packages to newer architectural frameworks will be an evolutionary process. Hence choosing a long term partner is very critical.

Always choose a vendor on the basis of whether or not its product meets your business process needs. Then examine its viability. Use as few ERP systems as you can. If you have a range of very-small to very-large plants or business units within your organization, you may need to have a high-end and a low-end system to correctly meet your needs. However, multiple high-end or low-end systems can seldom be justified.

If you must use a specific vendor ERP, examine it carefully to see if the business processes are fully supported. Examine the financial viability

and make sure it will be around for the long term. Check if international support is required; examine it carefully to make sure it is present in each required region and not just in their website.

Choose a vendor that is moving toward standard application-development technology and away from its own proprietary-development environment and language.

CHAPTER 12

Life after an ERP Implementation—Continuous Business Improvements

It's not what the Vision is, but it's what the Vision does!
—Robert Fritz

Current reality is as important as the clear vision. This philosophy is applicable to ERPs too. But many great companies have become victims of ERP's complexity. Many schemes are left drowning in details without a clear perspective on those details. Many are in a systemic confusion trying to figure out important issues, high and low leverage strategies for dealing with such issues from all sorts of issues.

It is quite natural. One has to be a bit philosophical in dealing with an enterprise-wide computing system. We all know the metaphor of being able to step back far enough from the details to see the forest. But unfortunately, for most of us when we step back, we just see lots of trees.

We pick our favorite one or two, and focus our attention and efforts for changing those.

Systems thinking finds its greatest benefit in helping us distinguish high-from low-leverage changes in highly complex situations. In effect, the art of Systems thinking lies in seeing through complexity to the underlying structures generating change. Systems' thinking does not mean ignoring complexities. Rather it means organizing complexity into a coherent story that illuminates the causes of problems and how they can be remedied in enduring ways. The fundamental problem faced by most managers with ERP is not too little information, but too much information.

Advaita and ERP

Sometimes you have to look at ERP from a philosophical perspective as the indivisible whole. There is a sound philosophical foundation for this called 'Advaita Doctrine,' i.e., non-duality or the oneness of nature mentioned in the Hindu scriptures as propounded by the Saint Philosopher Adi Shankara.

In March 1969, astronaut Rusty Schweickart flew on Apollo 9, which tested the lunar module in earth orbit. He describes this beautifully:

"Up there you go around every hour and half, time after time, after time. You wake up usually in the mornings and just the way that the track of your orbits go, you wake up over the mid-east you wake up over north Africa, as you eat breakfast there is Greece and Rome and the Sinai, the whole area and you realize in one glance that what you are seeing is what was the whole history of man for years. And you go around down across North Africa and out over the Indian Ocean and look up at that great subcontinent of India pointed down, and Ceylon Burma and across the Pacific emerges the Americas.

You look down there and you cannot imagine how many borders and boundaries you cross again and again and again and you don't even see them. There are no boundaries and all you see is an indivisible whole—the earth."

The idea of looking at an organization as an indivisible whole, like a living organism will only bring quality results to your ERP environment.

Post-ERP Evaluation to Unlock Value

Stepping back in time to the period of early 90s, the flavor of the month was ERP. Every wannabe organization worth its salt was toying with an ERP implementation (never mind which ERP, never mind what business benefits it was supposed to deliver).

A few agonized over the choice of an ERP and implemented only after a proper BPR exercise to realign business processes with business needs and ERP constraints.

- Some pain, high ownership across the organization
- Generally high satisfaction level
- Little customization
- Some loss in local MIS and control-reports

Some took the line of no-customization, were willing to change local processes to be in line with ERP constraints (largely to avoid a BPR exercise).

- Much pain, middle-of-road ownership across organization
- Medium-to-High satisfaction levels
- Major losses in local MIS and control reports

Some barged into ERP implementation and set up process based on suggestions from the implementation agency.

- Extreme pain across organization, very low ownership
- Very low satisfaction level, bordering on disgust

Generally speaking, the ERP implementation process would have been driven by the CIO, with a team consisting of functional specialists and implementation partners. The entire focus of setting up processes to be captured and the development of MIS in the ERP system has been largely driven by concerns of the Finance dept. First, manufacturing, next, would be the purchasing department. Sales and Marketing and service functions would have received only a passing reference. Initial efforts to buy 'ownership' by 'involving users' in the design and development would have been discarded very quickly as the D-day approached. Most

suggestions and requests for specific treatment of processes and MIS would have faced the guillotine, the long arm of the finance chief dictating what was 'essential—Need to Have' and what was 'nice to have'.

Post-implementation, most non-financial departments would have been at the receiving end of 'unwanted queries' from the finance department, often being frustrated at not being the 'first to know' and hence, having to 'justify'—all for want of adequate MIS from the ERP system.

Unfortunately, in most organizations, the ERP has become a convenient tool for witch hunting and one-upmanship, rather than a tool to improve operations and manage customer needs.

Unfortunately, again, no organization will accept that their post ERP experience in managing their business efficiently is anything less than excellent and that there are any gaps in information needs or that, a few additional modules may now be required to bring the ERP implementation and experience up to the required speed.

What is clear is that the offering from any IT services company cannot have any negative connotation or even remotely suggest that all is not well with the implementation and that they hold the magic wand to make all pre-ERP dreams come true.

The emphasis must be—going forward, how can a post-ERP evaluation audit help in extracting more value out of investments already made in the ERP?

1. First we need to identify potential areas that can lead to **value unlocking**. These could be in:
    - MIS reports from the existing ERP installation so that users can get to see control-reports in a form that makes sense to them
    - Customized to user needs
    - Additional reports to cater to new business realities
    - Net enabling control-reports and MIS
    - Tweak-existing field definitions and parameters to introduce flexibility in managing operations

- Tweak business processes to cater to changing business needs
- Look for opportunities to extend the scope of ERP to cover customer management process at one end and vendor management process at the other end

2. Identifying opportunities to enable value enhancement

   One way of doing this is to conduct a quick audit of existing processes by talking to a cross section of all users. The objective is to get an honest feedback, however sketchy, on how effectively the ERP system is being used to manage operations. This feedback will help identify 'gaps' between 'what should be', 'what can be' and 'what is'.

Such an audit can take place only after the CEO is convinced of the need for such an audit, and the organizations ability to identify 'gaps,' and come up with a road map for extracting value from existing operations.

Thereafter, a dip-stick study will provide a clearer picture of potential benefits and additional costs that may have to be incurred. The first step therefore is to go right to the top and offer a compelling reason to revisit the ERP experience.

From a CEO's perspective, there can be no better compelling reason than a low-cost (or better still, no-cost) evaluation of the post-ERP environment conducted by an impartial third-party resource.

Next Step

A brain storming session to

- Identify 'big picture themes'
- Home in on potential areas that can lead to value unlocking
- Finalize shape and scope of offering
- Evaluate in-house resources regarding various ERP platforms
- Identify target organizations
- Finalize the approach to be used
- Mailers

- Workshop
- Direct contact with CEO

Finalize areas for audit, resources and expertise required, covering

- Hardware, software, communications
- MIS
- Expanding scope of ERP coverage with consulting backup

ERP User Group Approach

A new ERP system means a new user group for support when issues crop up. There are many user groups—SAP user groups, Oracle user groups etc. They are very useful and provide tons of practical tips and tricks that are not known even to some top ERP consultants.

Vertical market user groups in the mid-sized enterprise space are an amalgam of talented, business-savvy users. Unlike users in the technical groups that form around cross-business applications from companies like Microsoft or Symantec, mid-sized ERP users are business people first and techies later.

Business-focused user groups offer conferences, websites and list servers, working groups, and topical summits. These features have become as much a part of ERP systems, upgrades and support contracts. Mid-market vendors proudly showcase their user groups (to which they offer financial and technical support) as part of their package.

Through your ERP selection process, make sure to visit user-group conferences associated with three of the vendors you are considering. These large, annual conferences are attended by people from industry-related councils and working groups.

Each user group works like a laboratory where members seek creative solutions to new problems, and share what worked (or didn't). This kind of information sharing is one of the unheralded advantages that local and regional companies have over their larger brethren: they share best

practices proudly rather than protect them like crown jewels. As a result, you get access to hundreds of practical studies, available as a part of reasonable annual membership fee.

Post-ERP Lifecycle—Issues and Solutions

Organizations worldwide, whether public or private, are moving away from developing IS inhouse and are instead implementing ERP systems and other packaged software. ERP has been referred to as a business operating system that enables better resource planning and improved delivery of value-added products, and services to customers. ERP systems have, in recent years, begun to revolutionize best practices in the areas of business processes and functions. They automate the very core of the corporate world, such as manufacturing and management of financial, and human resources and supply chain. Most of it is done by eliminating complex, expensive links between systems and business functions that were performed across Legacy systems.

Management and Support provided by an entire lifecycle of ERP are ongoing concerns rather than a destination. The pre-implementation, implementation and post-implementation stages continue throughout the lifetime of ERP as it evolves with the organization. Unlike the traditional view of operational IS that describes a system lifecycle in terms of development, implementation, and maintenance, examination of ERP implementation is revealing that their lifecycle involves major iterations. Following initial implementation there are subsequent revisions, re-implementations and upgrades that transcend what is normally considered, system maintenance. As the number of organizations implementing ERP increases and applications, improved understanding of ERP lifecycle implementation, management and support issues is required so that development, management, and training resources can be allocated effectively. A better understanding of ERP lifecycle issues will also help direct its research agenda.

The first observation was that issues associated with the ERP lifecycle are a multi-faceted phenomenon of immense complexity, which defy any simple solution. Experience suggests that a lack of product knowledge

has been a major concern for many organizations. The complexity of ERP systems, revealed that it is difficult to obtain fully-qualified experts who can advice an organization holistically on every single module. While there appear to be experts on individual modules, what seems to be lacking is an informed overview of the system, which enormously impacts on the ability to use the system efficiently and effectively.

Other issues identified also reflect the consequences of insufficient ERP knowledge. This is why many organizations use external consultants to assist the implementation process. Consultants may have more experience in specific industries, comprehensive knowledge about certain modules including their strengths and weaknesses, and thus may be better able to suggest which will work best for a given organization; however, hiring and managing the consulting firm, and its employees is another challenge.

Shared knowledge among project team members is a concern throughout. The issues perceived are not entirely negative—there are stakeholders who learn from the issues experienced by others. The central aim of the issue assessment is to understand the cause and effect of the issues identified, and how stakeholders might organize their actions around these. For example, lack of user training and failure to completely understand how ERP changes business processes, frequently appear to be responsible for the difficulties associated with ERP implementation.

Soon after 'go-live', measures such as making a large investment in staff training and ongoing support to minimize reliance on external contractors and to build inhouse expertise are very useful.

Implementing an ERP system also involves re-engineering existing business processes to meet the standards of best business process. However, the costs and benefits of aligning with an ERP model could be very high because it is difficult to gain agreement to accept the new process from all who are affected. Furthermore, some existing business processes are so specific to the agency (agencies) that they need to be preserved or appropriate steps taken to customize them. This can be counter-productive in the long run, and can negatively affect the viability of the organization and interests of all stakeholders. If the effects are too radical, ERP implementation can critically disrupt the organizational

environment. In such a case, it is important that any ERP initiative has strong political support from key stakeholder groups, and evidence of gains for each group. Unfortunately, many reported ERP issues have been caused by insufficient support.

As ERP systems cross functional and departmental boundaries, the cooperation and involvement of all involved appears to be critical. ERP benefits cannot be realized without strong coordination of effort and goals across business and IT personnel.

'Configuration' should only be requested when essential, or when the competitive advantage derived from using non-standard processing can be clearly demonstrated. However, differences in business orientation, organizational size, and related requirements may argue for unique processes. The general perception is clear from the study that crucial detrimental compromises had been made to achieve the desired level of standardization.

It is therefore very unlikely that any ERP implementation can be simply asserted to be a success or a failure. Such claims usually hide all effects of ERP lifecycle-wide implementation, management and support, and fail to appreciate the rich variety of stakeholders' expectations of the system.

Successful consulting and managing user requirements is directly proportional to successful systems implementation. An organization's requirements may exceed the capabilities of the system or may be too simple to need one. ERP systems often fail to meet requirements despite positive contributions to the organization if the system is 'oversold' by the vendor.

Careful deliberations on success measurement and management of requirements throughout all stages of the ERP lifecycle are important success factors. While many in the IS business consider project management an oxymoron, its importance in ERP projects is well documented, and numerous methodologies and management tools exist. Project management activities span the life of the project from initiation of the project to its closing. The contingency approach to project management suggests that project planning and control is a function of the project's characteristics such as project size, experiences with

technology, and project structure. The vast combination of hardware and software, and the myriad organizational, human and political issues make many ERP projects huge and inherently complex, requiring new project management skills. Proper management of scope is critical to avoid schedule and cost overruns, and necessitates having a plan and sticking to it. A project scope that is too broad or ambitious can cause severe problems. Customization increases the scope of an ERP project, and adds time and cost to an implementation. Therefore, clear goals and objectives that are specific and operational, and indicate the general directions of the project, were prerequisites in an ERP implementation.

No simple approach will solve the arising issues. More emphasis has to be placed on understanding contextual features of ERP (and organization). Stakeholders should focus on those critical issues in ERP that will have adverse effects on their interests. ERP lifecycle issues should be studied as dynamic processes that can be shaped by stakeholders' action. This action depends on available interpretation and 'mappings' of the situation, i.e. how and in which light, stakeholders make sense of the situation. The main concern is the content and scope of the 'mapping' or 'understanding' process. These are the conceptual means by which stakeholders inquire and reflect on ERP. Consequently, these findings should be of benefit to stakeholders in their involvement with lifecycle-wide ERP implementation, management and support.

Another condition for preventing ERP lifecycle issues is to establish organizational arrangements that help to channel stakeholders' involvement during the different stages of implementation, to allow them to meet one another. Here, more open, democratic, and participatory arrangements seem to be necessary. Organizing a consortium is a possible means of developing a direct link.

Setting realistic expectations facilitates corporate planning for missing functionality and consideration of alternatives. Generally, a deeper understanding and sharing of experience together with an open style of communication would benefit not only project team members, but also user organizations. It is also imperative for organizations to establish goals, and educate and communicate their goals and long term perspectives, to win support of all members of the organization affected by the changes. A negative consequence of this may be a slower

development pace, but the reward is—higher fulfilment of expectations, reduced resistance, and more informed, diversely qualified and competent ERP users. Therefore, it is important for organizations to be aware of certain critical issues before, during and after implementing any ERP system. Careful consideration of these issues and prior planning to minimize their effects across all stages of implementation will ensure a smooth rollout and realization of full benefits of the ERP solution.

CHAPTER 13

ERP Risk Management and Mitigation Strategies

Compliance and ERP

Risks and regulatory requirements are nothing new to business. What is new is their size and severity. ERP amplifies the risks in an environment of integrated systems. The new regulations have sharper teeth and deeper impact. They've caught the attention of board members and the C-level suite. But governments aren't the only pressure point. Customers are placing demands on companies too. Take the special mandates in the US from Wal-Mart or the Department of Defense, for example, on suppliers fixing RFID tags on shipments. Also one should not forget that businesses may have their own self-imposed set of ethics, fairness and sustainability policies.

It is well understood that ERP is complex. But regulations are becoming more complex. And there are more of them. Of all the new regulations, the Sarbanes-Oxley Act (SOX) in the US has definitely garnered the most

attention. It's certainly been a catalyst for change in companies and industries of all sizes. Yet, SOX is only one piece of a larger regulatory puzzle. Regulations in data security, privacy, records retention, human resources, payroll and taxes, risk management, health and safety, bio-terrorism, homeland security, international trade and environment are all putting pressure on companies. Failure to comply in any of these areas can mean stiff penalties: directors may be sent to jail, and companies may be fined and even shut down.

Businesses need to leverage technology to meet compliance challenges quickly across an enterprise, be able to scale across geographies and reuse common technologies across multiple compliance issues to lower overall cost of compliance. Relying on manual processes or taking a fragmented approach to compliance can be fatal as a company's reputation is at stake in the business and capital markets. One serious incident and a company could lose that valuable reputation and its customers along with it.

Companies certainly understand that compliance in an ERP environment isn't a one-time thing. It is here to stay. Smart companies are moving forward on that assumption, which is why they're making compliance, risk management and corporate governance an important part of their corporate strategies.

Fundamental Changes in Business Controls

An ERP implementation and its associated changes transform critical elements of business. Some reasons for the change include:

- Decisions taken on erroneous ERP real information or reports often are irreversible or costly to correct.
- Batch-oriented controls are not the focus in an ERP online and real-time environment.
- Traditional and paper-based audit trails do not exist.
- Access control requirements have expanded vastly to include field personnel and, increasingly, suppliers and customers because of ERP portals, ERP CRM/SCM extensions.

- ERP master data changes can have a significant impact on transactional data as they are tightly integrated. If you have a wrong customer address—the invoice will go to a wrong address. If you have a wrong pricing scheme—you may end up losing money.

In view of this, the integrity and control structure supporting ERP-driven business processes also must be transformed. ERP systems can change internal controls in three fundamental ways:

- **Real-time controls**—shift away from checking and validating paper-based records to online monitoring and controls.
- **Validation control**—shift from multiple validations of transactions, often based on printed outputs, vouchers and source documents, to a single validation at the point of creation. This is often an online approval.
- **Quantum of control**—shift from several process and embedded controls to few automated and strategic controls.

Thus it makes good business practice to ensure these re-engineered controls are integrated into ERP-enabled processes and the ERP system.

Strategic Business Risks and Key Management Controls

The strategic business risks associated with the implementation of an ERP package have a significant impact on:

- Project management—planning risks, cost
- Hiring third-party consultants
- Business process and functional areas

Project Management Risks

ERPs require a number of process changes and re-engineering efforts resulting in significant changes. These changes if not analyzed from a control perspective will result in weak controls in finance, sales logistics,

materials and other functional areas. During the initial budgeting and business-case-phase for a project, these areas are often de-scoped or downscaled due to the need to reduce costs. However, ERP implementation typically brings with it significant amount of change, and an insufficient effort on change management, and training often is considered as a major cause of project failure. Internal staff requires ERP training on changed business processes and hands—on exposure to the system to get used to new processes and systems. Retention of trained staff, is a key issue and a risk; as many find better jobs as ERP consultants.

Planning and Project Management Risks

Project planning and management is key to ERP success. There are several risk factors, Scope-creep risk, time and cost overruns, staff attrition to lack of executive support. Many ERP projects fail right in the beginning due to lack of proper positioning and executive support.

ERP requires a professional manager with the skill and ability to:

- Handle and, lead IT, and business users to take decisions together
- Help users decide whether to adopt to ERP processes, or to customize ERP to suit re-engineered processes. It is a very critical task.

Risks in Third-Party Consultant

External consultants bring a lot of value but they are also a big risk. Many a times, they work on multiple projects and are not able to focus on one project. This could result in a disaster. In many cases, ERP consultants lack the industry experience and are not able to correctly understand user requirements. They just produce power points and XL documents but not a fully functional ERP system. In some cases, they leave a bit too early to other important projects—leaving your project in the hands of inexperienced juniors. Some large consulting firms have a practice of posting trainees as consultants—get trained at your cost.

ERP Cost Blow-out Risks

All the factors discussed above can lead to a cost blow-out. Some of the major causes of project cost blow-out are change management; training and a lack of software functionality, customization and integration, etc.

Risk in Software Functionality

If the functionality of an ERP is unable to handle some parts of business process,—it can result in a major problem. This situation can occur if the ERP selection process inadequately addressed key functional and business-process requirements.

Best practices to control such risks are:

- Get a list of references within your industry for the ERP and talk to them
- Localization aspects—legal, compliance, statutory reporting, peculiar business models
- Forex handling or multiple currency or language capability
- Impact change from Legacy to ERP functionality or process
- Stability of the current ERP release
- Specific industry solution
- Country-specific operational and reporting needs
- Logistics and SCM related requirements

ERP—can be Sole Point for Failure

In a Legacy environment, many systems run and failure in a single system cannot bring the organization to a standstill. But in an ERP environment—the whole company runs on an ERP as backbone. If the ERP system stops, the company will come to a grinding halt. This is referred to as single-point for failure. The best way to mitigate the risk is to have a Business Continuity Plan (BCP) in place.

An online, real-time system also needs an online, real-time business environment that can effectively monitor and deal with exceptions before

they turn into significant problems and impact on other areas. System maintenance and version control are also important in terms of maximizing system availability and integrity.

Importance of Establishing an Integrity Framework

The implementation of an ERP system can introduce and alter an organization's risk profile. As a result, organizations need to redefine their approach toward risk management and control assessment to cater to the differences in risk encountered and to achieve complete coverage of the management controls. A framework is required to facilitate the assessment of risk and completeness of controls. There are several frameworks that can be adopted to model the ERP control environment. The control framework consists of the following five areas:

- **Business process control**—includes automated (e.g. online approval, three-way matching of purchase order amount, goods receipt quantities and invoice particulars) and manual control (e.g., reconciliation, manual approval, review of exception report) within the re-engineered business process. Business process control is most cost-effective when incorporated from the beginning of the project, and throughout the design and development phase. Retrofitting controls after the implementation, often, is expensive.
- **Application security**—includes maintenance of user profiles that provide access to application functionality and system services as well as system and security administration procedures. It incorporates the setting of security parameters (e.g., password lengths) and the granting and removing of user access to application system.
- **Program interface and conversion control**—needs to be considered within the framework to address the risks associated with converting or interfacing data from Legacy or external systems.
- **Technology infrastructure—**includes controls surrounding the technology platform on which the application resides. The

technology infrastructure consists of servers, operating systems, and database and network layers.

- **Project management**—specifies the aspect of framework control. This relates to change-management and project disciplines discussed earlier.

ERP Security Road Map

Securing ERP systems against common failings like poor access control, fraudulent transactions and unplanned downtime is a complex task.

Addressing ERP Security Concerns

ERP systems affect many processes, people and technologies. Originally, they were enhanced accounting ledgers. Now, modules to handle purchasing, stock, sales, distribution, manufacturing and human resources can all be integrated with the core financial system. An ERP system introduces a whole new environment to an organization, one that affects the security and data integrity of every business process it touches. Companies continue to expand their planning systems to include SCM, CRM and real-time enterprise concepts. As they do so, concern and uncertainty over ERP security and potential risks grow.

Addressing these security concerns can prove to be a struggle. Systems are implemented rapidly; have complex security requirements, suffer resource constraints and require manually-intensive administration. Companies are often uncertain about how to monitor security, giving industries like manufacturing an excuse to delay investing in IT security. ERP security may, in these sectors, be their first attempt to address IT systems' security. Organizations new to security will face extra difficulties because they lack resources and a culture that supports it.

Five Major ERP Security Concerns

Poor Management of Access Control, User Profile and User Provisioning

Problems arise within ERP systems, due to the proliferation of systems from multiple vendors and with non-ERP systems. Security authorization and user issues become complex within ERP systems. For instance, a policy covering user access in the system may contain several potentially-confusing policies, procedures and conditions dealing with variety of roles, systems and transactions.

Companies must face two challenges:

- To create a process to establish, review and change user authority profiles as and when required, and ensure that changes are properly authorized.
- To decide how user accounts should be managed, put password controls into place and work out what to do with 'superuser' accounts.

Action Item: Implement a user-provisioning process that ties workflow features of user management to other business processes (for example, employing automated procurements and e-mail approvals), and role- and policy-based access management. Password management and synchronization services may be included.

Failure to Detect Abnormal Transaction Execution

Much fraud is initiated by insiders and takes advantage of poor handling of users' access permission within the system, and insufficient audit and control to trace illegal transaction access. Real-time monitoring and authorization is needed to spot fraud among the thousands of transactions processed every day in the average ERP system. It is vital to control each critical transaction. Authorization checks are critical to determine whether duties are appropriately segregated.

Companies must implement authorization engines and blocking systems. Blocking systems need to block transaction execution as soon

as tolerances are exceeded, for example, during invoice verification. Random invoices should be blocked for spot checks. Transaction authorization profiles are needed to trace, check and review users' activities, and compare it with the activities users are permitted to perform.

Action Item: Implement automated management process for tracking and logging to establish real-time monitoring requirements for fraud and misuse.

Risk of Breaching the Confidentiality and Integrity of Data

ERP systems face traditional data and human security issues. Social engineering ploys could trick a responsible person into granting access to key information. ERP integration is built on the principle that data is captured only once. For example, a purchase order captures all the information necessary for supply of goods, allowing the goods receipt, invoice receipt and payment to be based on this initial data capture. In human resources, auditors must evaluate whether the security access restrictions to sensitive data are adequate. Systems must be consistent with laws and regulations, governing storage and transmission of personal data.

Companies must ensure that all source-data has been prepared by authorized personnel who are acting within their authority, and that duties are segregated—origination and approval do not overlap.

Action Item: Implement a data management process to classify data according to business criticality, and control the mapping and the workflow of data stored within database repositories. This requires development and maintenance of transaction and data cartography.

The Problem of Downtime

ERP systems need to remain available for business continuity. Companies must be prepared to restore the system and data, and reduce the need for system downtime, maintenance and management. Particular problems include scheduling background jobs, distributing and balancing

workloads, monitoring the performance of ERP applications, databases, operating systems and networks, generating alerts, and customer-tailorable performance thresholds and analyzing exceptions.

Service levels: response time and system downtime must be managed. For many years, ERP systems have had only weak tools for handling response time and downtime. A third party software tools market emerged to help organizations, extend the basic performance management capabilities of ERP systems.

Action Item: Implement automated ERP performance and availability management to improve service levels, and speed up the response when failures do occur.

The Need to Segregate Duties and Audit the ERP System

Segregation of duties: It is not unusual for people to have several roles in an organization, but this can lead to regulatory violations. Most systems of internal control rely on segregating access to assets from responsibility for maintaining the accountability for those assets. One person should not do both.

Responsibilities that should be segregated include:

- Transaction initiation (acquisitions or disposals)
- Transaction authorization
- Transaction recording
- Custody of assets
- Reconciliation of fixed assets and liabilities

For example, it would be a violation of the segregation of duties principle to authorize one person to set up a new vendor, and to enter an invoice. Under the U.S. Sarbanes-Oxley Act, which is designed to prevent corporate fraud, a violation of this type is an invitation to fraud, and must be tightly monitored and controlled. Those responsible for acquiring, disposing, recording and maintaining fixed assets should be responsible for only one of these functions, and have no system access to functions outside their assigned role. Those responsible for processing transactions relating to fixed assets should not maintain, or even be able to update, the master file of fixed assets.

In a manual system, segregation of duties may be enforced administratively, based on assignment of job responsibilities. In an automated system, segregation of duties is typically enforced through the use of automated access restrictions, like authorization engines and audit systems.

Auditing the ERP system design: System design auditing should be performed as early as possible in ERP implementation. But when resources are stretched and deadlines short, audit issues can be overlooked. Unfortunately, this can lead to an insecure system with poorly designed controls. Once the system is deployed, auditing requires a risk-based systems review supported by detailed checklists and practical experience in designing controls. This sort of review will not only uncover weaknesses but also support a redesign to improve security levels.

The ERP security organization must ensure that each person involved in the ERP implementation has a role in security: auditors, risk managers, designers, developers, module owners, IT operations and IT securities.

Action Item: Centralize policy development and distributed implementation. A specific organizational unit or person should be responsible for developing and managing the ERP risk-management program to identify business and IT-operational risk. Typically, this responsibility is assigned to the chief information security officer, who bridges the gap between business processes, policy directives and technical security measures.

ERP Security is Essential to Business

- ERP systems cover more business functions than most other products, which makes the associated security and control issues more complicated.
- ERP transactions are complex and use information with thousands of configurable tables and multitude of alternatives.
- The integrated nature of ERP increases the risk that design decisions made for one ERP module might cause unexpected problems elsewhere.

- Many IT department functions (including security) are performed within the application, making segregation of responsibilities difficult.

Hardening ERP Security

Security for systems cannot be achieved by simply purchasing a product—it needs to be built from within. Organizations tackling ERP security as part of business application should concentrate their efforts on creating a security group. They should recruit people to implement user-provisioning, data management and transaction-incident management through their ERP systems. Once a group of skilled people is established, tools may be selected to support their ERP security efforts.

What is Good IT Governance

IT Governance Defined

As a basic definition, IT governance is the process by which decision is taken around IT investment. How decisions are made, who makes the decisions, who is held accountable, and how the results of decisions are measured and monitored are all parts of IT governance. Based on this definition, everyone has some form of IT governance to perform. Unfortunately for many firms, the governance process is ad hoc and informal. There is no consistency across the enterprise, accountability is weak—if present at all—and there are no formal mechanisms to measure and monitor the outcomes of the decisions.

There is just too much at stake today for organizations to leave IT governance to chance or Legacy processes. Optimizing IT investments must become a priority. There is a growing trend on the part of large organizations to elevate IT performance to the level of Board of Directors. In addition to the traditional audit and compensation committee, boards are adding an IT oversight committee to become more involved in the role that IT plays in enabling and executing the enterprise's strategy.

Such executive commitments are only natural. IT governance cannot exist in isolation but must be a subset of enterprise governance. It is the responsibility not just of management but also of the Board of Directors and other executive management. According to the IT Governance Institute (ITGI), IT governance 'is an integral part of enterprise governance and consists of the leadership and organizational structures and processes that ensure that the organization's IT sustains and extends the organization's strategies and objectives.'

Existing Framework

Implementing good IT governance requires a framework. While there is no single, complete, off-the-shelf ERP/IT governance framework, number of frameworks are available that can serve as useful starting points for developing a governance model. As a result, most IT organizations today are 'rolling their own' models, but borrowing heavily from existing frameworks. Most of the existing frameworks are complementary, with strengths in different areas, and so, a mix-and-match approach is often taken. Three of those frameworks are discussed in more depth in the following discussions.

COBIT

Control Objectives for Information and related Technologies (COBIT) was developed in 1996 by the Information Systems Audit and Control Association (ISACA)[1]. It is now issued and maintained by the ITGI as a framework for providing control mechanisms over the IT domain.

Now in its fourth edition, COBIT has been extended to serve as an IT-governance framework by providing maturity models, critical success factors, key goal indicators, and performance indicators for the management of IT.

At the heart of COBIT are 34 high-level control objectives. These control objectives are grouped into four main domains: planning and organization, acquisition and implementation, delivery and support, and

monitoring. Corresponding to each of the 34 control objectives are 318 detailed control objectives.

- **Planning and organizing**—This domain covers a whole range of topics. Included are the strategy and tactics used by IT to achieve business objectives, strategy planning, strategy communication and management, risk and resource management, which insures that the required technology infrastructure and human capital are in place.
- **Acquisition and implementation**—For IT to realize its strategy, it must identify, develop or acquire, and implement solutions to business processes. Additionally, it must manage the lifecycle of existing systems through maintenance, enhancement, and retirement.
- **Delivery and support**—At its most basic level, IT delivers service to its customers (users). This domain concerns service and support issues including performance and security, and it also includes training.
- **Monitoring**—All IT processes need to be regularly assessed for their quality and compliance with control requirements. The monitoring domain addresses the management's oversight of the organization's control processes.

More recently, COBIT added a set of action-oriented management guidelines to provide management direction for monitoring achievement of organizational goals, for monitoring performance within each IT process, and for benchmarking organizational achievement.

Overall, COBIT represents a comprehensive framework for implementing IT governance with a very strong auditing and control perspective, which has increasing resonance in the era of Sarbanes-Oxley and other compliance-related regulations and legislation.

ITIL

The IT Infrastructure Library (ITIL), initially developed in the UK by the Office of Government Commerce (OGC), is gaining traction in the global

IT community as a framework for IT governance. The library currently consists of eight books, including: *Software Asset Management*, *Service Support*, *Service Delivery*, *Security Management*, *Application Management*, *ICT Infrastructure Management*, *The Business Perspective*, and *Planning to Implement Service Management*. ITIL is focused on identifying best practices with regard to managing IT service levels and is particularly process-oriented.

- ***Planning to Implement Service Management:*** This deals explicitly with the question of where to start with ITIL. It outlines the steps necessary to identify how the organization would benefit from ITIL. It helps identify current strengths and weaknesses, and gives practical guidance on the evaluation of the current maturity levels of service management within the current organization.
- ***The Business Perspective:*** The Business Perspective is designed to familiarize business management with the architecture and component of Information and Communications Technology (ICT)—infrastructure required to support business processes. The book helps business leaders better understand the benefits of best practices in IT management.
- ***Software Asset Management:*** This book encompasses the entire infrastructure and process necessary for effective management, control, and protection of software assets within an organization, throughout all stages of their lifecycle.
- ***Service Support:*** Service Support focuses on ensuring that the customer has access to appropriate services to support their business functions. It covers configuration management and other support issues including incident, problem, change, and release management.
- ***Service Delivery:*** This covers the service the business requires of IT to enable adequate support to business users. This includes processes for service-level management and also for availability, capacity, continuity and financial management for IT services.
- ***Security Management:*** This looks at security from the service-provider perspective, identifying the relationship between security management and the IT security officer, as well as outlining how it provides the level of security necessary for the entire organization.

It further focuses on the process of implementing security requirements identified in the service-level agreement.

- ***ICT Infrastructure Management:*** This covers all aspects of infrastructure management from identification of business requirements to acquiring, testing, installation, and deployment of infrastructure components. It includes design and planning, deployment, operations, and technical support processes.
- ***Application Management:*** This addresses the complex subject of managing applications from initial business requirements through application management lifecycle, up to and including retirement. A strong emphasis is placed on ensuring that IT projects and strategies are tightly aligned with those of the business throughout the application lifecycle. Once an application is approved and funded, it is tracked throughout its lifecycle by the software asset management function of ITIL.

While COBIT takes the perspective of audit and control, ITIL takes the perspective of service management. The two frameworks are more complementary than competitive. The components of both can be taken to build a governance framework.

ISO 17799

The International Organization for Standardization has developed the third major governance framework, ISO 17799, titled 'Information Technology—Code of Practice for Information Security Management.' It was first released by the ISO in December 2000. However, it is based on the British Standard 7799, which was finalized in 1999. The intent of the standard is to focus on security and aid an organization in the creation of an effective IT security plan.

The standard has the following high level groupings: security policy, organizational security, asset classification and control, personnel security, physical and environmental security, communications and operations management, access control, systems development and maintenance, business continuity management, and compliance. The standard is very thorough and covers a great deal of material in a concise manner.

ISO 17799's relatively narrow focus on security makes it unsuitable as the sole basis for an IT governance framework, but since risk management is a component of IT governance, there is relevance to ISO 17799, and parts of it can be adopted in building an overall IT governance framework.

Adopt COBIT as the Control Framework

A number of control frameworks have been developed and introduced in the past few years, including COBIT, ITIL, and ISO 17799, to name a few. Each has its pluses and minuses, but for overall IT governance and control, we recommend implementing COBIT, due to its breadth of coverage and its links to business objectives.

- **COBIT has a recent history**—This framework was developed by the ISACA and released in its first edition in 1996, followed it up by a second edition in 1998. In 2000, ISACA formed the ITGI to take over as the publisher of COBIT and released the COBIT 4.0 in 2005.
- **COBIT views information as resources managed by processes**—The COBIT framework approaches control of IT by looking at the information that is necessary to support the business objectives and requirements, and also by viewing information as a collection of IT-related resources that need to be managed by IT processes. The COBIT framework consists of three levels, including four domains at the highest level, 34 control processes at the middle level, and 318 activities/tasks at the lowest level.

The COBIT Domains

COBIT defines four domains that represent an organizational structure in line with the management cycle or lifecycle that is applicable to IT processes. These domains are as follows

- **Planning and organization**—This domain covers IT strategy and tactics, and the ways in which IT can best contribute to the achievement of business objectives. Additionally, it addresses organizational structures and technology infrastructure.

- **Acquisition and implementation**—Successful execution of IT strategy requires that IT solutions be identified, developed, or acquired, as well as implemented and integrated into the business process. Furthermore, a lifecycle approach is required so that changes and maintenance activities are also included.
- **Delivery and support**—This domain is concerned with the delivery of IT services that range from operations to security and continuity to training. Support processes are required to deliver IT services. This domain also includes application controls.
- **Monitoring**—All IT processes need to be regularly assessed over time for their quality and compliance with control requirements.

Table 13.1 COBIT control objectives

Planning and organization	Acquisition and implementation	Delivery and support	Monitoring
Strategic Planning Information architecture Technological direction IT organization and relationship Manage the IT investment Communicate aims and direction Manage human resources Ensure compliance Asset risks Manage projects Manage Quality	Identify solutions Acquire and maintain application software Acquire and maintain technology architecture Develop and maintain IT procedures Instal and accredit systems Manage changes	Define service levels Manage third-party services Manage performance and capacity Ensure systems security Identify and attribute costs Educate and train users Assist and advise IT customers Manage the configuration Manage problems and incidents Manage data Manage facilities Manage operations	Monitor the processes Assess internal control adequacy Obtain independent assurance Provide for independent audits

Source: ISACA, ITGI, *www.isaca.org*

This domain addresses the oversight of the IT organization's control process and includes provisions for independent assurances by internal and external audits.

Notes

1. ISACA, SAP R/3 Security, Audit and Control, *www.isaca.org*

PART 4

Future Directions and Case Studies

CHAPTER 14

Future Directions—Does ERP Matter?

Most of us prefer being precisely wrong rather than vaguely right.

—John Maynard Keynes

What is the Next ERP Wave

Implementing ERP alone is no longer considered a strategic advantage; it's the second-wave tools that will fully leverage ERP systems and let users get the most out of their investments. At least, that's the newest selling point for ERP vendors, which has started pitching users on the idea that 'you can't get there without starting here.' As a result, more companies are factoring such calculations into their ERP-driven business cases from the beginning.

Few companies can expect quick payback on their enterprise systems. Many companies realize that ERP-type applications are more like the 'foundation'; it's what they build on top of that foundation that determines the benefit. It's the so-called second-wave application, such

as business intelligence, SCM, and online procurement, E Portals, SOA Service-Oriented Architecture that can leverage the ERP backbone and offer the highest return.

Modular Add-ons and Integration will Dominate ERP Market

In 2001, the overall ERP market grew four percent, even as traditional ERP investments (financials, human resources, production management) dropped three percent, according to a recent report by Boston-based AMR Research. AMR predicts that ERP vendors will soon derive most of their revenues from adding CRM, SCM and PLM capabilities. These extensions produced $4 billion of the total vendor revenue of $20 billion in 2001, according to the report. By 2006, they will make up half of the vendor revenues.

The extended ERP has seven layers using the ERP technical infrastructure as the foundation, and moving up through a transactional backbone.

- ERP transactional backbone
- Advanced applications—SCM, CRM, SEM
- Cross-application repository
- Middleware—transaction and performance monitors, messaging applications
- Security and controls
- Analytics and management dashboard
- Enterprise portals

The middleware layer increases the scope and complexity of an ERP project as well as the cost. ERP upgrades and new release to production is a critical point in the lifecycle that affects IT service delivery, as well as operational considerations (performance and capacity baselines, workload scheduling, etc.).

Self-service ERP

Many companies have figured out the value of replicating some information—a parts catalog, a web server, and then pointing to suppliers, dealers or customers to this URL. There may even be dynamic updates between the inventory database and the web server to keep information timely, and up to date. But placing ERP on the web is a different ballgame. It extends core, mission-critical systems onto the web, while retaining the strength of ERP, streamlining and integrating complex business processes.

ERPs of the Future

Future of ERP applications point to tectonic shifts in the next generation architecture. The market directions are:

- Pointing to continuing vendor consolidation
- Fewer large and new ERP implementations, more consolidations, extensions and integration of ERP systems
- New models in architecture, outsourcing and ERP licensing
- Maintenance, hosting, subscription licensing
- Growth in SMB market and industries

You should focus on SOA platforms in technology-buying decisions. It should be noted that SOA is an architecture. You can't buy it from a vendor, and you can't build it with a programming code. Architecture is a set of best practices that guides your implementation, regardless of the technologies you choose.

Simplicity and usability criteria (User Interface, Tools, Reporting). This is happening now. The ERP vendor's consolidation is taking place at a rapid pace—some times confusing customers and potential buyers.

ERP has a New Name— 'EAP'-Enterprise Applications

The ERP offerings just keep growing in size and momentum is on the rise in the market once more. Much of this growth and momentum is driven from a buyer side that must do more with less. These are the major drivers and trends related to ERP for the coming years:

High integration costs. Largely ignored during favourable economic conditions, it has become a sore spot when functionality must be provided at less cost.

High cost of training and new skills. It is expensive to train new hires on the proprietary language and architecture of the EAP vendors. It behooves EAP vendors to build on more standard architecture.

Growing adoption of Java/J2EE as a strategic platform architecture. Significant majority of large companies around the world have standardized on J2EE, as a strategic architecture, not only as a platform for application development, but also as a desired platform for packaged applications.

High-value, small-company acquisitions. Small companies with innovative technology have run into hard times or have been spun off larger parents that wished to shed non-core businesses. Other companies wishing to harvest new ideas are purchasing these companies. After the acquisition they must be integrated with the parent.

ERPs become EAPs. ERP is not dead but the three-letter-acronym is becoming dated, as the top four vendors—**SAP, Oracle, PeopleSoft** and **J.D. Edwards**—have all become EAPs. In addition, all four have incorporated SCM and CRM into their ERP suites.

EAPs gain strength over BOB products. Putting a BOB suite together is difficult. Keeping it up and functioning is even harder—consuming as much as 75 percent of the IT budget. As ERP vendors become EAPs with fuller offerings, it becomes harder to justify BOB suites.

ERP joins CRM and CRM joins ERP. Companies that have deployed or are in the process of deploying both ERP and CRM systems are addressing the challenge of making them work together more effectively. As a result,

CRM vendors will move toward being EAP vendors while the EAP vendors now have first generation CRM offerings and are still working to strengthen them.

Emphasis on Internet architecture and web services. More value is being placed on applications that have 'no code on the client,' and the emphasis is no longer only on the front end. The desire to use the Internet for providing services is growing. The required standards include: XML, Web Services Description Language (WSDL), Universal Description, Discover and Integration (UDDI) and Simple Object Access Protocol (SOAP).

ERP moves toward more open architectures. It started with internet enablement for applications. SAP is building a robust web server that will support both Advanced Business Application Programming (ABAP) and J2EE along with sophisticated, standard-based integration architecture. SAP is also moving its applications to that architecture while also selling the new base in the market. Others will, no doubt, follow. Oracle is already talking loudly about its own web server. PeopleSoft will add a broker to its architecture early next year but will remain on its proprietary, PeopleTools architecture.

Corporate deployment of ERP to smaller organizations. Companies that have deployed a corporate administrative system (for example, for human resources and finance) in principal geographical headquarters are looking to deploy the systems on a wider basis, allowing faster, and better rollup of administrative and other business information. However, the challenges are significant, as the lower-tier ERP vendors don't have the breadth and depth of top-tier vendors and these are not reasonable in pricing to install.

Corporate consolidation to ERP solutions from one or two vendors. Companies that have adopted different ERP systems over time from multiple vendors or have acquired multiple ERP systems though acquisition are revisiting these systems with an eye to having only one or two. Integration requirements and common business processes are driving this consolidation.

Vendors embrace enterprise portals to improve employee access to and use of ERP. Single-system logon and access are becoming important

as companies try to consolidate the user desktop and provide role-directed access, including security.

Top-tier vendors kill the smaller players. Vendors in the low and middle markets are seeing increased competition from the traditional top-tier vendors. This is putting strong financial pressure on them as they try to compete.

ERP Vendor Consolidations

Recent consolidations in the ERP vendor domain are:

- Oracle–PeopleSoft
- Lawson–Intentia
- SSA Global–Baan
- Infor–Mapics
- Epicor–Scala

The future direction of ERP will have SOA embedded in it. The following trends are worth considering:

- Integration of heterogeneous applications across multiple platforms
- Modular components within suites
- Market transformation to standards-based architecture

SAP has released a platform called NetWeaver that is a middleware stack that provides SOA. SAP Calls this Enterprise Services Architecture (ESA). ESA provides—process integration, component arbitration, service based integration in a flexible, open-standards based middleware platform. This is called the 'Applistructure'—a platform linking ERP with infrastructure.

What will all this mean to an ERP customer? ERP is moving towards a new symbiosis of applications composed on a flexible infrastructure platform with the following facets:

- Message-based integration—simple and easier connections using standards
- Lowers maintenance and integration costs

- Components—more flexibility
- Assembly of industry-specific and process-oriented solutions (e.g., order-to-cash)
- Fewer vendor choices but more deployment options
- Architecture transformation—major upgrades may be required within five to eight years. So be prepared.
- Business process platforms that allow time-to-process effectiveness happen in a matter of days.

Major ERP Players Setting the Trend

SAP

SAP is the leader along major application vendors in moving to SOA, with its NetWeaver platform. ESA represents the service-enablement of the ERP application.

- NetWeaver is the middleware platform
- Business-process platform is the unifying marketing umbrella
- Timetable for completion is 2007
- Core ABAP code will be retained, not a total rewrite but open to Java and .Net and very flexible

Codes need not be written—they get generated automatically—as you configure the process. This is like magic but a reality. SAP has a great vision about a business-process driven ERP architecture.

Microsoft—Great Plains and Navision ERP

Microsoft has a project code named—Green for ERP of the future

It has the following components:

- Well-publicized, next-generation application strategy announced in 2002

- Features .NET-based SOA and process-centric design
- Promises greater flexibility and openness
- Will converge five product lines into new code base
- Transitional strategy based on:
  - User interface alignment within existing products
  - Technology-infrastructure alignment
  - Conversion to .NET-based processes

Meanwhile, existing products are being enhanced and supported at least through 2013.

Oracle

Oracle with PeopleSoft is a strong challenger to SAP. Oracle has a similar—'me too' strategy (SAP NetWeaver) on integration platform. Oracle calls it—'Project Fusion'.

Oracle's Project Fusion announced in January 2005 features:

- A J2EE-based SOA
- Components and data hubs
- Platform independent, but leverages Oracle middleware, and database technologies
- Transition to Fusion middleware in the next release of products

Opinion by Experts

- Stay current on releases to keep migration options open
- Consider alternatives on older, customized products
- Consolidate disparate ERP applications
- Improve reporting capabilities
- Negotiate to reduce maintenance costs
- Use web services for integration, but wait for proof-points on business flexibility

Sometimes it is better to be one step behind strategy, especially in ERP. It is better to wait for proof of concept and then move on to a new ERP platform strategy. But can you be one step behind strategy? If you don't want to be part of a vendors ERP strategy—it may be a cautious approach but you cannot afford to be a observer when all the action takes place. You have to be a player otherwise you miss the bus.

Key Considerations for a Future-proof ERP

Here are some thought starters

Flexibility is the key for growth and survival. You need a flexible ERP to compose and re-compose your business processes rapidly to stay ahead of the competition.

Case in point. A large European telecom company started a huge project to consolidate the billing process. They wanted to offer a differentiator to a customer—a single unified bill for—wireless, wired, internet and satellite usage. This project ran for 30 months and consumed millions of dollars, and man-hours in development.

Things changed overnight. The marketing decided to offer VOIP—internet bandwidth package that enables a customer to use all the services in one package, for US$99 and one can buy this over the internet by swiping your card. The bill is a single-line debit of US$ 99.

The unified billing project was closed. This is a clear case where one single business-process innovation can kill a million dollar project based on wrong or outdated ideas. It is better to take a look around and listen to experts and make your own judgments. The key point is stay current and build a flexible ERP with SOA. That is the future.

Web Services and Business Process Platforms (BPP)

Web services are the most talked about item in the last 12 months. Web services means—you are able to describe your business elements—

customer, supplier, partner and transaction in a common set of grammar and offer services over the web.

But that is not good enough. Web services indeed provide flexibility but are not enough to reconfigure and re-compose your business services. Now what? BPPs are offered by ERP vendors that provide configurable enterprise services.

Applistructure

Applistructure means application infrastructure. This means your ERP will be coupled with IT infrastructure in a manner that you draw application services from ERP and infrastructure services from your IT platform (middleware) which is based on standards. This provides for a tight integration of your middleware with your ERP system.

Compliance

Compliance to corporate governance, legal and country-specific regulations such as SoX will have a major impact on ERP decisions. Large to medium size companies look for ERP solutions that has an in-built compliance manager—such as Management of Internal Controls (MIC) framework of SAP which is a compliance management tool. Compliance will drive toward consolidation of ERP, most are cases of single-instance ERP, ERP upgrades, minimal customization, better reporting and analytics and process consistency for internal controls. The best practices for compliance in ERP will be:

- Consolidation of like-systems
- Process consistency
- Centralization or outsourcing
- Compliance culture
- Content or records management
- Automated compliance process
- Enterprise risk management

The business benefits of an ERP compliant to regulations are:

- Faster close and reporting
- Control and efficiency
- Economies of scale
- Integrity and accountability
- Reusable knowledge
- Lower compliance costs
- Fewer surprises

Companies will look for automated compliance tools within an ERP framework and its inherent process controls will be the key to success in a regulated environment.

All major ERP players such as SAP, Oracle have a compliance manager tool that is an add-on to the ERP application. In addition to this, continuous monitoring tools are available to add better control environment and data assurance.

Complete Solution

The ERP of the future is not about breaking a solution to manageable pieces or point solutions. It is about taking different pieces and recomposing smart business processes. Composite Application Frameworks are re-defining the ERP systems.

1. **Process execution times are reduced from weeks to minutes.** For example, the process of order-to-cash—sales order—delivery-shipping-invoice to entry in P&L and balance sheet takes place at sub-seconds—200–400 mill-seconds, thanks to an integrated ERP. This is called time to transparency—the time it takes for a process to put an entry in P&L and balance sheet.
2. **Product lifecycles are reduced from years to weeks.** Thanks to an efficient ERP, you can achieve great operational efficiencies in procurement, sales, order management, production planning and logistics. Product launches can be done in a few weeks by putting together a New Product Launch setup in the ERP system.

3. **Change-management and process-build times are reduced from years to months.** This is the biggest challenge. The time taken to change in an organization, to put a new business process in place is the most difficult job if this has to be done in a few months. For complete implementation ERP systems take several months to years. To introduce an innovation fast, before it gets copied is the biggest challenge and a key differentiator. The invention—innovation to implementation cycles are getting shorter and shorter thus posing a major challenge to an ERP system's ability to handle changes in business models and processes. For example, most of the enabling and mission critical activities are performed by ERP's today in many organizations. Many organizations are outsourcing non-core activities to BPO companies. This means the layer processes (that are outside the core processes) get done outside. This leaves many companies with a core that is not easy to change. Ability to re-wire an ERP is the major requirement to gain competitive advantages.

Case in Point

A smart mid-size computer peripherals manufacturer in the US found a way to re-wire their business processes to gain 20% market share in 18 months. It looks like magic. Every Monday morning they used their ERP to send requests to all suppliers—what can you sell cheap today? They bought all the cheap excess inventories and built computers in a week's time. Then they put the computers in an auction to sell thru their internet stores. This worked like magic because they offered to customers the best configuration PCs at the cheapest possible prices. They gained 20% market in 18 months before the competition could realize what hit them.

This is a case study where an innovative business process is used to create growth and market share. This is done by taking a standard business process and composing a new business process with great speed. That needs a flexible ERP and ESA.

One large apparel manufacturer in Europe had outsourced apparel production to around 1000 Chinese apparel manufacturing companies.

The whole company started working only in managing 1000 Chinese suppliers, i.e. issuing Purchase Orders (PO), payments, amendments, clarifications etc and could not achieve the objective of focusing on business and customers. They wanted to solve this by consolidating all purchase orders and issue one single PO. This was achieved by configuring their ERP with one PO to many suppliers. They consolidated the master data of suppliers, and standardized invoicing and outsourced the rest of the process to a third party company. This was done to break the single PO to multiple POs on 1000 Chinese suppliers, and manage logistics and payments. This resulted in saving millions of dollars and better customer deals.

SOA—Service Oriented Architecture

The power of emerging SOA is hard to ignore. They make it easier to implement radical, near-term changes to business practices at the local level—changes that can lead over time to radical changes in overall business practices and structures. That is the essence of radical ERP incremental approach, and of good strategy.

Getting there from here!

SOAs are in the first stages of emergence; the current deployment of web services technology is a promising early initiative in this direction. In particular, the foundation standard—the XML—provides a major advance by creating ubiquitous standards for presenting data, and for defining the interfaces that loosely coupled connections require. But other standards and protocols for SOA particularly, standards and protocols relating to security and management of business processes, will have to become more robust before they can fully support mission-critical, long-lived transactions. Even for companies that have started to focus on SOA (such as Eastman Chemical, General Motors, and Merrill Lynch), these additional emerging standards and protocols remain largely conceptual. As of now, the use of web services technology tends to be very limited in scope and targeted at a specific area of a business.

However, early implementation is creating optimism about the business appeal of these architectures, which can not only provide much greater flexibility in supporting operations but also be put into service in a more incremental fashion than previous generations of IT architecture. Each stage of implementation can be geared to specific business initiatives and, with relatively modest investments and short lead-times, deliver tangible business value. SOA thus represents an inflection point, shifting enterprises from rigidity to true flexibility and also leveraging vast resources.

Companies don't need to shift their entire IT architecture or remove existing IT resources to enjoy the business benefits of a SOA. They can begin with a focused effort to support specific initiatives.

SOA Defined

SOA is fundamentally a design philosophy. This exposes business functionality and information of an ERP application as encapsulated services, and use these services whenever that functionality or information is needed. But the impact of SOA is in the opportunity for IT to address the constraints that have hindered its support for business: increasing flexibility for business change, enabling multi-channel access to business functionality, and positioning for closer coupling between a firm's business processes and those of its customers and suppliers.

SOA on a Supply Chain Application

A simple example of defining the boundaries of an SOA application might be a supply chain solution where an enterprise creates new service interfaces for suppliers to update their order status. The new services may easily be viewed as simply another part of the supply chain application, managed and developed by the supply chain team. The new services are used to enhance existing business relationships, so the same business unit pays for both the new services and the supply chain application. The IT operations team has new infrastructure to manage,

but it, too, can treat the new services as part of the supply chain application. In this example, SOA has not materially affected the definition of the supply chain application or the planning and management activities for it.

SOA will Change the Traditional Definitions of 'ERP Applications'

In discussions about SOA, the concept of an application goes away. Instead of thinking of ERP, the CRM and the billing application, IT department will simply create an amorphous body of business services that are assembled in many different ways. As the contention goes, with such widespread and intermingled sharing of business services, there are no clear boundaries to delineate where one application starts and another stops, and thus the concept of an ERP application ceases to be a useful way to think about business solutions.

While there is a certain level at which this line of logic holds together, a closer look shows that IT still needs the concept of an ERP application for purposes of planning, managing, and delivering business solutions. However, IT must now work with multiple definitions of 'application,' depending on the purpose of the discussion and the structure of a firm's SOA-based application assets. These various definitions come together in the notion of composite enterprise applications, which integrate groups of SOA-based assets into a working business solution.

SOA Restructuring ERP Applications

SOA divides ERP applications into two dominant layers: the interaction layer and the business services layer. Each of these layers is further divided into separately usable modules.

The interaction layer provides for business optimization by allowing each business process to have its own-targeted user interface designed for its specific contextual needs. The business services layer provides for business flexibility and IT efficiency by allowing a unified, consistent set of business capabilities to be used where, when, and how they are needed for any business process.

Both layers are designed in accordance with the business processes they serve, and they may use declarative business process specifications to increase flexibility and speed of change.

SOA and ERP Vendors

ERP applications will bring services into your IT environment. The software suppliers, major ERP application vendors like SAP and Oracle, as well as many smaller ones, are vigorously incorporating SOA into their product plans. This enables them to unify their products under a single architecture, and to make it easier for their customers to change their applications and incorporate new offerings.

Application developers will slip SOA into their software deliverables. Among technologists, SOA has tremendous mindshare. The platform and tools these vendors work with are building SOA functionality into their products.

Unmanaged SOA will yield the same morass ERP already confronts. Without a plan, there will likely be a proliferation of incompatible services, duplication, and redundancy rather than sharing of common services, a one-off technology and infrastructure choices—all the issues that ERP already recognizes. SOA adoption must be planned if its benefits are to be realized.

SOA challenges basic IT assumptions. SOA changes the definition of an application. An application has been a somewhat self-contained combination of business logic, process, and data on its own platform with its own user interface, but now an application will be an assembly and orchestration of business services, service composition, process engines, and user interface modules. The concept in IT of who owns what, change, funding, change control, operations, portfolio management, etc. is a daunting list. Business solutions will be comprised of services that might be shared across business units or sourced from partners in a business process.

ERP Business Portals

Corporate portals must connect us not only with everything we need, but (also) with everyone we need, and provide all the tools we need to work together. This means that groupware; e-mail, workflow, and desktop applications —even critical business applications —must all be accessible through the portal. Thus, the portal is the desktop.

—Gerry Murray, Director of Knowledge Technologies, International Data Corporation

Portal is a term derived from the Medieval Latin word 'Porta' that means city gate. A portal provides access to a city or a church. In the world of ERP, portals are the gates to access web content and applications. Portals are not just gates to information.

They involve not only bundling information and applications, but also the targeted processing of decision-making documents so that employees, customers, suppliers and partners can make optimal decisions and transact business over the web.

ERP has changed and expanded to accommodate portal strategy. ERP's enabled mapping and optimization of processes within a company, with the use of one comprehensive package. Portals characterize the ability to map processes between companies, facilitate information flow among employees from widely separated locations, combine information from various sources into one uniform interface and realize seamless collaboration between several applications.

Portal Best Practices—in a Nutshell

- Organize structured and unstructured information
- Ensure that content is current and relevant
- Put the data into a context that is meaningful to the user
- Build an enterprise information portal that allows for user-friendly navigation to relevant, context-sensitive, dynamic information
- Supplement appropriate people processes to create dynamic communities of practices with the goal to increase revenue and decrease cost

ERP Business Portal Strategies

To simplify the current ERP environment and improve productivity, the portal will provide seamless integration across all company assets and resources. It will allow staff to quickly find the information needed to do their jobs. All necessary tools will be provided to perform business processes and transactions. And most important, self-directed orientation and training will be available to allow for just-in-time learning and knowledge creation.

The portal will be built using technology to authenticate, authorize and personalize information for the user. Authentication and authorization will allow users to log-on once to the ERP system and have seamless access to all applications and resources required to do their job. The personalization layer will customize the portal contents to dynamically link users to tools necessary to do their job at that moment.

Critical to the portal's success is the creation and maintenance of easily accessible content that is dynamic and relevant. The content must provide end-users with information that helps them determine what to do, how to do it and, when possible, guides them through the process online. The self-service model for example in an university E-portal has the potential to allow the university to economically meet the increased demands on administrative resources associated with anticipated student and faculty growth. Leading companies like Cisco systems have achieved growth of 50 percent a year through better use of self-service technology. In fact, Cisco attributes its strategic advantage to the self-service model that allows all constituencies doing business (or potentially doing business) with Cisco to operate directly with the company without requiring an intermediary.

To maximize the usefulness of the business portal, users will personalize their entry point to make content meaningful and relevant to their individual job requirements. Alternative paths to the same destination will provide maximum guidance to entry-level users. Expert paths will provide minimal guidance to experienced users allowing for faster transaction processing and information retrieval. For example, Cisco's corporate intranet is designed for customization to communities

of interest (e.g. new hires, accounting staff, service engineers, etc.), and dashboards list information by organization and topic, providing multiple paths to navigate to the same destination.

The quick launch strategies are:

- Develop a portal model that migrates from static web pages to a database-driven environment with links to ERP systems and ERP data warehouses
- Develop a prototype business portal template, based on best practices in industry, for adaptation and use by employees, vendors and business partners
- Deliver consistent content for core business applications to employees via the business portal
- Develop a navigation model that allows new employees quick and intuitive access to integrated business information, transactions and online training

A portal thus enables:

- Integration of customers, employees and business partners
- Integration of structured and unstructured information
- Integration of business processes
- ERP portals also enable integration of CRM, SCM and business information warehouses into a single unified platform.

First, the portals do more than use web technologies to provide information and access applications. They unify the information and applications of many disparate Legacy and partner systems so that users can work from an integrated interface. Portals tailor information and applications to the needs of users to enable them to configure—role based information. The users are not required to expend considerable energy and time creating configurations themselves.

Portals integrate structured and unstructured data from internet, a company's intranet, and other applications such as ERP into the portal environment that is most conducive to supporting the users' productivity.

Portals in an ERP environment help users find, organize, and access information efficiently and effectively.

Portals build an integration platform for users; the actual technical components can hide behind the portal platform. A portal can help user-oriented success factors for an application, such as usability, look and feel and increase the acceptance of an ERP application that are critical to a company's success.

Portal approach makes it much easier to exchange applications and the information contained in such business applications. Laborious product training and complicated installation procedures to install the front-end onto employee's personal computers are no longer needed. Even non-web enabled old Legacy applications can be integrated with a portal framework.

Portals make the applications available to customers, vendors and partners instantly with secure connections. This makes enormous business sense and lightens the load on system administration and IT overheads.

Portals create a consistent and context-sensitive access to web services—the technology of the future. In terms of technology, web services consist of a structured, uniform and content rich question–answer protocol that by its very nature does not include a user interface. A Java server page or an active server page can be written quickly; however, if a web service were to run alone in a web browser, the JSP or ASP has to handle all the context information and menu prompts itself. A portal can handle those tasks very efficiently thus making it the generic Graphical User Interface (GUI) of the future.

There are many Portal vendors who claim Plug and Play features. But the reality of such a Plug and Play portal is several years away. This complexity is due to the heterogeneous features of IT infrastructure of many medium and large companies.

In the world of web services—a portal installation consists primarily of configuration procedures that can be left to technical people. But various information sources, contents, applications must be adjusted or tweaked to fit the ERP portal which can be a considerable effort that

requires involvement of users and business managers. The critical precondition for a portal is that the company that wants to implement it should clearly identify to whom the specific content be made available and who should make the decisions regarding IT support. That makes it necessary to re-adjust or re-compose business processes and structures. Technical, operative and even cultural hurdles must be overcome. Portal security is an integral part of portal success: without appropriate security measures, an ERP portal poses a very high risk for the company—the risk of offering on a platter data to any internet hacker or a disgruntled employee.

ERP Business Portal User Benefits

Business portal users will experience a number of key benefits:

- Flexible method of finding useful information, allowing for greater productivity and fewer transaction errors
- More accurate data available for management reporting along with better-standardized reporting templates
- Online tutorials and navigation reducing the need for conventional training courses
- Workload will be reduced as more transactions are automated using workflow tools
- Over a period, the system will become more userfriendly and personalized as feedback is collected from the user

Overall, employee job satisfaction should improve, resulting in higher levels of retention. New staff will acclimate to ERP application systems more easily and learn how to do their jobs faster. In the long term, integrated business portal should lead to lower costs of doing business and at the same time, provide a more consistent level and quality of service. The portal will also provide access to shared information and knowledge fostering a sense of community that promotes better communication and collaboration among employees, vendors and business partners.

CHAPTER 15

Best ERP Case Studies

There is nothing wrong with learning from others' experience—It's a lot easier and cheaper to learn from others.

—Jeffrey Pfeffer and Robert I. Sutton

The rules of the military are five: measurement, assessment, calculation, comparison, and victory. The ground gives rise to measurements, measurements give rise to assessments, assessments give rise to calculations, calculations give rise to comparisons, and comparisons give rise to victories.

—Sun Tzu, The Art of War

A company can take either of the two approaches to ERP. One, buying all the software modules from one vendor, gives you the benefits of integration. The other approach is to buy each module from the vendor with the best product, the BOB tack. In the current wave of adoption, the ease of integration has led to a lot of manufacturing companies to go with a single vendor. As more standards evolve to represent business information in a formal way, the use of different packages will become more feasible.

Another consideration is how much customization you do to the ERP system. Some packages let you customize in such a way that, as their new updates come along, your customized work will still function. In

other cases you'll be constantly reworking your code to adapt to their new version. It's part of the revolution in component software, to make it easier to separate and maintain your customized modules without having to spend a lot, every time, on a new version of the ERP system that comes out. In short, Sun Tzu's advise can find a practical application here—measure and assess ERP requirements, calculate costs, risks and critical successes factors, compare processes and case studies of how great companies executed their ERP systems, and then, victory is assured.

Why Case Studies

There is nothing wrong with learning from others' experience—vicarious learning, as contrasted with direct experience, is an important way for both people and organizations to learn how to navigate a path through the world. After all, it is a lot cheaper and easier to learn from mistakes, setbacks, and successes of others than to treat every management challenge as something no organization has ever faced before.

—Jeffrey Pfeffer and Robert I. Sutton, essay in HBS Working Knowledge

So benchmarking using a case-study approach—using other companies' performance and experience to set standards for your own company—makes a lot of sense when you are investing lots of money in an ERP system. In the end, good or bad performance is defined and measured largely in relation to what others are doing. The logic behind what works for top performers, why it works, and what will work elsewhere is very important while studying success stories. There are problems in that, as companies often have different strategies, competitive environments, and business models—all of which are trying to adapt different methods for success. This is true particularly for companies that borrow practices from other industries, but is often true for organizations even within the same industry. But the benefits of such an approach in an ERP situation are valuable.

This best case-study collection is only a selection based on specific analysis. Many worthy candidates are available in the case study repositories of SAP, Microsoft ERP and Oracle–PeopleSoft combine. These are some of the best case studies that give more useful insights to a CEO or CIO, or a consultant with practical examples. It's not just a

compilation of case studies from ERP vendor websites. These are well researched and presented from an implementation perspective.

Technology has that magical quality of turning strategic vision into reality. It would be naïve, however, to assume that great companies are built on technology alone. No. Great companies are characterized by the way they embrace technology to transform information management, enabling their business strategies to come to life. These industry powerhouses are also renowned for their excellence in execution of certain fundamental principles.

Great companies spend a good deal of time simplifying their businesses. If your business is complex, chances are you will lose control. Although simplifying a business is by no means a simple task, it is a crucial process.

Technology infusion is the only way a complex business can be simplified. Besides cutting back on the number of business processes within a function, or across business ERP solutions align and integrate these processes.

These enterprise applications work together seamlessly to streamline every area of a company's business—from sales, service, and marketing, through financials and human resources, to supply chain and manufacturing. ERP is the fastest path to high-quality enterprise, bringing the company a true, 360-degree view of finance, customer, and supply chain.

The case studies in the following pages exemplify this transformation. So read on to find out how:

- Compaq (now part of HP) reduced product cycle-time to reduce costs and improve bottom line
- Microsoft is powered by SAP ERP and how it saved $20 million
- Alcoa saved $400 million by a single-instance Oracle ERP implementation
- Australia's MBF uses e-business intelligence to support growth and diversification
- More world class ERP case studies will leave you with some key insight and learning

Compaq Conquers Cycle Time Using SAP

Compaq (now HP) used SAP to simplify the business processes and reduced product cycle-time to achieve tremendous business advantage and cost reduction.

Probably nowhere has the product cycle shrunk more than that found in the PC industry, and the changes caused by a shrinking time to market are an indication of how other industries will also be affected. In this situation, a better flow of digital information does not simply make things better but, rather, is a requirement for success.

In just a few years the product cycle for Compaq dropped from eighteen months to twelve months. By late 1998, it dropped to six months for business products, and to four months for consumer products. But with its older information systems, Compaq required forty-five days to roll up its worldwide sales information into a single set of numbers that it could use to complete its product planning. By the time it could communicate its manufacturing needs to suppliers, the company would be halfway through the four-month lifecycle for important products. In an industry in which cycle-time is king, the company needed dynamic planning to remain competitive.

Compaq implemented an ERP system, using SAP software as the base. In manufacturing, a good ERP system tracks the way the enterprise is operating each day and gives business managers the ability to control the way the manufacturing system responds. ERP at Compaq enhanced its ability to accurately schedule production, fully utilize capacity, reduce inventory, and meet shipping dates.

Compaq started ERP projects several years ago when it had different financial and planning systems in geographies and factories around the world. Compaq now has all its factories on SAP, including the factory that came with the acquisition of Tandem, and thirty-nine of Compaq's forty-six sales subsidiaries worldwide. In parallel, Compaq has implemented a planning system for production that consolidates supply, demand, and manufacturing capacity into one data warehouse sourced primarily from SAP.

This consolidation gives Compaq worldwide consistency of all data needed to plan sales and manufacturing. As Compaq has considered systems, it has shrunk its forty-five-day planning cycle to a weekly planning cycle. Generally, a week's worth of sales information is necessary to get a real snapshot of the market for long-range sales planning. Compaq continues, though to drive down its manufacturing cycle. It is now approaching daily 'pull' capability to schedule materials from suppliers. Soon it will drop to a shift-oriented (eight-hour) pull schedule and ultimately to a four-hour-pull schedule.

While shortening its regular planning cycle, Compaq is also implementing real-time systems to enable it to react to unplanned stages in demand. Using the same data sources, the company wants to take a separate snapshot three times a night, eight hours apart—at midnight, respectively, for the United States, Europe, and Asia—of information about its supply capability and committed order position. With real-time data instead of week-old or day-old data, Compaq wants to be able to see and react to, say, an unplanned order for 7,000 desktops, and work with suppliers to determine instantly whether the company can get all the critical parts and deliver on the order.

To develop this kind of corporate reflex, Compaq is moving its existing Electronic Data Interchange (EDI) systems to the internet, using protocols and standards. Where the complexity of the EDI system limits response to a weekly interval, an internet-based, e-commerce solution offers the company the ability to develop an event-based, real-time response with partners. When an order comes in, the supplier can see the new demand on the extranet, at the same time as the Compaq planner.

John White, who was CIO at Compaq for more than four years through 1998, likens Compaq's installation of its ERP system to changing the wings and engines of a jet in flight. You have to keep the enterprise running even as you install the new systems. While Compaq was making the transition, the company's revenues grew from $7 billion to $35 billion, and it absorbed Digital Equipment Corporation. The latter had just begun its own conversion to SAP with a slightly different approach.

White recommends that a manufacturing company put in the entire ERP package in one area, which could be by sales, geography, or sales

subsidiary or by factory. Put in the complete portfolio at one go rather than disrupt an organization repeatedly to install purchasing, financing, manufacturing, and planning one-by-one.

Business @ The Speed Of Thought —Bill Gates

Case Study—Microsoft

SAP: ERP Software that Saves Microsoft US$ 20 Million Annually

The Problem

- Too many systems and too little integration
- Too many expenses and too many administrative headaches

These were the primary forces that motivated the executives at Microsoft to find and implement an integrated ERP solution. SAP R/3 provided a scalable, three-tier client or server infrastructure that offered broad and integrated business functionality.

Customer Profile

As the worldwide leader in software for business and personal computing, the vision of Microsoft is to empower people through great software—any time, any place and on any device. Employing more than 55,000 people, Microsoft had revenues exceeding $25 billion, for the year ending June 2001.

Situation

Microsoft's tremendous growth rate was straining its financial, operations, and human resources support systems. Microsoft needed an effective ERP solution to increase efficiency and reduce operating costs.

Solution

SAP R/3, a scalable, three-tier client/server infrastructure that offers broad, integrated business functions.

Benefits

- Provided accurate, global, real-time information to enable managers to make faster and better-informed decisions.
- Consistent month-end closings in four to five days, instead of up to four weeks.
- Savings of over $20 million per year in reduced procurement costs.
- SAP R/3 uses scaleable, multi-tier client or server technologies and provides for highly efficient communications between servers and client systems around the world.
- SAP R/3 offers long term potential for future development because of SAP's commitment to investing in new technologies and new functionality.

Situation

Before Microsoft began implementing its SAP R/3 solution, the company's tremendous growth rate was straining the systems supporting its business. More than 30 separate systems supported the company's finance, operations, and human resource groups alone. Based on divergent platforms, the systems communicated through a complex series of costly custom interfaces. Batch processes moved information among systems, but as the company grew, the window required to run the batch grew as well—to more than 12 hours.

Microsoft executives realized that the corporation needed a new global and integrated core business solution. Such a solution would help in reducing internal operating costs and improve manager's access to decision-making information while enabling the company to keep pace with and support its growth. The company would be able to capitalize on new business opportunities while making the links between Microsoft, and its customers and vendors more efficient and effective.

Several business groups drove the development of requirements for the solution. In the early 1990s, the primary goal for Microsoft's corporate finance group were to simplify and consolidate. The group wanted to

bring together multiple systems into a single, worldwide chart-of-accounts.

The finance section also wanted to standardize corporate taxonomy and processes for finance and procurement, particularly in the areas of general ledger, fixed assets, purchasing, accounts payable, and accounts receivable. The solution had to be able to handle currency, language, tax, statutory requirements, and regional needs of many countries. The existing environment posed a different set of challenges for Microsoft's Corporate Procurement Group. Until 1996, Microsoft relied on dozens of applications for procuring goods and services. The process was slow and costly, as well as prone to human data entry errors. High-volume, low-dollar transactions represented 70 percent of Microsoft's corporate procurement, but only about 3 percent of the total accounts payable. HR group had its own set of functionality requirements for the new system, driven by the need to provide more accurate, timely, and consistent corporate head-count information. Also, the HR wanted to increase productivity and efficiency of users through streamlined processes and better decision-making tools. Finally, HR wanted to bring its benefits application into SAP to replace a no-longer supported application, and also to bring its payroll back in house.

Solution

Microsoft chose SAP R/3, running on the Microsoft Windows NT Server operating system, with Microsoft SQL server as the database engine. Starting in August 1995, the core and extended teams worked closely with Deloitte & Touche to implement the core SAP financial modules for Microsoft. Within seven months, the Microsoft team went live with the procurement and payables aspect of SAP R/3 MM and FI modules. Then the SAP-based GL system for corporate finance and the Microsoft Canada subsidiary were added. During this same timeframe, Microsoft implemented MS Market to enable employees to create and submit requisitions online for purchasing materials and services. MS Market is now available in 56 countries and handles more than 400,000 transactions worth $6 billion a year. Microsoft employees use this application to

complete 99.8 percent of their requisitions. Within 19 months of the initial team-planning meetings, the financial system was in place in 15 subsidiaries worldwide. Microsoft had moved off many of its Legacy financial systems, and managers were reaping the benefits of access to real-time data, in a single database. By the end of March 2000, more than 60 subsidiaries worldwide were to live on SAP financial solutions that are customized to meet local language, currency, and statutory requirements.

As the success of the SAP financial module became apparent, managers' running-order management systems were eager to move their systems to the SAP environment. All Original Equipment Manufacturer (OEM) hardware, packaged product, retail licensing, and programs systems were moved to SAP. Microsoft replaced Legacy systems with SAP SD and MM modules. This move ensured the compliance of the Y2K-year 2000 for sales and distribution systems. It also ensured a more configurable, tightly integrated system for the entire organization.

In June 1999, Microsoft began implementation of the SAP BW. Microsoft SQL server Online Analytical Processing (OLAP) Services and Microsoft Office XP web components allow valuable BW information to be analyzed with ease in native Excel pivot tables. BW extracts purchasing, accounts-payable and general-ledger data along with the associated master data for reporting. This creates the key reporting data for the corporate procurement group. Microsoft employees use an internally developed front-end reporting tool, called MS Insight, to access pre-defined reports. This application enables employees to view standard reports or develop and save custom ad hoc reports, working in a familiar spreadsheet environment.

By consolidating the SAP HR module, Microsoft was able to integrate HR and finance data to support head-count tracking and reporting. In all, 23 separate HR systems were replaced, and more than 25 systems interfaces were eliminated. More than 37,000 Microsoft employees worldwide could access their HR data through the Personal Data Tool application, a self-service web application linked to SAP HR that enabled employees to update personal information, such as their work location, address, and emergency contacts. Employees and managers could also access HeadTrax, an easy-to-use web-based application.

Developing Internet Tools

At Microsoft, executives decided to streamline several of its businesses, HR, and Application Support processes. To that end, Microsoft developed simple internet-based, bolt-on tools that link directly to R/3. These tools have increased efficiency and reduced cost remarkably. They provided Microsoft with over $20 million in annual savings. A brief discussion of the major tools developed follows below.

- **MS Market**— In many cases, the accounting process that low cost requisitions set off was complex and far more expensive than the goods or services purchased. With a combination of SAP R/3 on the back-end and custom-developed web applications on the front-end, Microsoft was able to rework the related procurement process. MS Market linked all employees directly to vendors who were authorized to provide goods or services. All employees could order up to $1,000 worth of office supplies, catering, books, and hardware products. (Items valued at more than $1,000 required manager approval before the requisition could be sent to the vendor.) MS Market processed more than 8,000 orders each week. This tool reduced purchasing costs substantially. Moreover, the sole-source agreements Microsoft had with selected vendors allowed the company to obtain discounts. And with the payments set up to take place automatically on a monthly basis, Microsoft could negotiate further, early-payment discounts. In addition, MS Market alone could eliminated the need for 26 full-time procurement positions.
- **MS Invoice**—This tool, available in the US and seven other countries, enables company-approved vendors to quickly create, validate, and submit an invoice to Microsoft electronically through a web-based application. A vendor could submit invoices directly to the company over the internet. By eliminating the paperwork, MS Invoice could reduce invoicing costs in the US from $19, per paper-based invoice to less than $2, per web-based invoice.
- **MS Expense**—This web-based application enabled employees to submit expense reports through the company intranet using a Microsoft Excel template. It automatically routed the expense form to the appropriate manager for approval and to the expense

department. This had shortened the reimbursement cycle from several weeks to less than three days.

- **MS Inquire**—This web-based application supports end-user procurement and accounts-payable inquiries and reports PO and invoice status. It enabled business managers, employees, and vendors to check these in SAP R/3 in real-time.

Benefits

SAP R/3 has provided managers throughout Microsoft with better tools for making decisions with a single chart of accounts. At the same time, the new system reduced overhead costs—including hardware, software, and maintenance that were associated with the Legacy systems. Phasing out Legacy systems alone saved more than $5 million especially in the area of maintenance contracts. The SAP system has been designed to be very efficient over a wide area network. The system is very easy to access no matter where the user is located. And the three-tier architecture allows relatively low-cost servers to be added easily. This enables system-scale as the company grows.

Internet tools provide the opportunity to streamline business processes and eliminate inefficiencies. Self-service applications, such as MS Expense, HR Data tool, and Benefits tool, have allowed Microsoft to shift the burden of administration to employees themselves, and the company could manage without additional HR staff.

Finance

With real-time access to information in the SAP database, Microsoft could operate much faster. Instead of taking four weeks to close the books at the end of the year, Microsoft could close in eight days, and could routinely close in four to five days after sometimes. At the same time, because SAP is designed to support multiple languages, currencies, and tax and reporting requirements, the subsidiaries have rapid access to the information they need to close their books and meet local statutory requirements. An ROI study conducted by the SAP IT management team showed that Microsoft's implementation of SAP R/3 Financials paid for itself within two years.

Functional Integration

While each of the organizations that have migrated to SAP discovered compelling, quantifiable benefits from the move, other benefits arose from integration in the SAP solution that transcend the effect on any individual group within the company.

By having information for the entire workforce maintained in a single global system, business processes are more consistent and the same language is spoken between HR and finance, and between corporate and subsidiary HR personnel.

Summary

The key to the success of Microsoft's venture was that Microsoft approached ERP solution as a business project from its inception, driven by business requirements and goals. Beginning in the office of the corporate controller and filtering through the business groups, all aspects of this project had executive sponsorship. Thus the corporation could implement the changes that it needed to make, adopt new ways of doing business, and, ultimately, enjoy the rewards of its transformation.

The immediate and direct financial benefits of these re-engineering efforts are remarkable. The internal web-based applications for procurement, invoicing, and expense reimbursement alone generated an annual savings of over $20 million, every year. The long term financial and strategic benefits are even more important. Microsoft has a single, global chart-of-accounts and an integrated set of tools to support all its financial applications. This eliminated disparities and inconsistencies that existed among different financial systems. Its managers could get accurate, up-to-the-minute information from finance, procurement, HR, sales and distribution, and other areas. Support for local currency and taxation has significantly enhanced Microsoft's ability to meet local reporting requirements while facilitating overall corporate reporting. Because the company is tied more closely to its customers and suppliers, it can interact more responsively with both. This has translated into better relations, increased profits, and greater opportunities for Microsoft.

Source: Microsoft web archives

SAP at Nestle and its success

In June 2000, Nestlé SA spent $280 million to install an ERP system for its global enterprise. The strategy of the Switzerland-based consumer goods giant was to use the SAP system to help centralize a conglomerate that owned 200 operating companies and subsidiaries in 80 countries.

Nestlé USA, the $8.1 billion US subsidiary, embarked on an SAP project, code-named Best (Business Excellence through Systems Technology). Nestlé's global SAP project, which is tied in to a larger $500 million hardware and software data center

According to Nestle CIO, to date, the Best project has saved the company $325 million. Regardless of the project's exact ROI, the lessons learned are real. The primary lesson the CIO learnt from the project is this: no major software implementation is really about software. It's about change-management.

Situation

Nestlé USA, where vanilla brands represented a multitude of inefficiencies and missed opportunities. Before 1991, Nestlé was simply a collection of independently-operating brands, such as Stouffer's and Carnation, owned by the Swiss-based parent. In 1991, the brands were unified and reorganized into Nestlé USA. Technology standards meant that every Nestlé company had to follow one system under ERP restructuring systems across the empire. This created savings through group-buying power and also facilitated data sharing between subsidiaries.

On the technical side, a smaller team spent 18 months examining every bit of item-data in each division in order to implement a common structure across the company. In the case of the supply chain, the team decided not to use SAP because the ERP company's SCM, APO, was brand new and therefore risky. Instead, Nestlé turned to Manugistics—at that time, an SAP partner. Manugistics' SCM followed all the SAP standards and could easily be integrated.

By March 1998, the key stakeholders had a plan in place. Nestlé would implement five SAP modules—purchasing, financials, sales and distribution, accounts-payable and accounts-receivable—and the Manugistics' SCM. Each would be deployed across every Nestlé division. For instance, the purchasing group for confections would follow the same Best practices and data as the purchasing group for beverages.

The new SAP system allowed Nestlé to reduce inventory and save on supply chain cost. With SAP in place, common databases and business processes led to more trustworthy demand forecasts for its various products. Furthermore, because all of Nestlé USA was using the same data, Nestlé could forecast, down to the level of distribution center. That allowed the company to reduce inventory and redistribution expenses that occured when too much of a product was sent to one place and not enough to another. The supply chain improvements accounted for a major chunk of the $325 million Nestlé said it had saved from SAP.

Bottom line is to focus, first, on changing business processes and achieving universal buy-in, and then, and only then, on installing the software. If you try to do it with a system first, you will have an installation, not an implementation, and according to the CIO of Nestle, there is a big difference between installing software and implementing a solution.

Source: CIO web archives

MBF Australia: Integrating Acquisitions with E-Business Intelligence

Keeping up with Growth Demands

MBF Australia Limited (MBF) is Australia's largest privately-owned health insurer, employing around 1,100 staff, at its 80 centers nationwide. The fund's membership has grown strongly in recent years, from 636,000 in 1999 to approximately 875,000 in 2003. This growth resulted partly from government initiatives promoting lifetime health cover.

By 2002, it was apparent that MBF's Legacy COBOL-based business systems lacked the sophisticated functionality required to support the fund's strategic goals. As it pursued further growth and diversification MBF wanted to reduce costs to gain greater economies of scale. Access to key financial and corporate data was not fast enough to allow the company to respond quickly to market dynamics and customer demands. The management decided that MBF needed to upgrade its core healthcare and financial systems.

High Level Project Goals

- Modernize applications platform to improve functionality and flexibility
- Ensure faster access to data
- Reduce cost of operating, maintaining, and extending business applications
- Seamlessly integrate acquisitions

Ahead of Schedule, under Budget

MBF began its technological evolution with the implementation of Oracle RAC, Oracle AS, and the core financial modules of Oracle E-Business Suite, including General Ledger, Receivables, Payables, and Cash Management. After carrying out a feasibility study in November 2002, to identify MBF's exact requirements, Oracle Consulting completed the first phase in less than six months. The system went live on July 1, 2003, in time for the new financial year. This rapid implementation was completed with minimum risk using the standardized functionality approach of Oracle Business Flow Accelerators.

Improving Strategic Decision-making and Efficiency

MBF realized significant benefits from its move to Oracle Financials. Access to accurate and timely financial data gave the management a clearer picture of the business performance. This enabled more informed decisions to be made more quickly.

Further efficiencies were expected when the back-end system processes became fully automated by 2004–05. In November 2003, MBF deployed analytical tools including Oracle E-Business Intelligence and Oracle Balanced Scorecard. Managers were able to drill down through the data and analyze problems by division, by state, and by product. They no longer needed to call up the CFO to ask what is going on.

Ultimately, members benefited through the fund's ability to reduce costs and deal with healthcare providers and suppliers more efficiently.

Source: Oracle advertorial, *Fortune* December 6, 2004.

Procter & Gamble uses Consumer Demand Information

Consumer goods supply chains are extremely complex. They include many plants and suppliers all over the world linked by sophisticated technologies and robust logistics systems. But despite all this complexity, a single moment of truth is all that really counts: when the consumer stands at the store shelf and chooses a product to purchase.

For Procter & Gamble, one of the world's largest consumer goods manufacturer, this 'first moment of truth' has become the centerpiece for its entire business strategy called the Consumer-Driven Supply Network, or CDSN. This is a core concept as well as an operating strategy.

P&G's goal was to win at the consumer level, so the CDSN is a concept created to direct all of the activities as to what is going on at the store-shelf level, to work-off of real demand, so that P&G produces what is actually selling, not what is forecast to sell.

One way in which P&G used actual demand was to pick up scanner data at the point of sale and make it visible at the plant where it became a part of the daily production schedule.

This involved aggregation of data from systems-handling ordering, shipping and billing—into useable numbers that became the demand-field for plant systems. That demand-field drove the replenishment plans, displayed in P&G's supplier portal where they could find their way back into suppliers' systems.

P&G liked to have all of its 140 plants in 80 countries and many of its 100,000 suppliers work-off of real data, not forecasts, POs and traditional processes, but the company is a long way from that goal. For the foreseeable future, P&G's supply network will continue to run-off of an underlying flow of real-demand data that is supplemented with forecast data, promotions and other initiatives. The CDSN approach provides many tactical advantages, especially for new product launches, where the demand is based on assumptions.

Another important role for CDSN capabilities is to become an engine for volume and profit growth by creating value for retail customers. For example, P&G is using CDSN to help lower inventory, customize products and grow their business, all in a way that recognizes the value that P&G brings to them without adding cost to the whole supply network.

Technology and Metrics

P&G has a collaborative working arrangement with SAP, which the CPG company views as its primary software supplier for its supply network.

The ERP development process is R&D for P&G, which receives tools it can use to better support its CDSN initiatives. SAP gains solutions that are tested in the marketplace and that it can sell.

Source: Supplychainbrain.com

Metro Magic—ERP and Supply Chain Innovation

Reportedly the world's fourth-largest retailer, Metro operates in almost 30 countries. Its brands include the Kaufhof Galleria department stores; a wholesale chain called Metro Cash & Carry, which is set to enter Pakistan early next year; the Extra and Real food stores; the Media Market consumer electronics outlet; and Praktiker, its brand in-home improvement. Group operations are said to generate 50bn euros (about $61.4bn) a year in revenue.

Germany's Metro Group said SAP ERP, RFID, smart shelves, intelligent scales and other technologies brought efficiencies to the retail industry. But to hone those innovations, the ERP initiative was launched in 2003 with the RFID technology.

In retailing, the future is now. In fact, officials at Metro Group in Germany, particularly those in SCM, have been peering into the future since April 28, 2003. That's when the conglomerate turned one of its extra supermarkets into the so-called, Store of the Future, to test RFID and a number of other technologies in real-time and in real-life conditions. Simply put, Metro wanted to cut costs in its grocery operations, always an industry with paper-thin margins.

Its outlet in Rheinberg, not far from Metro's Düsseldorf headquarters, became the hothouse testing environment for smart shelves, RFID self-checkout systems, kiosks, smart scales and other leading-edge technology.

It hasn't been alone in the project. Supplier-partners active in the experiment included Gillette, Kraft, Procter & Gamble, and almost 40 others. Technology-partners are a stellar line-up as well: Microsoft, SAP, Intel, Cisco Systems, IBM, Philips Semiconductors and Intermec to name just a few.

Results were not kept a trade secret one would have expected. Metro hasn't been shy about sharing information on the project, even with competitors. Certain technologies and processes have been incorporated into other stores in the Metro pantheon.

So what are the results? According to Juergen Homeyer, Metro corporate's communications officer.

'Since the Metro Group Future Store initiative has several goals, a variety of metrics are needed to evaluate the success,'. The group 'formulated a RFID business case' in 2003 with P&G and IBM. The assumptions on which this study was based were checked in an extensive validation process in September 2005. Eleven Real stores, two Metro Cash & Carry stores and three [Metro Distribution Logistics] warehouses took part. Our expectations were confirmed, indeed, in some cases even exceeded: RFID and EDI result in significantly more efficient processes and lower costs, although only two of 11 steps in the process chain were taken into consideration. Projected for the whole of Germany, Metro Cash & Carry, Real and the distribution warehouses of the Metro Group could save 8.5m euros [$10.4m] annually.

Self-checkout systems, which allow customers to scan their own bar-coded selections, have been incorporated into 50-plus Extra and Real stores. Info-Terminals, which provide detailed information on products, are in broad roll-out to other group stores.

RFID may be the most important technology tested at the store; certainly, its use in tracking goods from suppliers to distribution centers to the store and then on the shelves has garnered the greatest attention. The goal has been and continues to be—to optimize the supply chain and to reduce out-of-stocks.

In a nutshell, the RFID program works like this: at the Distribution Center Intermec RFID readers scan tags on cases as pallets are loaded. Tags can be programmed at the manufacturer with a Global Trade Identification Number (GTIN) and a serial number, and most manufacturers in fact are tagging their product. Only a slim minority doesn't, or can't, leave that work to extra employees.

The data is read as tagged items pass through dock doors and at trans-shipment points. Scans of pallets and cases send shipment and inventory data to the SAP backbone used in the Store-of-the-Future initiative.

A Baker's Dozen of Benefits to Retailers

Metro officials say RFID and other technologies in the 'future workshop' make retailing processes faster, more transparent and more effective. Ordering, delivery and warehousing are simplified, and merchandise can be tracked from one end of the supply chain to the other.

ERP and RFID technology in the 'Store of the Future' improves retailing processes in the following 13 ways:

- Warehouse inventories can be monitored more accurately and replenishment orders passed faster.
- Time losses due to mistaken supplies are excluded.
- Deliveries to the Future Store will be faster, appreciably improving availability of the merchandise in the store.

- Employees will recognize faster when shelves are about to run empty—hence 'out-of-stock' will be a thing of the past.
- By means of specific devices, the whereabouts of the merchandise can be accurately located at any time.
- Inventories in warehouses and shop-shelves are becoming more transparent.
- In the Merchandise Management System, it is easier to determine at what time intervals and under what conditions goods are sold.
- Quantities ordered can be controlled more accurately as a function of demand.
- Manufacturers are in a better position to plan their production.
- Less storage space is required, which will save warehousing and handling costs.
- New types of service will increase customer loyalty to supermarket and promote sales.
- New electronic systems make price labeling better understood and more reliable.
- The store can be better protected from theft.

Source: Supplychainbrain.com—2005 GL&SCS and CSCMP

PeopleSoft Case Study—Making Young America get Better ROI

The Company

Young America Corporation is a leading provider of integrated fulfilment service for large enterprises, including HP Best Buy, Sprint PCS, and Nestlé USA. With more than 1000 employees and over $80 million in revenue, Young America is headquartered in Minnesota. The company facilitates millions of customer interactions through an integrated approach to promotion-fulfilment, teleservices, and database management.

The Challenge

Executing of promotion fulfilment is a big part of Young America's business, and home-based contractors perform much of that work. At any given time, home-based contractors make up 40–60 percent of the company's corporate workforce. Existing means for communicating with these home-based contractors were inefficient and sometimes inadequate. To get their work assignments and establish schedules was quite cumbersome because as many as 600 workers would call the headquarters' Operations Support Center, every other week. Whenever inclement weather delayed the trucks that deliver work packages to pick-up sites, the center had little hope of contacting all the workers who were affected; the home-based contractors would waste a trip to a pick-up site but bill the company for their time.

Additionally, collecting time-reports from home-based contractors was a manual and error-prone process. Every two weeks, all contractors returned their time information to Young America. The group supporting the home-based contractors then had to verify these invoices and enter verified numbers into the company's payment system. The company needed a way to increase efficiency and dependability of time-collection procedures and communication with remote workforce.

The Strategy

In late 2001, Young America began looking for a portal solution that home-based contractors could use to set up schedules, get work assignments, and report on time directly for payment.

In January 2002, Young America's CIO chose a portal solution from PeopleSoft. Other vendors were considered, only briefly, because the PeopleSoft solution presented two obvious and compelling advantages.

- Young America could leverage prior investments in PeopleSoft Financials as well as internal expertise derived from that deployment.
- The interface for the PeopleSoft portal is totally browser-based.

Freedom from client software was one of Young America's key requirements because it needed a solution that would easily reach remote contractors, would not present a steep learning curve for technologically naïve users, and would create maintenance and support burden for the IT staff. Young America assembled a deployment team composed of three IT staff, one external consultant, and two business experts from the corporate operations department. Beginning in March, the group gathered and refined requirements, installed and customized the software, and authored the training materials; altogether, the effort took 80 personnel days. In July, the group put the portal online and sent training packets out with one of the regular truck deliveries. All home-based contractors were required to begin using the portal; many of those who did not have web access at home utilized computer resources at local libraries.

Key Benefit Areas

Deploying the PeopleSoft portal has significantly increased the efficiency of information exchange between home-based contractors and Young America's operations staff. Key benefits of the solution include the following:

Reduced operations support costs. Rather than call-in to get work assignments and set up biweekly schedules, home-based contractors could now do both, via the portal. This means at least 1200 fewer calls per month to a support center that Young America had contracted for these tasks.

Reduced labor costs and avoiding miscommunication. In the past, remote workers could expect to make at least one wasted trip to the pick-up site each year because they didn't know that a truck was running late. Young America was obligated to pay them for this time. Now, the workers always know when the trucks are behind schedule.

Reduced administrative support costs. Because the PeopleSoft portal automated the manual time-collection and data entry process, Young America was able to reduce its administrative support staff by three.

Reduced payment error rate. The online time-reporting feature of the portal has improved Young America's ability to correct invalid time reports. Company representatives estimate that this change has reduced overall payment for the remote work force by at least one percent. In addition to these benefits, which have already led to bottomline returns, Young America derives two other benefits that will develop over time.

Reduced cost of development. The PeopleSoft platform gives the company an infrastructure upon which it can easily create new portal applications when new business opportunities arise. One project already under consideration is an extension of the portal that would allow Young America to deliver, without a truck, certain kinds of work directly to remote workers.

Enhanced competitive positioning. PeopleSoft supplies capabilities indicates a commitment to new technologies that give Young America an advantage when it is vying for potential customers and for labor.

Key Cost Areas

Personnel and consulting generated bulk of the costs associated with the PeopleSoft portal project. Software licenses for the portal cost $12,500. Young America also incurred a small cost printing training packets and compensating home workers for the time they spent learning the new system.

Previous investments in PeopleSoft kept Young America's costs low for this project. The deployment team was able to install the portal on application, web, and database servers that provide a platform for pre-existing PeopleSoft Financials deployment.

Lessons Learnt

Members of the deployment team at Young America say that deploying and using the portal has been a relatively trouble-free process. They believe that the small, targeted scope of the project, the internal familiarity

with PeopleSoft technology, and the simplicity of the user interface all helped limit the potential for problems. However, two small issues did arise during deployment. The team chose to use Microsoft's IIS to deliver portal pages, and getting it to work well with its web-logic application server entailed a brief struggle. Once the solution had been successfully installed, the team also discovered that the solution didn't work well with unusual browsers, like WebTV. Both of these challenges, however, should be understood within the context of early adoption. Young America was one of the first companies to deploy the PeopleSoft portal.

Case Study of Microsoft Business Solutions

The Company

The vision of North Atlantic Industries (NAI) is to become the pre-eminent global supplier of innovative military and COTS solutions that fulfill the requirements of companies in the aerospace, industrial, and defense markets. Founded in 1955, NAI was initially recognized throughout the world as a leading manufacturer of AC electronic test and measurement products. In 1992, the company came under new ownership and management. Through an aggressive program of internal product development and acquisitions, NAI has expanded its core technology base to include intelligent DSP-based board solutions and rugged military and aerospace power supplies.

The Challenge

The technology that NAI was using for managing data for ERP fell short of the needs of users in various departments. In particular, employees faced the following challenges with reporting, data access, and resource management:

Inefficient reporting. With NAI's existing system, information reporting was a cumbersome process, taking several hours for most purposes and not allowing employees to view or print subsets of data. As a result, users were unable to manage by exception, instead having to go through huge volumes of paper to drill down to specific details in a report.

Inadequate access to data about operations. Employees didn't have easy access to data needed for fielding various customer queries or for determining the time and cost of delivering upcoming or processed orders. For example, NAI staff couldn't determine the costs of fulfilling a specific customer order ahead of time, having to offer customers estimates instead.

Excessive downtime. NAI's existing reporting system would often crash, leading to an average of two hours of downtime each week, costing both the affected employees and IT staff several hours' worth of productivity. In addition, running certain processes such as MRP required users to exit and remain outside the system until the process was completed—a cycle that could take up to several hours at times.

Low Visibility Into Inventory. NAI had little visibility into the level of inventory it held at any given time and was therefore unable to accurately forecast the amount of stock needed in future—often leading to high inventory levels and costs. NAI needed an ERP solution that would allow its employees to easily run reports and access accurate data about inventory levels, materials costs, and other information they needed for making decisions and managing operations on an ongoing basis.

The Strategy

In early 2001, NAI started looking for an integrated ERP solution and considered a number of applications, including Expandable II from Expandable Software, Vantage from Epicor, Visual Manufacturing from Lily Software, and Microsoft Business Solutions' Axapta software. NAI eventually decided to purchase and deploy Axapta for managing the inventory, manufacturing, and finance operations within the company. The company selected Axapta because it was the most cost-effective solution available and it offered an open and flexible platform for future customization and integration.

In August 2001, the company began implementing Axapta with the help of two internal personnel dedicated to the project and a few consultants provided by NAI's reseller organization. In addition to this core project team, an internal ERP committee comprising staff from finance, procurement, and engineering departments met several times during the implementation to define business requirements and provide other inputs for the development of the system.

The company completed the development of the solution in March 2002 and rolled it out to approximately 40 users spread across finance, procurement, planning, accounting, and other departments by the beginning of April. NAI's internal personnel did most of the user training, although the company's consultants also spent some time familiarizing users in the accounting and purchasing departments with the application.

Key Benefit Areas

Axapta has automated reporting and various clerical tasks for different departments at NAI and sharply increased the company's visibility into inventory, manufacturing, finance, and other key aspects of operations. Key benefits of the solution include the following:

Saved personnel costs. Axapta has automated and accelerated the creation of reports, processing of orders, data entry, and various clerical tasks performed by users in different departments. As a result, NAI has reduced headcount in its sales and finance departments, and avoided the hire of one procurement buyer.

Increased user productivity. NAI has been able to greatly increase the productivity of employees in the engineering and customer service departments by enabling them to run reports, exchange data with vendors, and perform other functions in less time.

Eliminated former system. NAI has been able to retire the old system it was formerly using for reporting, order processing, and other functions. As a result, the company gets to keep the cash it would have spent on annual maintenance fees for that application.

Reduced downtime. With Axapta, employees are now saving the time that they were formerly losing because of the downtime associated with weekly system crashes.

Reduced inventory. Axapta provides NAI with real-time visibility into the need for different kinds of inventory at any given time; the company has effectively reduced costs by 20 percent by avoiding excessively high inventory levels.

Key Cost Areas

Key costs included personnel, hardware, consulting, software, and training. The costs of software constituted the largest component of project costs at 46 percent of overall expenses. Personnel made up the second-largest cost category, reflecting the costs of internal NAI staff who spent time developing the solution and conducting user training. Consulting accounted for 16 percent of total costs. Hardware and training constituted the remainder of NAI's investment in Axapta.

Lessons Learned

NAI found that it was able to improve its overall payback by leveraging the skills of its internal IT staff for developing and customizing Axapta as well as for performing data conversion and user training. On an ongoing basis, the company can continue to gain benefits in new areas because Axapta provides an open architecture that internal personnel can easily customize to meet changing business and user needs.

Source: Nucleus Research web archives, *www.nucleusresearch.com*

Alcoa—An Oracle Case study

ALCOA generates US$ 400 million savings by moving to a Single-Instance Oracle ERP

Market leader Alcoa, embarked on an aggressive cost-cutting campaign—one that relies on a software standardization effort begun in June 2000, to withstand the market's downward pressures. Under the EBS software initiative, Alcoa replaced most of its applications with a single Oracle package that's designed to handle everything from financial management to order fulfilment, to human resources. The EBS project is considered by some software analysts to be one of the more ambitious attempts by a *Fortune* 100 company to use a common set of software applications globally. At the beginning of the EBS initiative, Alcoa was running some 3,000 different software programs—from Ariba, Hyperion, PeopleSoft and Siebel, to name a few—on 1,400 servers in 510 locations.

Alcoa CIO, Rudolph Huber said employing a common applications set allows the company to more easily share knowledge, collect information, analyze business and financial performance, and improve internal processes—all of which add up to lower operating and administrative costs.

While Alcoa has shuttered some facilities and instaled more efficient manufacturing equipment on its plant floors, EBS is one of the big reasons Alcoa is meeting its cost-reduction goals.

Using software to cut costs isn't just some alchemist's dream—it can work, but it's not easy. Alcoa has encountered numerous problems including project delays and cultural resistance. The most serious technical challenge, accoding to CIO, Huber, was software stability. Alcoa brought in the Oracle software package—the 11i suite—about two-and-a-half years ago, when it was still showroom-new. And, like other companies that deployed the initial version of the package, Alcoa found itself slowed down by software's bugginess.

Alcoa also ran into resistance from business-unit staff reluctant to deviate from their usual processes and systems. While information from Alcoa's various businesses could be tied together with data-integration tools, a software platform with common definitions of data allows information to be shared quickly and easily with all of Alcoa's business managers. This cuts down on redundancy and eliminates waste. 'By having common data, we can cut and slice data to understand profitability by customer, by product, by market—which we couldn't do

if we always had different systems and different data,' according to CIO Huber.

Some of the reductions resulting from Alcoa's streamlining are hard to pin down. But according to CFO Kelson, a lot of the savings drop to selling, general and administrative expense line on Alcoa's income statement. SG&A was $277 million in the second quarter, down from $326 million last year.

'Where you really save is in the collapsing of back-office functionality—multiple divisions duplicating financial functions, purchasing functions, order-management functions,' said Lawrence Crooks, a managing director at KPMG Consulting, which helped Alcoa implement EBS.

Alcoa deployed EBS in four phases. The first two phases address finance and purchasing, and were scheduled to be completed by the beginning of 2003. The goal is to allow business units to collectively gather, and exchange financial and purchasing information so those functions can act as shared services. In the purchasing area, this will allow Alcoa to consolidate buying operations, eliminate transaction costs, and trim the number of people on the purchasing staff.

The other two phases, which the company completed by the end of 2004, cover human resources and order-to-cash, which include everything from order-management to process-manufacturing. Here, the company says using a common set of applications—particularly in order management and fulfilment—will allow it to better collect and analyze data. This, in turn, will give Alcoa the ability to better manage inventories, assets, and plant maintenance, resulting in lower operating costs and headcount.

Source: Baseline, October 2002, John McCormic, *www.findarticles.com*

Tons of ERP success stories are available in the internet. A simple Google search with the search term 'ERP Success stories' will land you with thousands of stories. The key is to learn from great ERP success stories, to repeat Sutton. 'There is nothing wrong with learning from others' experience—vicarious learning, as contrasted with direct experience, is an important way for both people and organizations to

learn how to navigate a path through the world. After all, it is a lot cheaper and easier to learn from the mistakes, setbacks, and successes of others than to treat every management challenge as something no organization has ever faced before.' So read relevant case studies, learn how your competitor implemented ERP and learn from their stories before you decide the course of your ERP journey.

Index

Author's Profile

Jagan Nathan Vaman is currently CEO of Altrion Technologies, that provides consulting and technology services to global companies with a focus on ERP Consulting and support.

Jagan brings relentless focus in converting vision in to practical services and products in the information technology space. He has extensive success in growing value at technology based enterprises by converting leading-edge technologies to growing business enterprises. In his leadership roles at Siemens, Satyam, Sify, he generated significant customer and investor value and executed several projects and business turnaround strategies at Sify and Satyam. He has helped Satyam forge a major strategic alliance with SAP AG, has helped ISG in an M&A scenario to acquire Novasoft, helped Sify to strike a partnership with Ernst & Young in the SAP Security, Audit and control practice, etc.

Jagan has over 23 years of experience in leading technology product and service businesses. Most recently, he was Vice President, Global SAP Practice at Changepond Technologies LTD, a leader in the Sports portals software and ERP services. Before Changepond, Jagan was Vice President, SAP Technical Services of Sify (NASDAQ: Sify), providing strategy-consulting services to clients in the enterprise IT, ERM and ERP security, technology services and technology-enabled services sectors.

Earlier, Jagan was Founder and Retail Practice Head, of SAP Practice at Satyam Computer Services LTD, a highly successful and fast-growing Indian IT MNC. Jagan started his career at Siemens and held several leadership positions at Siemens both in India and Germany for over 17 years and has led the IT Services SBU for the Siemens SAP implementation. At Siemens he also managed a large business division (PN) and was Regional Business head for Industrial Products division at Indore. Jagan worked at Siemens AG for two years and was part of several Siemens strategic IT initiatives.

Jagan is a CISA, Certified Information Systems Auditor, from ISACA, US; a post graduate in Management from AIM, and has received the highest professional management training at Siemens Berlin Business School, Germany.