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An Investigation Into the Ingredients Necessary for a Successful Implementation of SAP

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**An Investigation into the Ingredients Necessary for a
Successful Implementation of SAP**

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An Abstract Presented to the Faculty of the Graduate School of
Lindenwood College in Partial Fulfillment of the Requirements for the
Degree of Master of Business Administration

ABSTRACT

This thesis will focus on the impact of Enterprise Resource Planning (ERP) software applications, mainly SAP, and the impact they have on business functions and efficiency.

Businesses have been able to take advantage of improvements in computer technology to make improvements to their every-day processes and procedures. One category of software applications they can use are ERP applications. ERP's provide many advantages for companies – faster access to more reliable data with which to make better decisions, and more efficient use of company resources. These advantages can only be achieved though, if the application is produced and used correctly, which is a challenging task.

These implementations are complex processes, requiring extensive modification of company procedures, and a major commitment of employees, time and money. Upper management must plan out the project from beginning to end, considering all the options along the way. One way to make this monstrous task more manageable is by breaking down the implementation into phases: strategy, initiation, definition, transition and improvement. If this project is not planned out appropriately, tragic consequences may occur, including, failure of the system, late or missed orders and squandering the company's money and time.

The purpose of this study is to investigate how successful the integrated approach and methodology of an ERP, such as SAP, can be

within an organization. Specifically, it is hypothesized that each phase of an implementation will have a serious impact on the successful completion of the project.

Numerous case studies of previous implementations were analyzed in this study. These case studies were evaluated by the researchers to determine whether the project was a success or failure, and why. There were also interviews conducted with people who had implemented SAP, and also users of the system. These people had the expertise of doing implementations, the knowledge of how the phases effect one another and how to avoid pit-falls along the way.

Results of this analysis produced evidence that the hypothesis be accepted and to conclude that, within the scope of this study, without careful planning, the different phases of an implementation can have a serious impact on the overall success of the implementation project.

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CHAPTER I

Introduction

Today's business environment has evolved from a regional market to a national market and now it has progressed to global competition between businesses. The organizations prominent in the 1950's and 1960's were the best providers of their product or service in their region. This was achieved through research of their competition, either through direct comparison or by a one on one interview with their customers. At the regional level of competition, there were few strong rivals and rivals at a national level were practically non-existent. International competition was unheard of. Then in the late 1960's and 1970's regional organizations started to expand into other regions. Newly established interstate highways made this possible. These entrepreneurs saw interstate trucking as an opportunity for new business. As interstate transportation became more common place, many of the less efficient regional suppliers started to go out of business. Then, as the late 1970's and 1980's rolled around, most regional organizations had been forced out of business, had merged with another supplier, or had grown nationally themselves. During this time of growth, many of the newly minted national organizations discovered another threat - International competition. This was first seen in the electronics

industry where lower cost Japanese suppliers were able to take a foothold in the US through low prices and, eventually, higher quality. Many US companies were able to fend off the Japanese attack on the US market but, others were not. Many household names like Zenith, RCA and GE were forced to withdrawal from the home electronics business and, as in the case of Zenith, they went out of business all together. It took many years and the purchase of non-US manufactured electronics for Zenith to re-enter that segment. (Janah and Wilder 42)

Now in the 1990's there is a new threat on the horizon for business - information. It is now a requirement in business to have access to instant information about the business transactions. For example, the sales department needs to know how much the raw materials cost for a product, so they can provide accurate pricing for customers. Once the order is placed, the production facility needs to be notified, so they can produce the part. Accounting should also be informed about what products have been shipped to the customer and the terms of sale so the invoice can be sent to the customer. All of these transactions are important in and of themselves, but the key to competing in this global environment is the accuracy of this information and the instantaneous availability to each department. To compete in the information age in the 1990's, companies have to follow a few guidelines:

- 1) Inventories have to be low or practically non-existent
- 2) The products have to be world class in quality and price
- 3) Information is needed on the progress of the product in the supply chain, so there is the ability to shift the product from one customer to another because of external priorities of the business. (Mirchandani 46)

There are different ways in which organizations are profiting from the information age. For example, At Federal Express, they run a fleet of 40,000 ground vehicles and 590 planes. This certainly is a competitive advantage for them, but their largest advantage is the ability to give instantaneous information to their customer:

..behind the scenes – and increasingly center stage – is an equally impressive infrastructure of IT systems and electronic connections that underpins FedEx's transformation from package deliverer to strategic provider of E-commerce, logistics, and other supply chain services. (LaPolla 42)

The web tracking information capabilities pioneered by FedEx have become industry norms rather than a competitive advantage. It's now a given throughout the industry that information about a package is as important as the package itself. (LaPolla 42–43)

As demonstrated with FedEx, information is not just a convenience. Rather, it is a required part of doing business in today's global economy. Information about one's business is a top priority when attempting to make strategic decisions.

Not only are companies today struggling with the problem of instantaneous information, but they are also trying to deal with what is referred to as the "Year 2000 Problem" (Y2K). This problem started with software developed in the 1960's and 1970's. These programs used a two-digit field to indicate the year of the date within various applications. This decision was made knowing that if the software program was still being used in the Year 2000, the software program would think that it really was the Year 1900 instead. This practice was standard back then because many organizations could not foresee using the software program in the next millennium. So, to conserve precious computer memory, many organizations decided to use two digit integers to represent the year of a date, rather than four. (Bucholtz 5)

With the need for resolving the Year 2000 problem, many organizations also decided to assess their IT infrastructure at the same time. They determined that there might be a way for them to turn the Year 2000 problem into an opportunity. Some organizations decided that it was not cost-effective to install new software, so they fixed their old software programs and continue on course. Others determined that if there was a way to replace multiple out-dated software programs with one leading edge program that could integrate their data, they could turn this problem into an opportunity. Integrating the data from different systems into

one system provides many advantages. It allows the different departments in the organization to share vital information, and they can do it on a real-time, or instantaneous, basis. Many organizations looked at Enterprise Resource Planning (ERP) software packages as a tool for providing the opportunity to integrate all of the data in the organization. An ERP system is defined as:

An integrated software application that allows an organization to use one software package for financial, sales, production and other operations, and to integrate that information together in a meaningful fashion. Many of these organizations turned to SAP as a choice for their ERP system. (Block 4)

History of SAP

In 1972, five systems analysts from IBM began working together to create a software standard for real time data processing. This was the start of the ERP revolution and eventually, a company named SAP was formed: Systeme, Anwendungen, Produkte in der Datenverarbeitung (Systems, Applications and Products in Data Processing). (Cameron, Colony & Lieu 3-10) (Cameron & Woodring 1-3)

The vision of SAP was to devise standards that would allow organizations to seamlessly integrate diverse business applications within an organization. The idea came from working with many IBM clients who were purchasing IBM hardware for custom developed

applications. One year these customers would purchase a mainframe computer for a financial system, then only a short time later, they would return to purchase another mainframe computer for a custom developed production planning system. This process was a recurring event. It occurred to these five developers that if an organization could standardize on a single application for financial transactions, production planning and sales, the organization could save a large amount of money on hardware purchases. (Cameron, Colony & Lieu 3-10) (Cameron & Woodring 1-3)

This group of IBM entrepreneurs met Hasso Plattner who had a similar idea. He had the idea that if all of these systems ran on one mainframe, and shared a single database, then the integration of financial, production and sales data could be possible. Real time processing would be available too. They theorized that if an organization had integrated data, the organization could get more reliable, accurate information on a faster basis. This was based on the assumption that current 1970's technology in computer applications created islands of information that didn't necessarily tie to other parts of the organizations together. (Cameron, Colony & Lieu 3-10) (Cameron & Woodring 1-3)

For example, if an organization has three different applications. The first might be a financial application that tracked balance sheet and income statement transactions. The next, would be a sales application that tracked sales transactions and the last would be a production application that planned production. The organization would have to transfer information between the three applications in order to tie the transactions together. If this organization sold a widget in the sales system, the sales system would transfer this sales data to the financial and production systems. The financial system then transfers costing information back to the sales system, so the widget is priced properly. The production system would then initiate production and shipping. Once this is performed, the production system would once again communicate to the financial system with regards to shipment, so the order can be billed and the receivable recognized. The production system would also inform the sales system, so the sales person can access the status of the order.

This is a complex process, just to conduct a simple sales transaction. To add complexity to the situation, what would happen if the customer wanted a blue widget instead of a red one? It would require more communication between all business systems. The founders of SAP were determined to develop a software application that would run on one mainframe computer and on a single

database. The advantage of their product is the benefit of up to date data integration, plus the added benefit purchasing less hardware. (SAP 1)

The initial product developed by SAP was mainframe based and called R/2. The initial functionality was Financial Accounting and Materials Management, these functional areas are called modules. As R/2 took hold in Germany, multi-national corporations were discovering that a product from a little German company had a big idea and SAP expanded to international markets. This step into the international arena in 1979 allowed SAP to showcase their product, *R/2*, at international trade shows and conferences.

As the idea of having real time data in an integrated application gained acceptance in the international market, SAP started to grow. However to other leading application development organizations, such as IBM, Oracle and Sybase, a small company like SAP did not even seem like a threat. In 1992, SAP released R/3, which was a client server version of its R/2 product. What is client server? According to Whatis.com it is:

Client/server 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 the client/server idea can be used by programs within a single computer, it is a more important idea in a network. In a network, the client/server model provides a convenient way to interconnect programs that are distributed efficiently across different locations. Computer transactions using the client/server model are very common. For example, to check your bank account from your computer, a client program in your computer forwards your

request to a server program at the bank. That program may in turn forward the request to its own client program that sends a request to a database server at another bank computer to retrieve your account balance. The balance is returned back to the bank data client, which in turn serves it back to the client in your personal computer, which displays the information for you.

The client/server model has become one of the central ideas of network computing. Most business applications being written today use the client/server model. So does the Internet's main program, TCP/IP. In marketing, the term has been used to distinguish distributed computing by smaller dispersed computers from the "monolithic" centralized computing of mainframe computers. But this distinction has largely disappeared as mainframes and their applications have also turned to the client/server model and become part of network computing.

In the usual client/server model, one server, sometimes called a daemon, is activated and awaits client requests. Typically, multiple client programs share the services of a common server program. Both client programs and server programs are often part of a larger program or application. Relative to the Internet, your Web browser is a client program that requests services (the sending of Web pages or files) from a Web server (which technically is called a Hypertext Transport Protocol or HTTP server) in another computer somewhere on the Internet. Similarly, your computer with TCP/IP installed allows you to make client requests for files from File Transfer Protocol (FTP) servers in other computers on the Internet. (64)

This move occurred at a strategic time in the computer industry. The industry as a whole was in an upheaval because of the enormous costs of maintaining mainframe based systems verses less-expensive client server based systems. Companies were evaluating their mainframe systems, which required construction of a building, specialized electrical and cooling systems. These systems were also a huge burden to the overhead costs of maintaining software programs that were largely developed

in the 1960's and 1970's and were now inadequate by 1992 standards. Corporations were becoming attracted to client server systems, for which the overhead and applications were far less expensive. This was because the hardware did not require the large overhead expenses of special facilities. Instead, this client server based hardware could be put in a closet and run seven days a week, twenty-four hours per day. In 1992, Argon National Labs marked the first time that a Cray supercomputer was replaced with a client server based system that was constructed from 64 separate client server systems linked together to form a parallel processing environment. The total maintenance cost of the Cray was over \$1 Million dollars per Year. The cost of the entire parallel system was \$1.2 Million dollars with an estimated yearly operating cost of \$150,000. This was a quantum leap in cost reductions. The stage was now set for software application development organizations to build applications that could run on client server based systems. (Cameron, Colony & Lieu 3-10) (Cameron & Woodring 1-3)

Information Technology as an Asset

As stated before, the late 1980's and early 1990's also showed how many organizations were able to use information technology as a competitive advantage. Other organizations that innovated with information and technology in the early 1980's was

American Airline's SABRE system and American Hospital Supply's ASAP systems. Both were technological innovation at it's best.

American Airlines lead the industry with this airline reservation system. At the time, most airline reservation systems were not very sophisticated from a technology standpoint. Many of the reservation systems were decentralized and if one wanted to fly from St. Louis to Salt Lake City, the only way someone could determine what flights were available was to call the airline at the departure city or the arrival city. the reservation systems in that city were able to track how many seats were left in each class by city. Although this gave the airlines the ability to know what was available it did not allow them to dynamically determine if other flights were available in other cities. SABRE provided American Airlines a strategic advantage. SABRE was able to put all of American Airlines' flights in one system and allowed all reservations to be made against that single system. Now a customer could call a single phone number for making reservations on any American Airlines flight. No longer was it necessary to call multiple locations to check availability and book multiple destinations. This was a milestone in the airline industry. All the other major airlines had to follow suit or lose their market share. This is just one of many examples of how information is being used to enhance competitiveness in the global economy.

This strategic advantage of SAP's R/3 application, real-time information, allowed it to become a competitor in the information industry. This program allows organizations to, integrate application for all business units, process data on a real time basis, run R/3 on a less expensive client server based system.

SAP's competitors, IBM, Oracle, Sybase, which earlier did not see SAP as a threat, now could see that SAP, along with newcomers BANN and PeopleSoft would now provide healthy competition.

The Enterprise Resource Planning (ERP) race began. These companies were starting to vie for customers, who needed these systems. Numerous system integrators soon entered the race by providing project management expertise in large-scale custom application development and deployment. Although some implementations of SAP are successful, numerous implementations are not. This is highlighted by Dell's cancellation of their project Genesys. This project's objective was to implement R/3 for 115 million dollars. Once the project topped-out at 150 million dollars, Dell canceled the project because it was determined that R/3 could not support Dell's volume or complex sales order process. SAP defended the project, and R/3, as a well thought out product that provides the functionality that many corporations want today.

(White, Joseph, Clark, Don and Ascarelli, Silvia A8)

It was apparent quickly that moving to R/3 was a complex and expensive application to implement. Numerous stories of abandoned R/3 implementations were appearing everywhere from Business Week to The Wall Street Journal. Oracle, IBM, Sybase, PeopleSoft and BANN moved in with ERP solutions of their own. Some software was more complete than others, but all were vying for the customers that were afraid of implementing SAP's R/3. Oracle, BANN, and PeopleSoft's solutions were all accepted by the market as simpler alternatives to R/3. However, as their track records accumulated, it was apparent that their solutions were just as complex as R/3 to implement. It was discovered that it was not the ERP software that was complex to implement, but the complexity was in the organizational reengineering that was necessary for the implementation. The political environment within the implementing corporation was also determined to be a major factor in the reported failures. A study done by the MIT Sloan School of Management has defined the political environment as the one of the major obstacles in implementing a competitive strategy within an organization. The first reason is control -- control over budget, resources, and the direction of future business processes. Additionally, ERP implementations are typically high profile projects with the highest executive sponsorship, usually the CEO, CFO or COO. A prestigious position on a successful project could mean a

huge leap forward on the career ladder and life in executive suite.

(Ross, Janne, Beath, Cynthia and Goodhue, Dale 31 – 42)

With organizations quickly becoming global competitors, and the ensuing thrust for information compounded by a difficult Year 2000 date problem, many organizations are looking for proven SAP implementation methodologies to solve their problems. Many companies turn to large integration organizations like IBM, the “Big Six Consulting Firms” and SAP for their implementation experience and methodologies. Medline Industries Inc. was one of those organizations looking for a methodology and help in implementing SAP. However they also experienced some problems in their implementation:

In court papers filed in late August, Medline charges that Andersen [Consulting] ‘failed to configure SAP R/3 appropriately, failed to reformat Medline’s historical data accurately, failed to adequately test the configuration, and failed to alert Medline to these problems before Medline abandoned its old computer systems.

Medline’s Claims

- Its R/3 system could not produce financial reports for all of June 1996.
- Before converting to the system, Medline was able to fill 98% of all orders from stock; after conversion, it could fill only 90%
- In some cases, the system showed “Out of Stock” even when warehouse stock was present.
- Freight costs sky-rocketed as customers complained that goods hadn’t been received.
- The system went down completely on one day.

Things don't always go as planned. In this particular implementation Medline was quoted as saying:

Andersen, in effect, took over key parts of the project. Andersen had the expertise.' Says a source close to Medline. 'We had not experience on this scale'."

In their own defense, Andersen Consulting was quoted in the article as stating that "no decisions were made unilaterally and Medline officials were apprised daily of all progress." Although this case is still pending, a new integrator of SAP has taken over the project. (Stein 34)

The implementation of computer systems, specifically some SAP implementations has resulted in lawsuits. In an interview with James Musca, Director of SAP at a Ernst & Young LLP, Mr. Musca contends that typically SAP implementations are attempting to replace virtually every software program at a large organization, from the financial, production and sales software, the management of the effort is inherently complex. The need for skillful project managers of such a complex effort at an organization that has never experienced it is one of the key success factors.

Statement of Purpose

Because many organizations are now attempting to compete in the information age, to obtain a competitive edge, they are implementing ERP packages, such as SAP. In the rush to do this, many organizations are trusting large system integrator consultants to help define how to do this. They are defining methodologies, change management policies and conversion activities for systems to be replaced. If an organization undertakes this massive move to a single integrated software package they must understand what the ingredients are to a successful SAP implementation. Therefore, the purpose of study is to explore the different methods used in implementing ERP packages, specifically focusing on SAP, to ascertain what methods or ingredients are necessary for a successful implementation.

CHAPTER II – LITERATURE REVIEW

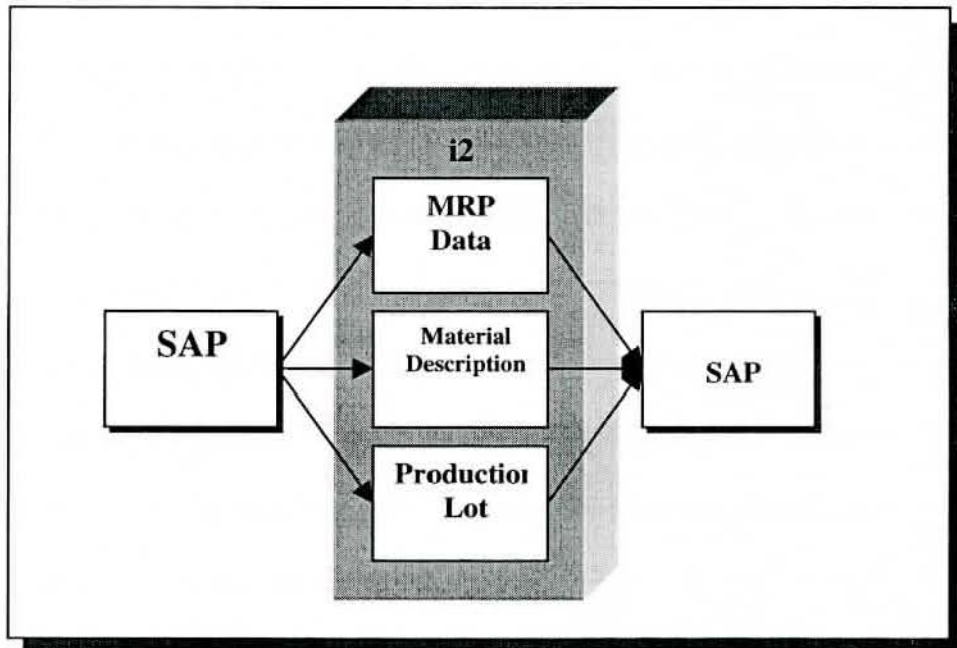
Introduction

The implementation of ERP packages is a new challenge to businesses, and these businesses are still trying to determine the optimal procedures when implementing one of these packages. The authors presented are concerned, in general, with different factors and phases of the implementation. Since each organization is unique, a standard ERP package must be modified in some ways to adhere to the differences in data types and processing. A company may opt for a Bolt-On package, custom development of an ERP package or modification of an existing ERP package. (Cameron 5)

Bolt-On packages, applications that only work in conjunction with another superior application, can provide solutions to problems that are unique to the organization. Bolt-On packages provide the convenience of processing this unique data. The superior application stores master data and transfers the data to a subordinate application for processing. Once the processing is complete, the results are transferred back to the superior application for storage and use (Figure 2.1). For example, an implementing organization may choose to use a production planning Bolt-On from the company i2, in conjunction with SAP. When using SAP, all of the master data pertaining to the final

product, raw materials, and the type of production machinery to be used is available within SAP. The i2 Bolt-on would help a production supervisor determine what product should be run next, using the master data provided from SAP.

Figure 2.1
i2 Data Integration Sample



MRP Data = Data that is required to conduct Materials Requirements Planning. (Required Completion Date, Assembly information and Standard Part Numbers for the Parts)

Material Description = Data that describes the attributes of a completed product. (Red with white trim)

Production Lot = The unique production number identifying whom the production is for.

One example of a superior/subordinate relationship is with SAP being the superior application and the Bolt-On from i2 being the subordinate application. There are a few different options as to how SAP might flow data to i2's Bolt-on in order to plan production for three separate products. One might the development of specialized interfaces between the two applications. This process allows the system to integrate information easily, but it requires a lot of man-hours and money on the front-end to prepare the interfaces between the superior and subordinate applications. This is because the programming involved in integrating the systems is complex, since the two systems have different "languages", and they must be able to switch data with one another. This requires employing experts to code and test the integration. Once this is complete, though, the only thing required for the systems to converse is a push of a button. (White 1)

Another important decision factor with ERP packages is making the decision between a model package implementation and custom application development. When organizations make a decision to implement a model package rather than internally develop the application, an underlying key assumption is made. The assumption is that minimal modifications will be required for the package that is chosen. This means that the amount of custom coding will be kept to a minimum. But, it may require modification

of many current business processes, in order to meet the requirements of the ERP package. This option is less expensive during coding and development, but there may be up-front costs of consultants, and the time associated with changing some current business practices. If changes are made, they should only be considered if it saves the organization money in the long run.

If the organization makes the decision to internally develop the application, then there would be no, or minimal, changes to the organization's current business processes. This is because the organization would tailor the new application to their current business practices. There are a few reasons why a company may choose to develop from within - there may not be an available ERP product, or they may be able to maintain more control and flexibility over the process with internal development. Since each company has policies and procedures that are unique to itself, especially in certain departments, such as marketing, a packaged application may require changes to the way they do business. This may not be acceptable to the customer. (Cameron 4)

Internal development is a time intensive process, since the developers are creating this application from scratch. The most expensive stage is during development, due to the cost of experts to create and test this application. The most cost-effective time period will be on the back end, since the system will only require

normal maintenance and support. When making this make vs. buy decision the decision-makers should have access to the costs of all of these options, the possible effects on the organization, and its procedures and employees. Only with this appropriate information can the team decide on the best option for the organization. The researchers of ERP tend to focus on the effects on the organization, its procedures and employees. (Cameron 8)

Area of Investigation

Research is limited in the field of SAP implementations because of the infancy of this industry, but there are a few noted experts. Gail Edmondson and Jeff Moad are two researchers in this field. Their research on SAP implementations tends to be situation specific, and they tend to focus on their specific area of expertise.

Gail Edmondson is a business strategist who writes for strategy related magazines. Her research on SAP focuses strictly on the effects of the implementation from a shareholder value standpoint. The implementation of SAP should provide the business information in such a way that it gives the company a competitive advantage, and thus the opportunity to run the organization more efficiently (Edmondson 17).

Jeff Moad views SAP implementations from an organizational change perspective. He focuses on how the implementation will effect the individual employee who has to do the daily work with SAP (Moad 44).

There are still others who look at implementing SAP from other perspectives, such as information technology or business process reengineering standpoints. Since the implementation of SAP is so complex, it is hard to determine the effects of more than one independent factor at a time. Although the focus on one factor at a time is helpful when presented with certain situations, it does not address the most complex part of implementing an ERP package - the difficulty of considering all of these possible variables at the same time so as to minimize the risks and successfully implement SAP. Each of these researchers concerns are for different phases during the implementation. In essence, if a combination of the work of these researchers is developed, a timeline for implementation can be created and each concern can be inserted into a certain place in the timeline. This shows that each author has a legitimate concern, even though they focus on different points of the implementation.

A standard timeline can be found in a Price Waterhouse Methods Handbook. This Handbook identifies the normal phases of a SAP implementation. These phase guidelines are not

considered inflexible; they are available to provide a general understanding of the critical works on SAP and the implementation process. The guidelines are based on the collective learning from other completed ERP projects. This methodology has been successfully applied at large multinational organizations such as Mobil, Compaq, and Tandem. The individual can then identify and match a particular implementation concern to a specific implementation phase (PriceWaterhouse 50). The flaw within this document though, is that it is only internal looking, it does not attempt to incorporate ideas, thoughts and methods that have been learned outside the PriceWaterhouse organization. According to the Gartner Group, which is an organization that rates and evaluates consulting businesses, PriceWaterhouse is strictly an information technology shop, with expertise that lies in installing computer systems (Gartner Group). They are not known for their skills with change management or training, which are important parts of implementing SAP. The book does have a timeline for the installation implementation process. The five main phases of an ERP implementation identified in this handbook are Strategy, Initiation, Definition, Transition and Improvement. (PriceWaterhouse 50)

Strategy

The business strategist focuses on the Strategy phase of a project. In this phase, an organization attempts to strategically ascertain if the implementation of an ERP package is a preferred business decision. The possibility of adding a Bolt-On to SAP or creating a custom package are also considered during this phase. This decision is usually based on strategic objectives and the ability of the ERP package to assist in the execution of the tactical business plan that supports the strategic objectives of the organization (PriceWaterhouse 50). Edmondson, the business strategist, focuses on this implementation phase to understand if SAP is the appropriate tool that will provide the company with a strategic advantage. If the system can allow a company to "scrutinize a global business, identifying where inventories have piled up, and which plants were running most efficiently", that is certainly a reason to consider implementation. (Edmondson 164) The ability to identify industry trends before the competition, or possibly set the trends of the industry's supply chain and production efficiencies can bring a company into the spotlight. (Edmondson 164) This strategic look at SAP should always occur at the beginning of the investigative process. If the implementation of SAP is compatible with the strategic vision, the project will move to the next phase, which is analysis, or initiation. (PriceWaterhouse 55)

Initiation

The Information Technology Strategist is concerned with the effects of the Initiation, or Analysis phase of the project. The Chief Information Officer (CIO) is the person who leads this phase.

During this phase, the CIO, Chief Financial Officer (CFO) and Chief Operating Officer (COO) all evaluate information processing, finance and accounting, and operations, respectively. The CFO is responsible for evaluating and documenting the current financial hierarchies, such as the Chart of Accounts, Cost Centers, Controlling Areas and Profit Centers. (Price Waterhouse)

Investigating the organization's operating capabilities and locations will be done by the COO. A gap analysis can then be performed to determine the difference between the current resources and the organizational capabilities required by SAP. In essence, a gap analysis evaluates theoretical data against the existing information technology infrastructure, to see if it is capable of handling an ERP package. (PriceWaterhouse)

The researchers with an information technology background tend to focus on this stage. This is because the CIO has the responsibility for this most difficult task in this phase. The CIO evaluates the type of computer that will be required to process all of this information. A review of current networks is performed to see if the current bandwidth is capable of handling the increased number

of data streams (Moad 146). Once this is all determined in the Initiation phase, and combined with the data from the Strategy phase, the organization can provide answers to the following considerations:

1. Whether the implementation of an ERP package is a strategic fit for the organization.
2. Whether the technology infrastructure can support the ERP package or if plans are in place to upgrade the information technology infrastructure to meet the new requirements.
3. How the current business processes can be changed to meet the requirements of the ERP package. (Moad 146)

The typical information technology writers and some business process writers will then evaluate this information and determine the processes needed for the definition, and transition phases. This will help to determine whether the organization is ready to implement an ERP package, and if not, how they can prepare for these phases. (Moad 146).

Definition

The managers that are concerned with business processes are involved at this stage. The business processing skills of the COO and CFO are vital in the definition phase (Edmondson 163). This is the phase that requires most of the work and effort when implementing an ERP package. The optimal strategy regarding the

ERP package will be developed, using information gathered from the analysis phase. (Edmondson 165) For example, Bolt-on applications are evaluated to determine if there is a strategic fit. Some examples of these packages are i2's or Manugistics' production planning packages, or AVP's Taxware package. During this phase, there is also a concerted effort to define the current processes that are being used within the organization. Then during the Transformation phase, which is a part the Definition phase, industry best practices are defined and compared with the 'Current State' business processes of the organization. The merging of these two diverse processes becomes the 'Future State' process that will be used as a guide in configuring the ERP package. In most situations, the defined 'Future State' processes are ideal representations of how the organization should conduct its operations. During this stage, there is much compromise in order to accommodate the required business processes without placing an undue burden on custom modifications made to the ERP package (Edmondson 165).

Transition/Roll-Out

The Transition/Roll-out phase is the main concern of change management researchers. The responsibilities of this phase can commence towards the end of the Definition phase of the project. At this particular juncture, the organization must decide how to

handle the change within the organization in preparation for "going live", or initiating the use of the ERP package within the organization. There are six major steps in the preparation to go live with SAP. They are:

1. Documentation Development
2. People and Culture Transition
3. Organizational Transition
4. Infrastructure Transition
5. System Transition
6. Acceptance Testing (Price Waterhouse Sec. 4)

The effects of some of these steps can be shown with one example of a receiving clerk within an organization. Derek Slater discusses how the effects of insufficient training can cause a SAP implementation can fail in his January 15, 1998, on-line article in CIO Magazine, "The Hidden Costs of Enterprise Software".

Training expenses are high because workers almost invariably have to learn a new set of processes, not just a new software interface. Take, for instance, a receiving clerk who accepts shipments of raw materials at a Monsanto plant's loading dock. "With SAP, that clerk now becomes an accountant," Cissell says. Because the clerk is keying new inventory directly into a live system, mistakes have an immediate impact on the books. And once every receiving clerk has access to the system, the plant's number crunchers can no longer simply look at their data in batches; now they need to be able to pinpoint the origin of each data entry to verify its accuracy if necessary. Employees at all levels have to accept different responsibilities.

Though Slater only focuses on the training aspect, it can be expanded to the other aspects of going live. The article states that a receiving clerk is now an accountant because of the implementation of SAP. How does someone's status change from a clerk to an accountant? The answer in this particular article lies in just one of the steps - training. This particular theory can be compared to the other steps in preparing to go live, and parallels can be derived. For example, documentation is required to support the new responsibilities of the receiving clerk, so the clerk can perform the new responsibilities with some knowledge of the effects of their actions. This will require that the person in that position change their mindset about their job. Before, inventory receipts were prepared in batches, so a mistake could be easily identified, and fixed. With an ERP package, that mistake has an immediate impact on the financial status of the organization. Now the organization's culture has to take into account this 'status' change of the inventory clerk. Organizationally, a transition must occur so the accountants that do analyze inventory can pinpoint any errors and resolve them in efficient manner.

Improvement

The improvement phase of a project is an interesting one. It attempts to evaluate what has occurred on a particular project to

see if additional efficiencies can be gained. The members on this team evaluate the procedures and the workings of the system and attempt to find more efficient ways to do the same job. (Casanato) This phase is an on going process, since organizations are always focusing on ways to improvement methods. This is also important from a research perspective because there is a concerted effort of information technology research firms, such as Gartner Group and Forrester Research, to quantify and evaluate the benefits of an SAP implementation. (Gu) The efficiency of a system is a good tool for these research firms to use when performing their evaluation (Gu). These research firms attempt to evaluate attributes similar to those that the Price Waterhouse SMM methodology identifies in the handbook as their guide for SAP implementations. This will allow for an easy correlation between how the researchers attempt to decompose SAP implementations to their simplest forms for evaluation purposes.

Although each phase has been subdivided, it may seem that one phase can not start until the previous phase is complete. This is not necessarily true. Like all processes in business, timing is extremely important. (Price Waterhouse Sec 4) Sometimes because of external pressures, for example Year 2000 issues, the organization must move more quickly. Or, if a decision has been made that the implementation of an ERP package is vital to the

success of the organization, the Initiation phase can be run parallel with the Definition phase. For example, the CIO can determine the hardware needs of the new application as the COO and CFO are determining the scope of the implementation, i.e., preparing the chart of accounts, etc. (Price Waterhouse Sec 4) In doing this, the organization must take the necessary steps to provide the information technology infrastructure required by the ERP package (Figure 2.2). If the time schedule is rushed though, management must recognize the risk of project budgets increasing and timelines decreasing.

Figure 2.2

Alignment of Writer with Project Phase

Project Phase	Writer Type	Why an SAP Implementation is Important	Stake holders
Strategy	Business Strategist	Integration	CEO
Analysis	Information Technology Strategist	Three Tier Architecture	CIO
Definition	Business Process	Standard Processes	CFO / COO
Transition	Change Management	N/A	CFO / COO
Improvement	Research Groups	N/A	CFO / COO

Research Specialization Areas

Based on the above figure, the breakdown of the ERP implementation is five main areas of specialization as it relates to the researcher's background. They are:

1. Business Strategist
2. Information Technology Strategist
3. Business Process Reengineering
4. Change Management
5. Researchers

Business Strategists

The business strategist writers focuses mainly on the strategy phase, over-looks the whole project, and tries to determine how the implementation of SAP helps the organization achieve its strategic goals and improve the service provided to both internal and external customers (White A1). For example, they may consider how SAP can be implemented in such a way as to reduce production times or eliminate inventories. In addition, many recent developments with SAP implementations have turned the focus of researchers to determine the Economic Value Analysis (EVA) associated with complex and far-reaching technology enabled projects. Return on Investment (ROI) of such implementations is evaluated and a determination is made, from a strictly economic standpoint, as to whether the ERP implementation can be justified

(White A1). These writers typically write for major general business publications such as, Business Week or Fortune, or they write for trade journals such as, Oil & Gas Journal and Traffic Management. Their viewpoint is typically from the level of a director, vice-president or president of the organization.

John Xenakis, Gail Edmondson, Joseph B. White, and Don Clark are the leaders in this area when it comes to determining the strategic value of implementing SAP. After interviewing several SAP customers, John Xenakis feels that customers want to implement an SAP system to "control all major business processes in real time". They allow companies to automate or eliminate tedious manual processes. He points out that it can be expensive, but he defends the implementation by writing that :

Every customer characterized, its experience so far positive, and staunchly defended its choice of SAP. All cited the considerable merits of R/3, whose multinational, multicurrency, multilingual functionality proves particularly attractive to global enterprises.

Both Clark and White, who also admit that implementation can be expensive and painful, argue that SAP "is becoming the new standard of business", because it "automates the basic processes of business: taking orders, checking credit, verifying

payments, balancing the books". (Clark A1) In the same article, on March 14, 1998, in the Wall Street Journal Clark and White, focus on an interview with a Compaq executive that said:

Compaq computer Corp. uses R/3 to monitor order backlogs on a daily basis, and John White, Chief Technology Officer, says the system helped the personal computer maker slash inventories last year to \$1.2 billion from \$2.2 billion, even as revenue rose 23%, to 18.1 billion (White).

The article quotes Bill Gates, Chief Executive of Microsoft, who said:

Microsoft Corp. is delighted with the software system. The company spent 10 months and \$25 million installing R/3 to replace a tangle of 33 financial-tracking systems in 26 subsidiaries. Microsoft puts annual savings at \$18 million.

Although one would think that an endorsement from Bill Gates would be equivalent of a "Good House Keeping Seal" from the software industry, it seems some might disagree. Through out the industry many have called installing SAP the equivalent of a corporate root canal. (Clark A1) This is due to the complexity of configuration and the expense of the software. Companies sometimes have to pay armies of consultants who charge as much as \$400 per hour for their assistance, and then stay on the job for years. (Clark A1) The costs for an implementation seem to vary widely. In one article Owens-Corning Fiberglas Corp said, "The costs for the R/3 project came to about \$15 to \$20 Million dollars just for the R/3 software". This same source is quoted "The pain level (of implementing SAP) is about a six or seven on a scale

where 10 is a hurricane." According to the Chief executive Officer Glen Hiner, in regards to the total cost of implementation at Owens-Corning, "We are spending \$100 million, which is a lot of money for this company. We have no savings as of yet." But further into the article Mr. Hiner is quoted as follows:

We expect to save a lot, starting later this year. Owens Corning had no choice, other than to keep spending \$30 million a year to maintain an archaic collection of computers. Our growth agenda forced us to go to this.

Gartner Group's Bonnie Digrius, also said, "The total cost of an SAP R/3 implementation depends on the deal each organization gets with not only SAP, but also their integrator or consultants".

(White A8).

If organizations are spending this kind of money on SAP what rewards are they reaping? As already shown by Compaq and Microsoft, company expenses can be easily controlled, as the monitoring of inventories, receivables, etc. becomes more accurate and easily attainable (Edmondson).

Others it seems, though, are not reaping these types of rewards. According to the same Wall Street Journal article:

In January 1997, Dell Computer Inc. quietly canceled most of a two-year-old R/3 project, code named Genesys, after its budget swelled to \$150 million from \$115 million and tests showed that the software couldn't handle the sales volume Dell was expecting. Dell won't comment, but people familiar with the project expect the company to use homegrown software for many tasks R/3 was supposed to manage.

Overall, the article was neutral on whether SAP has been able to deliver on much of what has been promised by SAP, the consultants and the executives that made the decision to implement. One thing was clear though, implementing SAP is enormously difficult and the results are questionable if they are not defined in the early stages of the project (White A8).

The strategy phase of implementation is the most difficult as it requires forward thinking, an understanding of the business improvements, and the monetary value. It also requires the CEO to commit of the funds and the employees to the project. They must also understand that, most likely, there will be unforeseen problems, and budget over-runs. Even with these setbacks, it seems that most companies have been satisfied with the overall results that SAP can provide the company at the completion of the project.

Information Technology Strategists

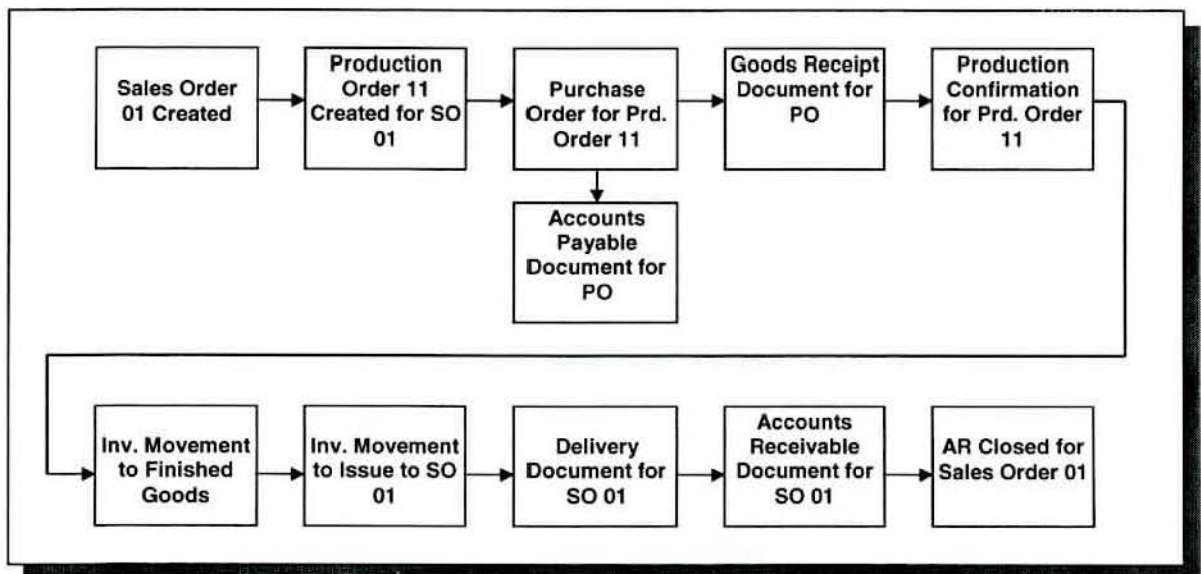
The information technology (IT) strategist writer attempts to ascertain whether the implementation of SAP will significantly reduce or eliminate redundant data. (Moad) Reduction of the number of computing applications is also of major concern. The number and variety of hardware systems that currently exist in the

organization need to be evaluated. The standardization of server platforms and desktop platforms (i.e. only have to service one type of infrastructure server and one type of desktop system) should be evaluated also. Human resources may also be effected by this standardization. All of these computer-related needs factors point towards the key focus - whether the existing IT organization possess the knowledge and manpower to implement such a complex and far reaching application (Moad).

Two pertinent IT leaders are Jeff Moad and Malcolm

Figure 2.3

Typical Sales Order Process



Wheatley, who have both noted that the deployment of ERP packages has only recently emerged as an important area for IT executives to focus on. This is because their customers are

demanding that data redundancy, duplicate data entry and complex user interfaces be eliminated and that the data that is dispersed between systems, such as sales, production, purchasing and balance sheet accounts should be integrated together (Figure 2.3). To a certain extent data in a large organization is tied together, but that is because there may be some logical association of data between systems such as a general ledger account number or a customer account number. That does not mean that all data originates from the same source. (Wheatly) In this example there are eleven steps required to fulfill to this simple order. Conservatively, there could be up to seven different computer systems involved in this process:

1. Sales Order
2. Production
3. Procurement
4. Accounts Payable
5. Inventory Management / Warehouse Management
6. Sales Delivery
7. Accounts Receivable

It is not unusual to have multiple systems that process the same information as another system. There are many factors that might have driven an organization to create or buy duplicate systems. The most prevalent reason is the need for specialized functionality from a particular system such as sales. (Wheatly) For

example, Phillips Petroleum had some redundant systems. Here was an organization that had four different sales systems for what appeared to be similar businesses. The first was for their North American Production organization that explores for oil reserves. They then sell the crude oil, natural gas and liquefied natural gas to pipe lines, refining companies and other crude oil producers. Another branch of Phillips is their Chemicals division, which produces chemicals from crude oil, natural gas and other assorted raw materials. This chemical product is then also sold to pipe lines, industrial product manufactures and other chemical companies. A retail business, which is the third sales system, sells gas and other items to gas stations and, lastly, their research and development group sells specialized production and refining technology to third world countries. At one point in time, each of these organizations evaluated the others sales applications and decided that the existing systems did not perform some functions they needed and a custom or purchased application would work better. This example of over-engineering a process, i.e. sales, is an underlying theme throughout many writings that discuss the need to eliminate these redundant systems.

Another example of this is found on an on-line CIO magazine article, written by Wheatley. In it, he references a third-party logistics contractor, Skyway Freight Systems. With the ERP

system, a person can track orders, with one press of a button. They just type in the order number and the system tells them what stage of the process that order is in. Whether the order is in the warehouse, still on order, or with the shipping company. All of this can be done in one program, rather than checking the sales system, then referring to the warehousing system, etc. (Wheatley)

In an attempt to eliminate the redundant systems, many organizations are looking at ERP packages to enforce a standard set of data supplemented by Bolt-On packages (Musca).

These are just a few of the many of these issues, according to Forrester Research, that effect whether the "Buy/Build Dynamic" or whether "Business Process Reengineering" (BPR) is needed.

Business Process Reengineering

Many technology writers research Business Process Reengineering (BPR) to determine if it is a necessity when it comes to a large IT implementation. BPR is the reengineering of the business' processes to reduce redundant tasks, and streamline processes. The COO and CFO are responsible to determine if the implementation of SAP provides the organization an advantage over competitors. In many cases, the researchers are attempting to determine if there is a benefit from having the entire organization follow a finite set of predefined processes in order to conduct

business. Ensuring the consistent capture of data by limiting the number of variations of a particular type of transaction would provide the business a strategic advantage. They theorize that the information is captured in a consistent manner, it will provide more informative data to analyze, which, in turn, may enhance productivity (Moad).

Jeff Moad, author of "R/3: Little material gain for Applied", in PC Week seems to best ascertain how any large scale IT project feels, as he quotes Plantronics CIO John Dick as saying:

As any veteran roller-coaster rider knows, the most exciting moment comes right after the train makes the big climb and starts to race downhill toward the first sharp curve. At that point, a person has to wonder is this thing going to stay on the track?

How does this relate to BPR? According to John Dick, a company must identify the critical processes first, then quickly reengineer these processes to meet the new systems requirements. Jeff Moad notes that though Plantronics was successful in their implementation, they can not relax. They must continue on the reengineering path - to not only reengineer their internal processes, but also to connect with their customers and suppliers, in order to reengineer their whole supply chain. This will

allow the organization to provide the customer with better service and a better product (Moad 141).

Many ERP writers suggest that this is happening because technology has come far enough to do these things. For example, Intel determined that it need to set up a web site that could take orders from tiny companies that were only ordering a few microchips. They could then tie this into SAP, and reduce man-hours and redundant processes by taking orders this way. This actually brought on a bigger idea, that could expand Intel's business even more.

"Intel was a customer of SAP, which was releasing a Net-ready version of its R/3 software for running back-office operations. Why not bundle SAP's software with Intel-based PC servers and sell the combo to companies that wanted to do business on the Web?"(Edmondson 163)

SAP and Intel launched a joint venture, a company called Pandesic. All of this new, more efficient business to Intel came about because of the ability to hook up SAP to the Internet.
(Edmondson 163)

Others suggest that it is because many large organizations are grappling with Year 2000 problems with existing homegrown applications, as well as vendor applications, that are no longer being supported.

Change Management

Change management theorists' question how the organization should prepare the employees for the procedure and business changes, once the SAP implementation is complete. This aspect overlaps somewhat with the area of Business Strategy, because as the strategists determine how this will effect the procedures, the employees are effected at the same time. The top management of the organization is responsible for conveying to the employees the importance of the implementation, and the relevance to their job and the company's competitiveness. Xenakis, in CFO Magazine, March 1996, discusses how an SAP implementation changed Fujitsu Microelectronics, Inc., in an interview with Charles Faust, vice-president of operations:

"When the project was completed, the job descriptions of 100 people changed overnight. The entire accounting organization, most of the operations organization, production planners, materials planners, customer-service people and also the IT organization made significant changes in their jobs." (Xenakis 27)

This forced management to bring in key people from other departments to train users, and because of this, the project fell behind schedule, and exceeded the budget by \$700,000. Did Faust regret the choice of implementing SAP? No. Fortunately, they were able to get their employees trained properly and through the increased productivity, they "expect the SAP implementation will pay for itself within roughly 18 months". Because of this

commitment from management, Fujitsu was able to have a successful implementation. (Xenakis 27-28)

Management also might communicate to the employees how other companies have dealt with successful or unsuccessful implementations of SAP. They should also discuss what change management strategies have worked before and what might work in their organization (Cameron).

Change Management has many meanings in business today, since there are differing opinions on this subject. For the scope of this paper, it will be limited to a change plan because in the SAP implementation environment, a plan is what is required to implement successfully. According to the Price Waterhouse methods handbook a change plan is:

A detailed set of tasks to be performed to accomplish a desired outcome. It must cover all major plan actions required, including changes in process, system, people (employees), organizational culture, the physical plant (facilities), the organizational structure (business units), and the training needs. (Price Waterhouse 6.2).

Improvement Researchers

The improvement researcher authors evaluate SAP implementations and try to assess what methodologies and leading practices were utilized during the implementation. With this analysis, they attempt to determine which methodologies and leading practices work best with different types of companies. For

example, the methodology that Microsoft used to implement SAP was different from the methodology used by Mobil. Additionally, many of these researchers look at the business cases that propelled the implementation and then attempt to determine if the economics of the decision were correct.

This research attempts to determine why one company in an industry chooses to build a core business application while another company in the same industry, chooses to buy an application. Additionally, the researchers attempt to determine if the buy trend will be permanent. They conclude that this trend will cease, for a variety of reasons. The first is history. Historically, package implementations have surged as new technologies are invented. But the same factors that increase the desire for packages also escalates the growth in building as innovative users push the technologies to meet their unique business requirements. Some examples are legacy McCormick and Dodge Financial Systems. These systems provided on-line data entry and batch processing that was the latest use for technology in the early 1980's. These stimulated technology savvy organizations to build mainframe based applications that had on-line, real time processing for operations such as order entry, accounts receivable and accounts payable. (Cameron)

The Forrester Report uses all of this research and its conclusion as a basis for making a bold statement. Which is:

“Client/server enterprise applications yielded control and cost efficiencies in the 90’s pushing forward-thinking corporations to build distributed solutions. Truly distributed problems – like sales and marketing and new customer connections – have not been met by vendors’ client/server offerings. Users have had to make their own.” (Cameron).

CHAPTER III - SELECTIVE REVIEW AND EVALUATION OF RESEARCH

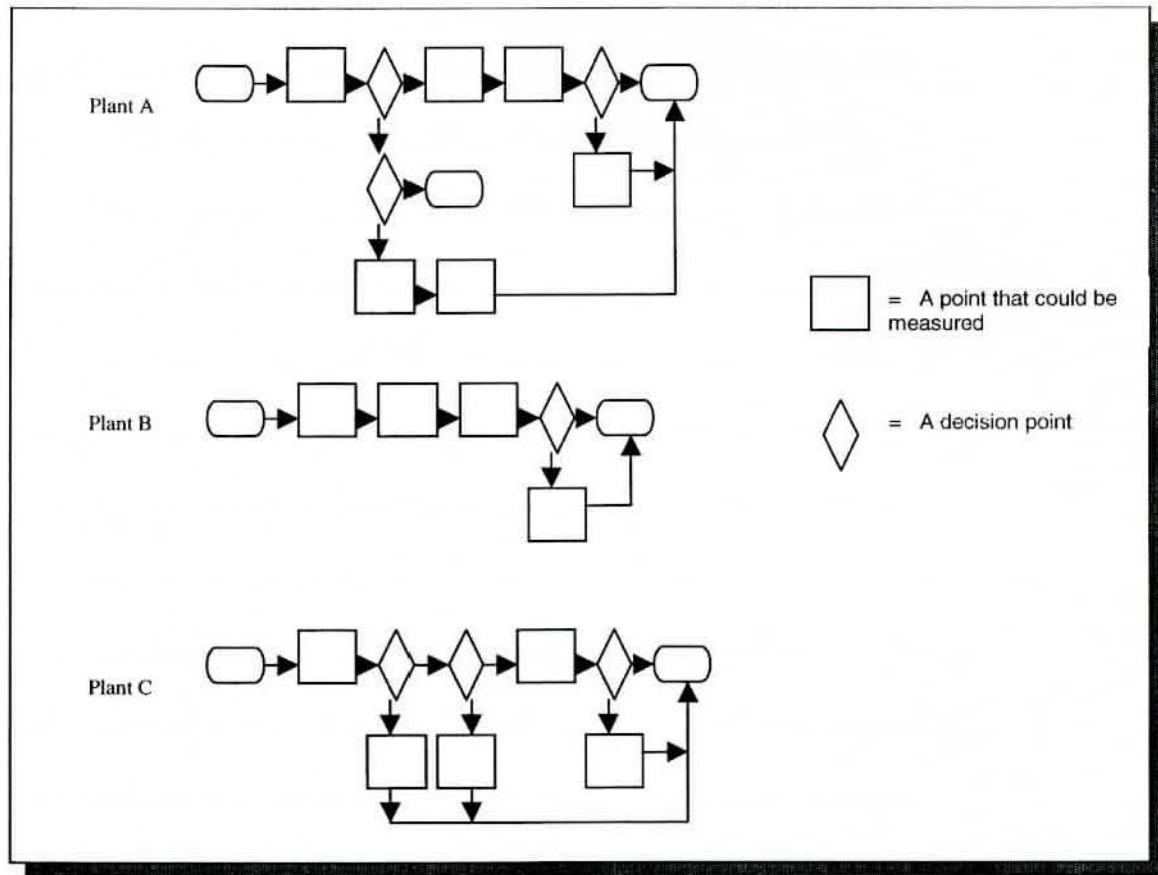
As discussed in Chapter II, SAP experts do not tend to analyze implementations in the aggregate, but rather they are looking at only a phase of an implementation. In order to have a thorough understanding of all of the authors' research, ideas and thoughts, a methodology or baseline must be used as a basis of comparison for each author. Only then can one attempt to understand the differences between the researchers.

Chapter II focused on how SAP is currently being viewed by the various authors compared to the structured SAP methodology that Price Waterhouse uses. It became apparent that the authors do not focus on the effects of the entire implementation process. Because they rely on their knowledge in their area of interest or expertise, the research only reflects the effect of one phase. Figure 2.1 reflected the fact that timing was a factor. This chapter will focus on breaking down the various authors and their views in respect to where they have concentrated their writing.

In understanding the perspectives of the writers and how their view

Figure 3.1

Three Plants' Sales Order Process Flow



of a successful SAP implementation occurs, we must look at why an organization considers an ERP package.

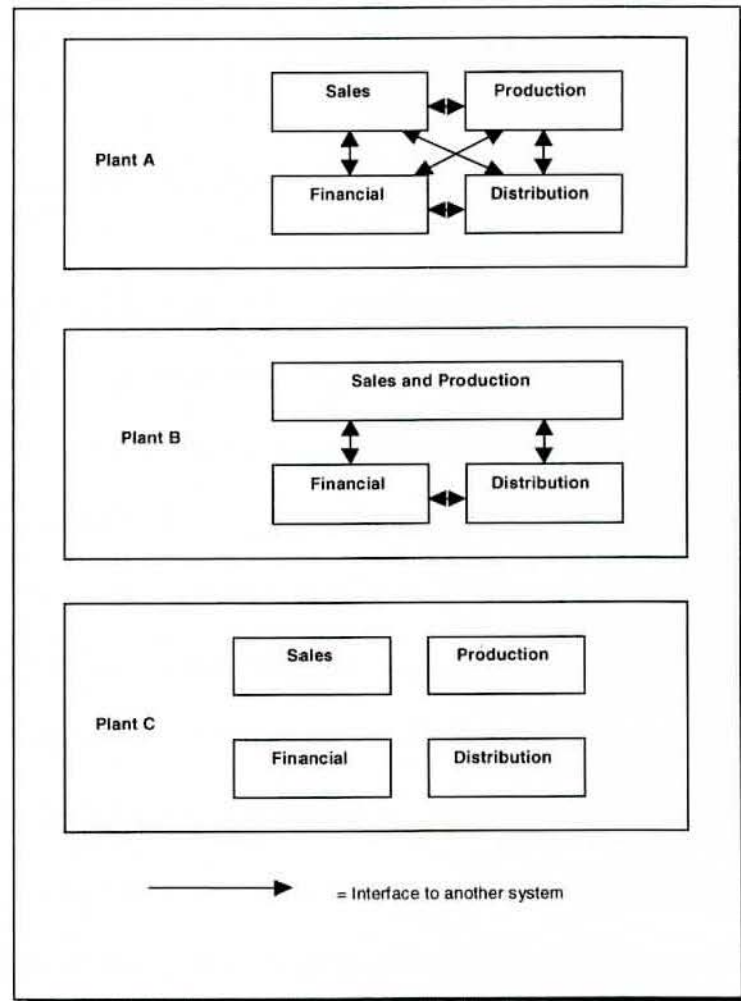
Business Strategist

Jeff Moad and Gail Edmondson concentrate on how the current processes and systems work. Figure 3.1 depicts an organization that has three plants and the corresponding sales

order process flows for each plant. Each plant has a different flow for sales processing. In fact, based on the diagram, there are differing measurement points and decision points in each of the three plants. Jeff Moad identifies the differing process flows for the same transaction within an organization as one of many factors analyzed to determine if an ERP solution is appropriate for a particular organization. Figure 3.1 shows that plant A has six measurable points and three decision points. Plant B has three measurement points and one decision point. Plant C has four measurement points and two decision points. This shows how different plants can have different processing needs. Gail Edmondson suggests that if an executive were responsible for those processes across the organization they would have a difficult time measuring them for a variety of reasons. The most obvious in this example is determining if there are common measurement points. To determine this, one would typically request a report from the system. This leads to an interesting question, posed by Gail Edmondson, which system should provide the report for management? It is hard to compare the systems against each other since they all provide different information for the decision making processes. An "ingredient" for success that Gail Edmondson identifies is to focus on implementing the parts of SAP that provide the most value to the organization as a whole and

managing the project to those values. Edmondson's provided a modified example in her November 3, 1997 article entitled "Silicon Valley on the Rhine". (Edmondson), (Mode), (White)

Figure 3.2
System Architecture



Due to the recent development of ERP applications, there has been no empirical data found on this subject as of yet. The researchers presented have not performed any detailed statistical analysis or sampling on the impact of their genre versus how it

affects the implementation of the project. They have simply provided insights into specific implementations and suggested ways that those implementations could have been more successful. These articles written by Edmondson, Mode and White are all more "lessons learned" rather than hard factual data that can then be in turn used to conduct further research and analysis.

Information Technologist

Figure 3.2 depicts the systems architecture for each of the three plants. This provides a good example of how different plants can achieve the same goals, but with different systems. Plant A contains four different systems processing information individually. The arrows in the diagram represent interfaces to the other systems. For example, when a sales order is executed, information must flow to the production system so the items can be produced. Additional information must also be given to accounting for credit and billing purposes and distribution must know where to ship the production output. In Plant B there are only three individual systems, but as in Plant A there are numerous interfaces to the various systems. Plant C has a purely manual process for exchanging information from one system to another and then coordinating the customers' requests accurately.

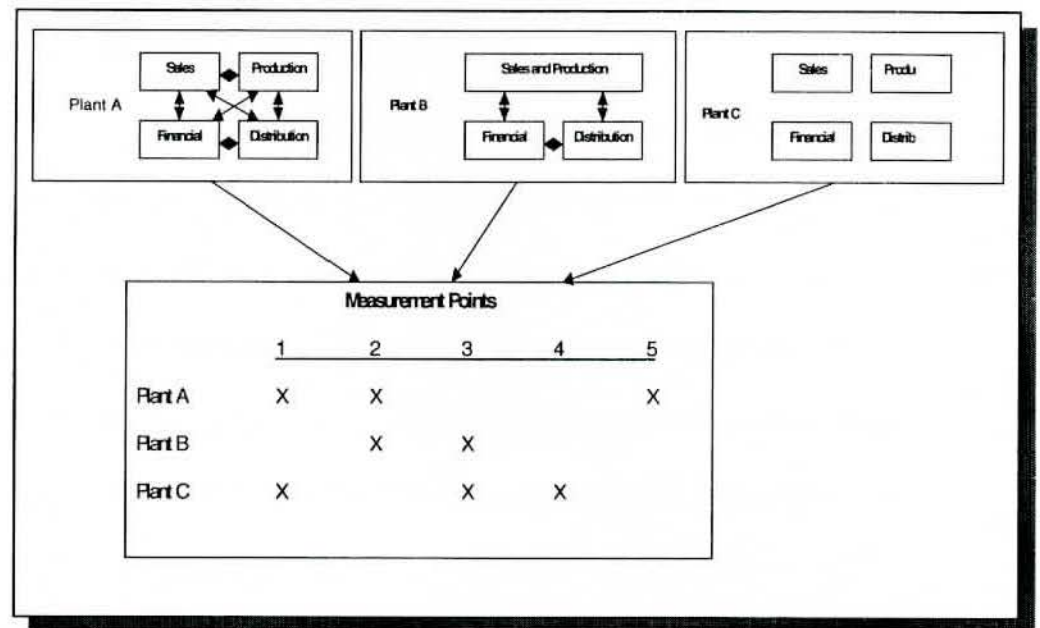
The impact of having non-uniform procedures amongst plants can be devastating to the information flow throughout the organization. According to Domenico Cecere, President of Owens-Corning roofing division, most of his organization limped along with archaic Personal Computers (PC) with out any integration (White). Joseph White, who is a Business Strategist, suggests that many organizations, from Dell Computer to Coca-Cola, are struggling with the same issues and are all coming to the same conclusion. An integrated system is more advantageous then the dispersed PC based and mainframe based applications being used today. Some, like Dell, decided to develop an internal system to resolve the issues, Coca-Cola decided to implement an ERP solution, in their case SAP. Why is this important? Mr. Hiner, CEO of Owens-Corning has a vision and according to Joseph White it is:

To give Owens-Corning customers one call shopping for all the exterior siding, insulation, pipes and roofing material that builders need. R/3 will give Owens-Corning the ability to make that happen, by allowing sales people to see what is available at any plant or warehouse and quickly assemble orders for customers. (White)

How does this work if an organization chooses to use SAP?

Figure 3.3

Reporting Amongst Three Plants



The sales example given for Owens-Corning is one way an ERP system adds value. (Figure 3.3) Another way, according to Gail Edmondson, is through reporting. Figure 3.3 shows the three plants and attempts to evaluate them on a common basis. This example shows that there are no common measurement points between all three plants. Comparison of two plants at a time is the only way to measure the plants against one another. Why is this? It has to do with the processes and systems that are in place. If there are no standard process or systems across the plants, it becomes

virtually impossible to measure them against each other in a meaningful way (White). Another "ingredient" to a successful SAP implementation according to Joseph White is to not allow your business be confined to attempting to reengineer SAP to meet your current business processes, but use SAP as an enabler to reengineer your business. (Edmondson)

Case studies, rather than empirical data, has been the focus of these researchers. These writers are concerned with how the implementation of the project is effected by their particular philosophy, and there has been no presentation of statistical studies or sampling. The researchers have provided their thoughts and ideas pertaining to specific implementations and suggested ways that those implementations can help to improve future implementations.

Business Process Re-engineers

Now that some of the common issues that have been defined, who within the organization will see value in implementing an ERP solution? The Business Process Re-engineers see value in an ERP solution, as well as the Information Technologist writers. Why is this? Figure 3.4 provides the example. This is the pictorial representation of the value that has been verbalized by both Gail Edmondson and Jeff Moad, that is there are three main methods that SAP specifically brings to the table. They are integration of information, standardized processes and a client /server architecture.

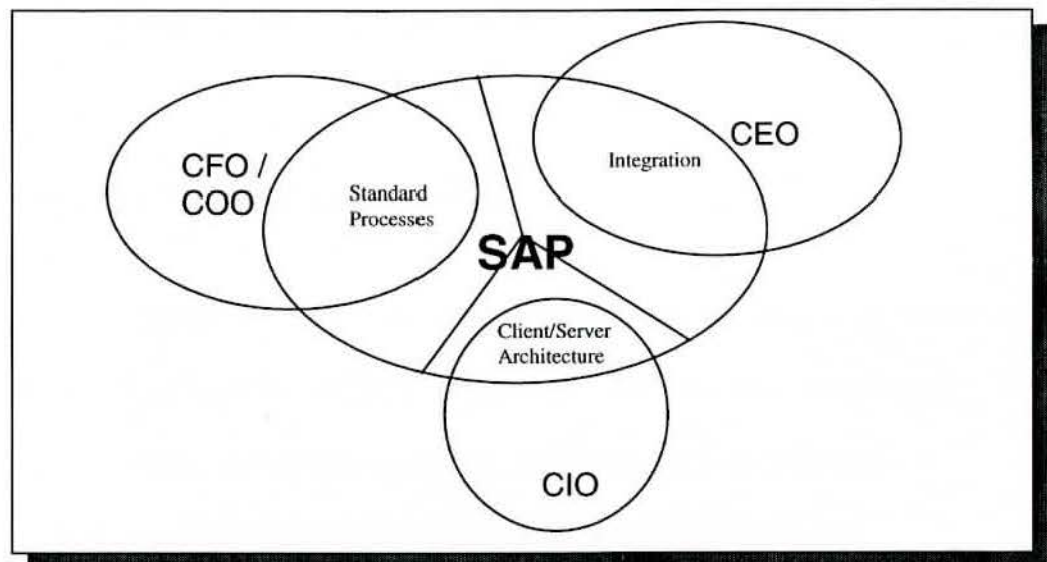
The business process writers that contributed to the Gartner Group series called "SAP Hope of the Future or Legacy of the Past" and Bobby Cameron have evaluated SAP and decided that the standardization of business processes can add value to an organization if done properly. An information technologist, like Julia King, identifies major savings on IT infrastructure through the use of a Client/Server architecture, such as the one SAP uses. The Software Engineering Institute at Carnegie-Mellon University defines the client server architecture as:

As a result of the limitations of file sharing architectures, the client/server architecture

emerged. This approach introduced a database server to replace the file server. Using a relational database management system (DBMS), user queries could be answered directly. The client/server architecture reduced network traffic by providing a query response rather than total file transfer. It improves multi-user updating through a GUI front end to a shared database. In client/server architectures, Remote Procedure Calls (RPC) or standard query language (SQL) statements are typically used to communicate between the client and server. (Client/Server Software Architectures - An Overview)

Figure 3.4

Where Executives See Value in SAP



According to the business strategists, information technologists and business process writers, there are three distinct areas in which SAP provides the firm with value. (Figure 3.4)

This figure shows how the major stakeholders' views overlap with the advantages that SAP provides to the organization.

According to Jeff Moad, and also briefly acknowledged by change

management writers such as Julia Vowler and John Xenakis, we can see where the stakeholders' interests overlap with the advantages of an ERP system like SAP.

Writers in this section were also concerned with the "lessons learned" from previous ERP implementations. So, due to the relative newness of ERP's, descriptive facts, rather than empirical data, has been presented. Statistical studies and sampling are essentially non-existent. The researchers have provided their insights pertaining to specific implementations and suggested ways to learn from these past implementations.

Roles of Organizational Leaders

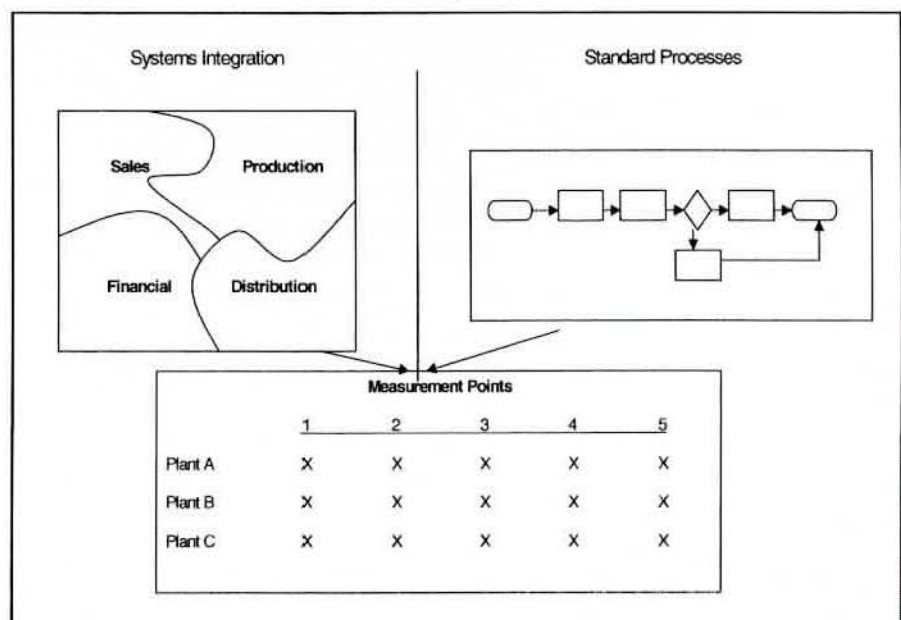
According to the business strategist, the CEO appears to be the most concerned with the integration of information across the organization. The COO and CFO, and the business process writers, seem to be the major proponents for standardizing processes across the organization. Finally, the CIO and information technologists seem to be the sponsor of the client-server architecture. This is an important point because each of these sets of analysts seems to discount the importance of the work of the other groups. For example, Gail Edmondson in her article "Silicon Valley on the Rhine" identifies that integration is of

key importance because it gives CEO's the information they require when they require it. However, she only briefly acknowledges that standardized processes and a Client /Server architecture are also very important in the scheme of things. (Edmondson) Another example is where John Xenakis in his article "Taming SAP" touts the business process standardization that is done and it's respective advantages to the COO and CFO, but does not acknowledge the other benefits that are derived with an SAP implementation. An SAP implementation will fail if each of the major stakeholders do not see the advantages that are derived across the board. (Xenakis)

According to Jeff Moad, another "ingredient" to a successful SAP implementation is the elimination of redundant or duplicate processes. (Moad) The next question that needs to be answered is that if the systems are integrated and the processes

Figure 3.5

Integration



are standardized across the organization, how does that meet the goals that the three sets of major stakeholders? (Figure 3.5) Figure 3.5 shows how the implementation of SAP can integrate systems and standardize processes. In fact, when analysis is conducted in the organization, we can see that the measurement points that were inconsistent in Figure 3.3 are now consistent across the organization. The needs of the COO and CFO are now met; the standardized processes are in place, which provide consistent measurement points for comparison of plants across the organization. This can now provide the CEO with information organized in an integrated fashion. This also allows the CEO to

Figure 3.6

Categorization of Writers

Project Phase	Writer Type	Why an SAP Implementation is Important	Stake Holders
Strategy	Business Strategist	Integration	CEO
Analysis	Information Technologist	Client/Server Architecture	CIO
Definition	Business Process	Standard Processes	CFO / COO
Transition	Change Management	N/A	N/A
Improvement	Researcher	N/A	N/A

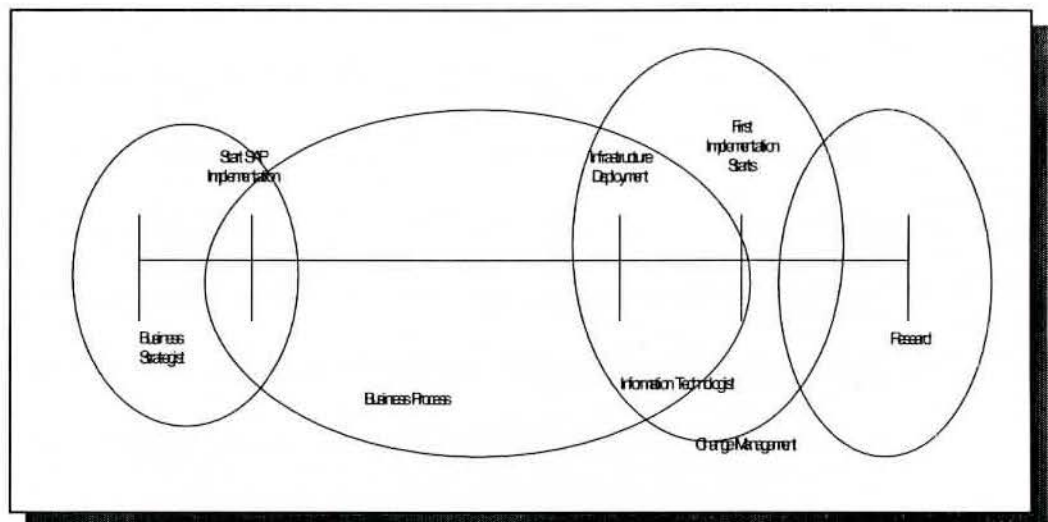
now have more reliable information, for making decisions and reporting to the owners of the organization (Moad).

Change Management & Researcher

According to John Xenakis, another "ingredient" to a successful SAP implementation is meeting the expectations of the stakeholders (Xenakis). In review of Figure 3.6, it shows how the various writers are categorized, by phase of an implementation, based on the Price Waterhouse System Implementation Methodology. Also in the figure is the philosophy of each category,

Figure 3.7

Writers vs. Implementation Timeline



the importance of implementing SAP to each group, and the stakeholders that each group has identified. For example, the strategy phase of an SAP implementation is the focus of the Business Strategist, and their typical audience is CEO's. Both the

researchers and CEO's see integration is an important factor in the decision to implement SAP. The Information Technologist focuses on the Analysis phase and identifies the Client/Server architecture as an important factor. Typically, the CIO believes this to be true also. The definition phase of the project is the focus of the business process writers. CFO's and COO's usually identify with the idea that standardized processes across the organization are an important factor in considering a SAP implementation. The other writers, the change management and researchers group, although they are important in the evaluation of the success of an SAP implementation, they are reactionary writers. Their focus tends to be on the effects of the decision, after the organization has decided to implement SAP - the implementation process. The Business Strategist, Information Technologists and Business Process are proactive, involved in the decision process and are important stakeholders in the design of the overall "To Be" or "Future State" of how SAP will be utilized. This discussion has allowed categorization of the writers into the implementation time line. (Figure 3.7) This is important because it helps to define where each of the writers have the most influence and also where the respective stakeholders are most involved. In Figure 3.7, there is a fall out on an implementation timeline. The methodology identifies that each phase of the project has a certain starting and ending

point within the implementation. Most of the writing and analysis that occurs for SAP implementations occurs at the end of the implementation. We can also see that the Business Strategist writer focuses mainly on the very beginning of the implementation and the business process writer focuses over most of the implementation. This also implies that the stakeholders that typically read the writings of each of the writer types also focus their time based on where the writer writes on. This facet of the figure will be discussed in Chapter 5 along with the methods recommended by the authors to ensure a successful SAP implementation.

Statistical studies and sampling are non-existent with these researchers also. So, cases studies, rather than hypothetical data has been presented, once again. These researches focus on the pitfalls and successes of previous implementations and suggest improvements, so the same mistakes are not re-created.

CHAPTER IV - RESULTS

Introduction

Each phase in an implementation has certain factors that need to be considered and worked around when implementing a SAP project. These writers have been focusing on the factors that affect only their phase or philosophy of thinking. The following is a summary of the major factors for each phase that should be considered when in a project implementation.

Strategy Phase

When considering all the different factors associated with SAP, one question that must be asked is will the expense of implementing SAP be worth it in the end? This is what is analyzed and deliberated during the strategy phase. Business strategists analyze whether this project gives the company such a competitive advantage that it is worth allocating the funds for the project. They focus on the complexity of analyzing the corporate changes and the complexity of implementation.

All business strategists' writings focus on this, and Xenakis is one example of these thinkers. The first step in this phase is to scrutinize the company's current policies and procedures and determine whether they really are the best practices for this

organization and industry. This is such a complex task because it requires the integration of policies between different groups in the firm. It requires communication between the different departments and some compromise between departments to ensure the smooth running of the organization as a whole. It is a time to question everything, scrutinize the policies and procedures, determine what policies should remain in place and set into motion some big changes.

The complexity of the system and initiation of SAP into the organization is also a matter to be investigated. Once the future state of policies and procedures has been decided on, it now must be integrated into the workings of the software system. This requires a clear representation of how paper, materials and information will flow, so it can be accurately followed within the system. For example, in SAP, marketing, manufacturing and finance all have different stand-alone modules that share information with each other. It must be assured that information that crosses group boundaries is set-up appropriately within each module.

In considering this system set-up, other factors should be considered that are often over-looked. The employees must be trained to use the system, data must be converted from legacy systems and analyzed and the new system must be tested to

ensure proper procedures. These factors are the most underestimated parts of SAP when it comes to analyzing the time and cost of implementation. (Slater)

The difficulty of making changes to procedures and systems requires complex software, such as SAP, a well-thought out plan, knowledgeable consultants and employees, and, consequently, a lot of money. Business strategists feel that each organization should question the expenditure of these monies and determine whether the expense provides the company with that competitive advantage that they are looking for.

Analysis

If the decision is made to implement SAP, in what way does it provide the company with a strategic advantage? The analysts focus on two ways that this could provide the company an advantage: instantaneous information and integration of systems.

The first way that this package offers an advantage is through instantaneous information. This is the dream of the CFO and other leaders in the firm – a quick view of the company's financial situation at any point in time. In the information age, accessibility to real-time information can help a company analyze cash, inventories and receivables on a daily basis. This quick analysis can help a company to make better and faster decisions,

and find company waste and errors quickly. This leads to a more efficient and inexpensive way to run an organization. For example, most legacy systems use batch processing, rather than real-time processing. This meant that an accounts receivable clerk would input a check on a customer's account and it would not be until that night or that week that the account, and cash balance would be updated in the system. With real-time processing, the customer's account and the company's cash balance are updated at that moment.

Another way that SAP can provide an advantage is by integrating many legacy systems into one. In many organizations, systems grow like dandelions over the years. This requires moving data from one system to another. Sometimes this is done manually, which can lead to input errors. Sometimes this is done through linking the two systems, which requires networking between the two systems, which is not always accurate either. There can be mistakes made in the programming, where fields do not match up, and there can be breakdowns between the two systems. SAP provides an advantage in that the modules are inter-related and data will not vary from one module to another. For example, when a purchasing clerk buys a raw material in SAP, the purchasing clerk, production manager and receiving clerk are all using the same screen in the system with access to the same data.

Compare this to using two or more different systems, where there may be differences due to the manual entries or fields between the two systems for example units of measure. Both systems could use different numbers for inventory parts also, which can lead to miscommunications and mistakes.

Though SAP can provide these advantages, there are two pitfalls that the analysts point out. The first is that technology should not be used just for technology's sake. ERP Systems are not always needed. Sometimes a tactical package, such as a MRP system can deliver 60 or 70% of the results an ERP implementation might have been able to give, while saving millions in implementation expenses. Another way to side step an implementation is to forge agreements with related parties, mainly customers and suppliers. Sometimes, the organization can develop integrated systems with these parties to transfer information.

It is also a mistake to think that implementing SAP will bring an end to the woes of an organization. The different groups within the organization must buy into the implementation to make it successful. Support for this project must be communicated from the top down, or the corporate culture will never support this new system, for two reasons. The first is that people are afraid of the unknown. If no information is known about this new system, they

may be afraid of the changes, or even losing their jobs.

Communication of the process can help subside these fears. The second reason for communication is that if the users of system do not understand and support the importance of this project, it will fail. These options should be considered during the strategy phase, and a plan should be put into action to decide how to show support for the project.

Definition / Reengineer

This part of the project is the most time consuming and work intensive of the entire effort. The system is designed and configured to meet the future state policies and procedures. It then needs to be tested and analyzed to ensure proper flow of data and information. This requires great attention to detail. If it is not implemented properly, it can have grave consequences to the company, as shown in the Corning Ware example in Chapter 2. When it is implemented properly, though the corporation can take full advantage of the system that they have chosen to implement. Analysts focus on what barriers there can be to implementation – the effects of proprietary interfaces, changes to the corporation and time, and how to evade these barriers.

According to Woodring, The largest barrier to re-engineering the system is the proprietary interfaces that SAP requires one to

use. This is because some parts of SAP will not replace legacy systems; they will stay in place. One example is with Seibal Systems variant configurator. This information technology tool is used as a sales front end to allow for simpler input and integration to the web. SAP has a module that is integrated with the sales operations portion of SAP. Customers that must have this functionality must either maintain separate systems or create an interface between the two. This is a costly and timely proposition, but in the end it can make sales processing more efficient depending on the needs of the organization.

Another situation to deal with is how to handle the actual organizational and procedural changes within the configuration of SAP. To gain the advantages of real-time processing, as stated before, SAP requires the re-engineering of complex business processes. There must be a clear communication of these changes to the project team, so the system is configured properly to handle these new flows. Team members and all employees must have an understanding of how their piece fits into the whole puzzle.

Time is the enemy in this phase. The faster that the system can be implemented, the lower the cost of the implementation, but it also leaves more room for oversights and mistakes. A sufficient time-line must be developed to ensure that everyone knows the deadlines for certain major points. The time factor also effects who

will handle the configuration and modifications to the systems. The more consultants that will be used, the more expensive the project. But, the consultants may have more experience in implementations, and may be able to implement faster than using company employees who are learning on the job. Also, the more modifications that are made to the current system, the more time consuming and expensive the project. However, the utilization of many consultants could also lead to the lack of ownership in the business and the overall success of the project.

Due to all of the changes and expenses that can occur in this phase, it must be handled in the most efficient way possible. Every organization has its limitations – implementing SAP or any complex system is a skill that is acquired over time, if the employees do not have these skills, some should be hired, or consultants should be hired to help the company wade through this process. It is useful to have employees that have information technology or procedural skills on this project, as they can use their background as a basis. The SAP knowledgeable people can help them through the SAP specifics.

The project manager is of key importance also. The project manager needs to have strong long-term planning skills. If the project manager can not juggle the long-term planning, employee administration and technology needs for the project, it will fail.

Transition / Roll-out

Transition of the project into the company is one of the most delicate steps in the process. This stage focuses on the changes being made within the organization and how it effects the people. Of concern are communication issues, timing of the project, training and limitations of the project.

As stated before, communication about the project must come from the CEO and other leaders. If support is not given from that level, the project has no chance to succeed. The leaders must show that they deem this project important, in order for the rest of the organization to take it seriously. There are five main reasons for top management to show this support:

- A SAP implementation is not just an IT project, it is a company-wide project. It will either benefit or damage the whole organization.
- Processes **MUST** be changed for the improvement of the company. It must be shown that management supports these changes to benefit the organization.
- Rewards and incentives will help individuals to adapt to the changes.
- An organization's culture will need to be evaluated to see if this is all possible.
- The Project Manager must play an active role in communication to the organization. To have an effective active role, this person must have obvious support from management.

If management does not show support for the project, or if information about project happenings is not communicated to the

employees, it only harbors resentment of the project, or fear of the unknown changes. (Diamond)

Timing of the implementation is of utmost importance also. Implementation should be done during a slow season. If you try to do it during a time when orders must go out the door, the employees will be too busy filling orders to work on the implementation. There is also the possibility of problems in bringing up the system and therefore, stalling out-going orders. Implementing during a holiday will only cause problems also. For example, if you choose to implement on January 1, this will cause resentment among the employees you are counting on to implement this project correctly.

Training of the employees who will be using the system is also a must. There are a few factors that affect an effective training session. First, training should be done in the context of a person's job – how it will be changed and how they will use the system to perform their job. It should not be shown as a simple transaction code. The appropriate paperwork and system transactions should be shown as one process. Second, if there is no one the team with appropriate training skills, help should be hired for this process to ensure successful communication to employees. Next, materials should be plentiful, and should explain, in detail, each step of the process that must be followed when using the system. If the

training process is not effective – the users will not be effective.

The users are the key to the system working properly. So, training must be adequately planned.

Improvement / Evaluation

This is the phase that comes after the initial implementation of the system within the organization. This requires an analysis of the implementation after the fact. It is a time to find any places in which the company can improve the processes it implemented and how well the new system took within the organization. It is also a time to learn about how to improve any future implementations.

The aspect that affects the current organization the most is what improvements can be made to the system or procedures. Was there anything that was over-looked during the previous phases that can be modified now to make the organization run even better? There usually are these changes to make. Hopefully, the project planning was thorough enough so there are few of these changes to make. It can be hard though, to foresee everything that can happen in a “live” system, so it is not unusual to have some of these modifications or upgrades. This step also entails looking at the system in production and determining if any mistakes were made. Is there a process within the system that is not working the way it was intended to? This is the time to fix those mistakes.

From an outside view, which is where the research firms come in, outsiders look at the implementation and decide how successful it was. First, they try to determine if this implementation really did provide the firm with a competitive advantage. There are many factors to consider here. Has it improved sales order processing, or inventory turnover, for example? If the answer is yes, have these improvements increased efficiency enough to justify the cost of the implementation? If the company can define cost savings because of this implementation, it probably was a success. Second, they analyze the amount of any unplanned downtime because of the implementation. Was the system running as promised, when it was promised? If there were no problems in the upstart, that is also a contributing factor to success. Third, they consider how the corporate culture reacted to the changes. If it was a smooth transition, with only minor bumps along the way, it can be a contributing factor to success.

Conclusion

These are the factors for each phase, that ensure the success or failure of implementing SAP. All of these factors are important for project personnel to consider and factoring into timelines, project administration, etc. It is important not to wear

blindness in this process and look beyond the effects of one phase of the project.

Chapter V – Discussion

As Price Waterhouse's, The Methods Handbook identified a specific time-line for implementation of ERPs, in the graphic titled "Integrated Method Life Cycle" this gave a dramatic view of how an SAP project can be broken down into five manageable pieces or phases. (Price Waterhouse 4.4) These groupings had three characteristics that are important to note. The first is that writers with a certain educational and experience background can be correlated to different phases of a project and these people tend to be consumed with their general area, rather than the impact on the project as a whole. Second, writers that were corralled to a specific group had a laundry list of similar concerns in each group. And third, each of the writers minimized the impact of other groups influence over the project.

Discussion Point 1 – Identification of Writers to Phases

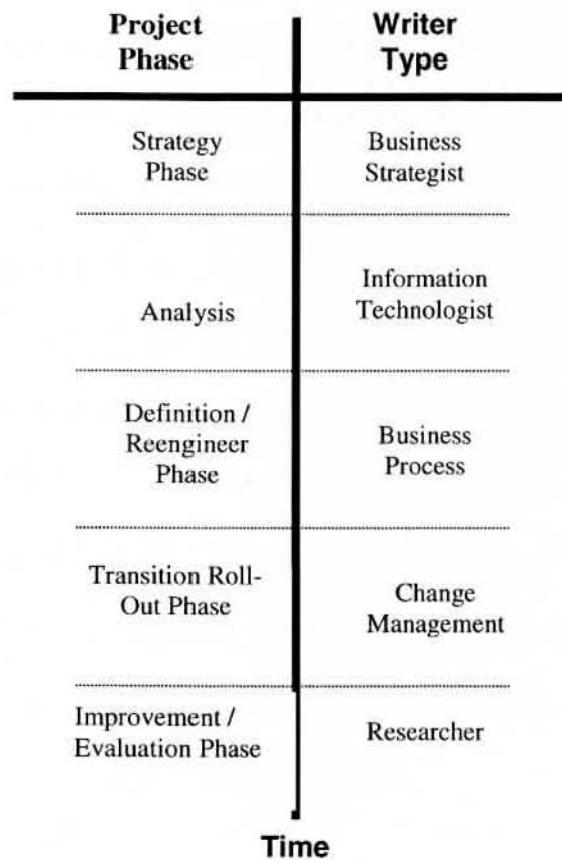
It is apparent that the writers on the subject of SAP hold differing opinions of the importance of a SAP implementation and how to successfully implement SAP. (Linear View) (Price Waterhouse 4.4) Being able to identify each with a particular point of interest allows for a better comparison and contrasting viewpoint. Since each writer falls into a particular realm of thought, they can be compared against the writers in their category, and only their

category. Also, since they can be categorized into a certain thought area, they can then be identified with a certain point on the timeline. (Figure 4.1) For example, the strategy phase is always at the beginning of a SAP implementation and the improvement phase is always at the end of a SAP implementation. Though each project may have its own concerns and situations, the basic model of time line can be used for each situation.

Once a writer had been identified as a certain type of

Integrated Method Life

Cycle (Linear View)



thinker in a certain area, and after reviewing the Integrated Method Life Cycle (Linear View) diagram in the methods handbook it became a fairly simple task of identifying a writer to a specific phase of a SAP implementation. After classifying each of the writers into a particular phase it was easy to compare and contrast writers within each phase. For example, in the Analysis phase both Jeff Moad and Malcolm Wheatley are identified as Information Technologist writers. Although both writers focus on the same phase, it is easy to contrast how Jeff Moad approaches the concern from a systems and manpower standpoint, while Wheatley is concerned from a data integrity and duplication perspective. Although both views are supported in their respective writings and by other writers, each approach the concern from a different viewpoint, the common element here is the hardware technology and its application in regard to SAP. It would be impossible to compare Jeff Moad to Bobby Cameron, who is classified as a Business Process writer and is focused on the Definition phase of a SAP implementation. Since the two focus on different phases, and have differing philosophies, there is no definitive way to compare the opinions of the two writers. Moad's is a technology perspective and how SAP can be supported from a hardware perspective, and Cameron is concerned with a business process perspective.

Discussion Point 2 – Writers were not focusing on the entire SAP implementation

The second result of the research was the narrow perspective from which each of the writers had on a SAP implementation. Each of the writers have their own specific background, such as Jeff Moad, a business strategist. His background is in technology, with a degree in computer science, an MBA and he writes articles for PC Week, a technology magazine dedicated to business managers. His background at the magazine would lead one to believe that he does not spend much time identifying the impact of business strategy decisions on an organization.

Compare Moad to Xenakis, a technology editor for CFO Magazine, who is concerned about the impact on the organization after the implementation is complete. His focus is on change management. He wants to determine how well top management communicates the importance of the project, how jobs are modified and how well organizations come within their budget. While, it is apparent that Jeff Moad is focused on how SAP can improve the strategic position of the organization. He is focusing the very beginning of a SAP implementation, the Strategy phase. (Figure 4.1) However, his thoughts on how the organization's structure, technology, procedures, and job

descriptions will change and how the organization will prepare for that change, are non-existent.

Another example of this is in Bobby Cameron, in his article of May 1996 in the Forrester Report, "Analyzing the impact of packaged application on business performance". He is focusing on how, from a business process perspective, SAP can help an organization standardize its business processes. His focus is on the definition phase. However, he fails to state why, from a strategic standpoint, it is a good business decision. In order to fully understand the impact of decisions in the Definition phase, one must take into account all of the other decisions and their respective impact on the overall SAP implementation.

Discussion Point 3 - Writers Concerns by Phase

Utilizing the Price Waterhouse Integrated Life Cycle Diagram in "the methods handbook" on page 4.4 and the identification of writer type to a phase, (Figure 4.1); the following is a description of the ingredients that each group has identified as important.

Strategy – Business Strategists

These writers focus on the strategic goals of the organization, and how the ERP can help to achieve goals.

Initiation – Information Technology Specialists

These focus on the implementation from the perspective on how it effects the system requirements of the organization. They focus on whether the existing technology can handle the proposed package.

Definition - Business Process Managers

These people are concerned with how the business processes in the organization will be modified and how the system will handle the current practices that are to be kept and how to transition in the modifications.

Transition – Management Researchers

These researches are concerned with how the organization handles the change from a cultural viewpoint. They are concerned with the effects on the people, job descriptions and tasks.

Improvement – Information Technology Research Firms

The firms are mainly concerned with the after affects on the corporate culture. This is the phase that tends to "stand alone". It

is effected by all of the other phases, but it is a continually improving process.

It is clear to see that the success or failure of each one of these phases can have a major impact on the success or failure of the project as a whole. Each phase though, does effect the other phases, so while you need specialists in each area, they need also to keep an eye open on how their step effects those down the road.

Discussion Point 4 – Following the process is important

Since each author has a different idea as to what phase is important in the ERP life cycle, it is important to have the timeline established early on in the project, to integrate all of these phases into one successful project. There are two reasons why everyone on the teams must understand that there is a process or lifeline to follow in order to ensure success for the project as a whole. First, following the lifeline will allow order and continuity throughout the life of the project, which is usually an extensive life. The second reason is that this will allow the team members to stay focused on their tasks.

This is why the timeline needs to be communicated to all involved in the project, so they can see the impact their part has on others. For example, the Business Process Managers are

concerned with the actual placement of the new procedures, while the Management Researchers are concerned with the impact of the changes on the corporate culture. There needs to be a meeting of the minds between these two groups so they can work together and not against each other. The Business Process managers need to understand that the changes to be made will have an impact on the corporate culture and there needs to be certain steps to follow, such as training and issuing new procedures, so there is a minimum impact on the project. The management researchers need to understand that this project is a major undertaking and there will be unavoidable changes made to the organization. As long as each group has an understanding of the impact of the other groups have and how they can work together to, the whole project can make a smooth transition.

Following the lifeline is also vital to allow the team to know what their responsibilities are everyday and allow them to focus on their part. It can be a difficult task to keep everyone focused on their piece of the puzzle, while also trying to have them think about how their piece fits into the whole puzzle. If they have an idea of how their work impacts others, they can stay focused on the task at hand, knowing someone else is depending on them. For example, the Management Researchers can not prepare any training

programs for the new procedures, until they know what they are. It is important to keep those communication lines open.

- Must follow the process in order to get best results.
- Following the process provides order and continuity throughout the long project life cycle i.e. You know what your are to do everyday.
- Following the process keeps the team focused. The writers only focused on one phase at a time and did not get the big picture.

Discussion Point 5 – Do not under estimate the complexity of the project

Having a project like this with a timeline, which can extend as long as a year and can have hundreds of people working on it becomes a complicated task. It can be a scheduling nightmare having people from different backgrounds, like the ones presented, who each have different priorities, focusing on what is important for this particular project. There needs to be one person, or a team that can understand the complexities of each situation and the different priorities and make the appropriate decisions when it comes to implementing the timeline.

It is up to this person to decide how much time is enough for the business process managers to determine the new procedures and processes. Once this task is done, they then must decide how much time to allow for the management researchers to prepare for training, and transition in the corporation. There must be adequate time for each team to do their job, and pass it on to the next phase. If the planning is not coordinated properly, or if the different groups do not communicate their needs appropriately, it can cause large delays in the project, as shown in the previous chapters. A delay in the Strategy Phase of the project, this impact can be felt all the way down the line to the Improvement Phase.

Conclusion

It is clear based on the research that I have completed that there is no definitive research that has been conducted on this subject. In fact there has been no empirical research completed to support or contradict the statements and writings of the various authors presented in this paper. In fact it is clear that in some situations, like Owens Corning, even the company that implemented SAP is not sure if there was a benefit or not. Although analogies and war stories that are quoted in some of the writings would suggest otherwise. It is clear that to truly determine if implementing a complex system like SAP is worth it or not, true empirical research is needed.

References

(Note: Many references are from electronic versions of publications provided by Knight-Ridder Business Base and as such do not have page references. Instead of using page numbers the word "Database" is used. Additionally some sources were obtained through a magazine web site. In those situations I have replaced the page numbers with the website address)

1. Baatz, E. B., "Ready or Not", CIO June 15, 1996:
http://www.cio.com/archive/061596_sap_1_content.html.
2. Bauer, Sylvia, "Drink giant takes a gulp of client/server; Cott Beverages Ltd; Feature Report", Computer Dealer News June 13, 1996: 31-33.
3. Beckmann, Scott Interview
4. Block, J., "ERP Optimizing Business Functions", Knight-Ridder Business Base-Inside Gartner Group This Week January 24 1997: Database.
5. Bucholtz, Chris, "The Ultimate Deadline", Telephony: January 12, 1998: Dow Jones Publications Library Database.
6. Busse, Torsten, "SAP bolsters configuration tools, eases R/3 installation", InfoWorld March 25, 1996: 38.
7. Cafasso, Rosemary, "Users of SAPs R/3 client/server tools say some installations not as quick as vendor claims", Computerworld March 27, 1995: 75-76.
8. Cameron, Bobby, Woodring, Stuart, Nordan, Matthew, and Hillman, Mark, "Analyzing the impact of packaged applications on business performance", Forrester, The Forrester Report, Packaged Application Strategies October 1997: 1-10).
9. Cameron, Bobby, "ASAP Drives R/3 Implementations", Forrester, The Forrester Brief, Packaged Application Strategies June 27, 1997: 1-2.

10. Cameron, Bobby, and Woodring, Stuart, "Why are R/3 Implementation Costs So High?", Forrester, The Forrester Brief, Packaged Application Strategies July 30, 1996: 1-3.
11. Cameron, Bobby, Colony, George and Lieu, Ketty, "The Buy/Build Dynamic", Forrester, The Forrester Report, Packaged Application Strategies May 1996: 1 – 12.
12. Casonato, R., "iXOS: A company to consider for R/3 Image-Enablement", Knight-Ridder Business Base-Gartner Group-Inside Gartner Group This Week February 10, 1997:Database.
13. Client/Server Software Architectures - An Overview, The Software Engineering Institute at Carnegie-Mellon University, http://www.sei.cmu.edu/str/descriptions/clientserver_body.html (January 24, 1999)
14. Cortese, Amy, "Here comes the intranet", Business Week February 26, 1996: 28-35.
15. D'Alessandro, Jennifer, "Purchasers Trim The Fat", Electronic Buyers' News May 9, 1994: 38.
16. Dresner, H., "SAP and BI: Big Plans, Limited Options", Knight-Ridder Business Base-Gartner Group-Gartner Group Research May 28, 1997: Database.
17. Duffy, Jim, "3Com takes its time with R/3", Network World June 24, 1996: 16.
18. Dyck, Timothy, "Good things in small Oracle package", PC Week December 9, 1996: 77-78.
19. Edmondson, Gail, "SAP's business applications have taken the Valley by storm", Business Week August 8, 1994: 53.
20. Edmondson, Gail, "For \$25,000, Pandesic can Put a Startup on the Net". Business Week August 8, 1994: 163.

21. Farnham, Alan, "In Search of Suckers", Knight-Ridder Business Base-Fortune October 14, 1996: Database.
22. Goff, Leslie, "SAP Central", Computerworld July 8 1996: 103.
23. Greenberg, Ilan, "SAP beefs up support, plans to shorten implantation time", InfoWorld September 25, 1995: 16.
24. Greenbaum, Joshua, "Major league software vendors are courting companies in the minor leagues", LAN Times March 4, 1996: 59.
25. Gu, H., "SAP in Transition ASAP", Knight-Ridder Business Base-Gartner Group Software Management Strategies December 13, 1993: Database.
26. Harding, Elizabeth, "Challengers eye U.S. enterprise tools market; with SAP thriving", Software Magazine March 1996: 24-25.
27. Hayden, Kevin, "Database decision is critical in supply-chain implementation", Manufacturing Systems June 1996: 66-68.
28. Iansiti, Marco and West, Jonathan, "Technology Integration: Turning Great Research into Great Products", Knight-Ridder Business Base-Harvard Business Review May 1, 1997: Database.
29. Janah, Monua and Wilder, Clinton, "Special Delivery", Information Week October 27, 1997: 42 - 60.
30. Johnson, Robert, "When Time is Money", Knight-Ridder Business Base-Fortune Technology Buyers Guide Winter 1997: Database.
31. Jones C., "Manufacturing Applications Strategies", Knight-Ridder Business Base-Gartner Group - Computer Integrated Manufacturing February 13, 1997: Database.
32. Jones, C., "Deploying ERP: Compromise for Large/Complex Enterprises", Knight-Ridder Business Base-Gartner Group - Computer Integrated Manufacturing April 29, 1997: Database.
33. Kalakota, Ravi, "Intranets: the SAP-killer?", Computerworld March 11, 1996: 37.

34. Keller E., Comport J., Dailey A., Jones C. and Magrassi, P., "SAP Hope of the Future or Legacy of the Past Part 1", Knight-Ridder Business Base-Gartner Group-Gartner Group Research June 27, 1996: Database.
35. Keller E., Comport J., Dailey A., Jones C. and Magrassi, P., "SAP Hope of the Future or Legacy of the Past Part 2", Knight-Ridder Business Base-Gartner Group-Gartner Group Research June 27, 1996: Database.
36. Keller E., Comport J., Dailey A., Jones C. and Magrassi, P., "SAP Hope of the Future or Legacy of the Past Part 3", Knight-Ridder Business Base-Gartner Group-Gartner Group Research June 27, 1996: Database.
37. Kerstetter, Jim, "Peoplesoft readies components", Infoworld December 9, 1996: 11.
38. King, Julia, "SAP AG boards "net bandwagon", Computerworld March 11, 1996: 4.
39. King, Julia, "Firm reaps benefits of arduous trip to SAP", Computerworld March 4, 1996: 70.
40. King, Julia, "Vendors turn on the tap of R/3 tools", Computerworld July 22, 1996: 69-70.
41. Kolbasuk-McGee, Mariann, "Ikon writes off \$25M in costs on SAP pilot", Knight-Ridder Business Base-Information Week March 21, 1997: Database
42. Lapolla, Stephanie, "R/3 scales to mainframe", PC Week December 23/30, 1996: 17.
43. Light, M., "Evaluating SAP's R/3 3.0, Part 1", Knight-Ridder Business Base-Gartner Group-Inside Gartner Group This Week November 29, 1995: Database.
44. Light, M., "Evaluating SAP's R/3 3.0, Part 2", Knight-Ridder Business Base-Gartner Group- Inside Gartner Group This Week December 6, 1995: Database.

45. Mirchandani, V., "The SAP Implementation Market Place", Knight-Ridder Business Base-Inside Gartner Group This Week May 3, 1996: Database.
46. Mirchandani, V., "Implementing SAP R/3 Avoid Becoming a Statistic", Knight-Ridder Business Base-Gartner Group-Inside Gartner Group This Week May 29, 1996: Database.
47. Moad, Jeff, "R/3: Little material gain for Applied", PC Week May 20: 1.
48. Moad, Jeff, "Hanging on for Dear Life", PC Week November 17, 1997:146.
49. Mullin, Rick, "SAP conference addresses process industries", Chemical Week September 27, 1995: 16.
50. Musca, Jim, Interview.
51. Musich, Paula, "Unicenter to support R/3", PC Week December 9, 1996: 6.
52. Pickering, Wendy, "SAP CEO Besier resigns, will go into Business@Web", PC Week February 5, 1996: 10.
53. Picarille, Lisa, "Standardization choice put off", Computerworld July 3, 1995: 4.
54. Plishner, Emily, "Tenneco's New Business", Knight-Ridder Business Base-Journal of Business Strategy November 21, 1996: Database.
55. PriceWaterhouse, "Systems Methods Methodology", PriceWaterhouse November 1997.
56. Radosevich, Lynda, "Styled just for us, SAP's R/3 client/server application suite", PC Week April 8, 1996: 19.
57. Reimus, Byron, "The IT System That Couldn't Deliver", Knight-Ridder Business Base-Harvard Business Review May 1, 1997: Database.
58. Ross, Janne, Beath, Cynthia and Goodhue, Dale, "Develop Long-Term Competitiveness through IT Assets.", Sloan Management Review Fall 1996: 31-42
59. SAP Web, "SAP History", SAP Web Site @ <http://www.sap.com/aboutus/index.htm>.

60. Slater, Derek, "Hidden costs of enterprise software", CIO January 15, 1998:
http://www.cio.com/archive/enterprise/011598_erp_content.html.
61. Sliwa, Carol, "SAP customers to get Notes integration wish", Network World
January 8, 1996: 1.
62. Stien, Tom, "Andersen Consulting Sued Over R/3 Installation", Information
Week October 27, 1997: 34.
63. Stein, Tom, "R/3 Hits Snags: Porting App to IBM Hardware Proves Difficult",
Knight-Ridder Business Base-Information Week March 17, 1997: Database.
64. Stewart, Thomas, "Owens Corning Back From the Dead", Knight-Ridder
Business Base-Fortune May 26, 1997: Database.
65. Sweat, Jeff, "R/3 Management", Knight-Ridder Business Base-Information
Week June 9, 1997: Database.
66. Thompson, Carrie, "Development Focus; Westland Helicopters Ltd. Selects
SAP/R3 Software", PC User September 20, 1995: 51.
67. Vowler, Julia, "SAP's honeymoon comes to an end", Computer Weekly April
6, 1996: 14.
68. Vadlamudi, Pardhu, "SAP rallies thrid-party tools to bolster R3 access via
Internet", InfoWorld December 25: 12.
69. Whatis.com, <http://www.whatis.com/cgi-bin/redirect.exe/clientse>.
70. Wheatly, Malcolm, "Lighten Up", CIO February 15, 1998:
http://www.cio.com/archive/enterprise/021598_supply_content.html.
71. White, Joseph, Clark, Don and Ascarelli, Silvia, "This German Software Is
Complex. Expensive – And Wildly Popular", The Wall Street Journal March
14, 1997: A1 & A8.
72. Xenakis, John, "Taming SAP", CFO March 1996: 23-30.