Engineering Management
Field Project

Critical Success Factors In Implementing SAP ERP Software

By

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EXECUTIVE SUMMARY

This project gives an overview of the Systems Applications and Products in Data Processing (SAP) Enterprise Resource Planning (ERP) implementation roadmap and tools that make up a complete implementation method to allow any organization to plan and execute the implementation of SAP ERP software. The ASAP (Accelerated SAP) implementation methodology is used as the SAP implementation reference model in this study as most of the companies implementing SAP use ASAP methodology.

In a survey of software implementation effectiveness, more than 30% of projects were perceived to have failed because of a lack of effective project planning, while 10% were perceived to have failed because of technology-driven causes[1]. Critical success factors and reasons for SAP ERP implementation success and failures are discussed in this project. Content analysis of articles reporting SAP implementations in twenty companies from all over the world have been done. Ten of these companies had a successful SAP ERP implementation and the other ten were failures. Common critical success factors have been identified for successful SAP ERP implementations based on the content analysis. Sustained executive management support and their ownership of the implementation, project team composition and good project management especially pertaining to process design, testing and training of the end users are the most important factors contributing to the success of SAP implementations in most organizations. The lack of sustained management support / contribution and user involvement / training and testing seems to be the most important factors contributing to the failure of SAP implementations in most organizations.

ACRONYMS

SAP   Systems Applications and Products in Data Processing

SAP AG Supplier and patent holder for SAP process

ERP   Enterprise Resource Planning

ASAP   Accelerated SAP

CSF   Critical Success Factors

CRM   Customer Relationship Management

SCM   Supply Chain Management

BI   Business Intelligence

PLM   Product Lifecycle Management

ROI   Return on Investment

OCM   Organizational Change Management

BPE   Business Process Engineering

SLA   Service Level Agreement

SKU   Stock Keeping Unit

MRO   Maintenance Repair and Operational

INTRODUCTION

For a long time, companies struggled with extremely long project timelines in order to develop information systems that met their specific requirements. Companies had to develop a custom code which was tedious process requiring many programmers as well as significant end-user involvement. Moreover, after implementation most of these programmers needed to be retained for the maintenance of custom programming. Project timelines were dragged out because often business owners didn't know what they wanted until they saw it ("analysis paralysis") [2]. Many companies had departmentalized systems, which did not share information and thus became the "information silos" within an organization. This resulted in data discrepancies which resulted in companies taking a long time to close the books for quarter and year-end reporting. These unconnected and multiple systems also created a need for many distinct interfaces between systems that were not designed to talk with each other.

In order to eliminate these problems, a new breed of software systems, called Enterprise Resource Planning (ERP), was created. These systems provide a single source of data with designed integration between different functional modules (for example, Accounting, Sales and Distribution, Materials Management, Production planning, etc.). These ERP systems are customized using the table-driven customization method, which provide a common set of data source to the whole organization. Due to table settings instead of old-fashioned hard-coded program logic, new and changed business requirements are rapidly implemented and tested in the system. There are various ERP products available today for example from SAP, Oracle, PeopleSoft, JD Edwards, Salesforce.com, Baan, Microsoft, and HP to name a few.

SAP AG founded in 1972 is the world's largest Enterprise Resource Planning (ERP) software with 82,000 customers / 91,500 installations / 12 million users in 120 countries as of year 2009 [1]. The SAP system comprises of a number of fully integrated modules:

- Financials
- Human Resources
- Customer Relationship Management
- Supplier Relationship Management

- Product Lifecycle Management

- Supply Chain Management

- Business Intelligence

These modules or solutions, as SAP would like to call them, cover virtually every aspect of business management. SAP provides a standard business application software which reduces the amount of time and money spent on developing and testing all the programs.

With hundreds of companies implementing the ERP systems to make their business more efficient only few are very successful in implementing them. According to a survey done by Gartner only 60% of companies implementing ERP system claim they got expected benefits[3]. In general an implementation is considered successful if it is done within budget and time with meeting all the preset implementation goals as measured by ROI, etc. Also, it is important to understand that delivering an ERP system on time and budget doesn't make sense if no one in the company uses it.

In any ERP implementation lots of variables are involved like personnel (business side, technical side, support side, users), implementation partner (for e.g., IBM, Accenture, Cap Gemini, Delloite, Wipro, independent consultants, etc.), software and hardware vendor (SAP, Oracle, QAD, Peoplesoft, JD Edwards, Baan, Salesforce.com, Baan, HP, Microsoft, etc.), and implementation strategy. With so many things coming together in a matter of few months to a year or so for implementation it is important to know the critical factors for success and failures of an implementation. This field project is a study in depth of twenty SAP ERP implementations all across the globe (ten of them successful and ten of them failures) to determine critical success factors and what needs to be done and what mistakes to avoid for a successful implementation.

LITERATURE REVIEW

Literature review is divided into three sections: ASAP Methodology, Critical Success Factors, and Case Studies.

ASAP METHODOLOGY

SAP ERP implementation is the group of processes that defines a complete method to implement SAP software in an organization. The two methodologies used to implement SAP ERP are Conventional and ASAP[4]. Conventional methodology also known as SAP Procedure Model was widely used initially. In recent past years SAP Procedure Model has been overshadowed by the ASAP methodology as implementations with later methodology are fast and provide flexibility. Most of the companies implementing SAP ERP system use ASAP methodology with the exception of very large companies with revenues in billion dollars. Therefore, in this project ASAP is used as the reference methodology.

In 1996, SAP AG introduced the ASAP (Accelerated SAP) methodology. This methodology provides an excellent tool for small and midsize companies to rapidly implement SAP and take advantage of its integrated business processes. ASAP provides content, tools, and expertise based on thousands of successful implementations by SAP and its partners. The ASAP methodology consists of a roadmap that defines the five phases of SAP implementation process and supports these with a comprehensive project plan[5].

ASAP Roadmap

Phase 1: Project Preparation - This phase provides initial planning and preparation for the implementation which includes project plan, project scope, and project team organization. In this phase the initiation of the SAP ERP project, which includes the overall goals, detailed task plans, and processes is formally announced to the company. Main activities in the project preparation phase include a Kickoff meeting and Project team standard meeting which include the following tasks:

- Define project mission statements which reflect the overall company goals and vision for the SAP ERP implementation.

- Identify specific company objectives and business drivers for initiating the SAP ERP implementation like improved inventory turnover, reduced shipping costs, improved customer service.

- Identify business measurements and document the implementation goals. These business measurement tasks measure the success of the project, specifically the business-related goals. Examples of business related goals are: Integration of business processes, reduction of on-hand inventories.

- Identify project measurements and document implementation goals, and how they are measured, specifically the project-related goals. Examples of project-related goals are: Target dates for completion of specific implementation phases or milestones, measurement of actual expense performance versus budgeted costs, completion of a specific deliverable(s).

- Develop the change charter: develop a comprehensive charter for the change project within the organization.

- Assemble project charter components: prepare a document that consolidates the mission statement, business drivers, business measurements, and project measurements.

- Approve project charter: reach agreement between company executive management, the project sponsor, and members of the project team on the project charter. It is important to have all members in agreement so that total commitment can be achieved.

- Finally, most important milestone of this phase is kickoff meeting. This meeting should be conducted with high energy and should be attended by company senior management. A strong first impression is important to project momentum.

Phase 2: Business Blueprint - In this phase the scope of the implementation are documented and defined and the Business Blueprint is created. The Business Blueprint is a detailed documentation of the company's requirements. Application consultants and the Business Process Teams achieve a common understanding of how the enterprise intends to run its business within the SAP ERP System, by carrying out requirements-gathering workshops. The Business Blueprint is created by detailed documentation of the results

gathered during these requirements workshops. Furthermore, the Business Blueprint serves to document the business process requirements of the company. On this basis, a common understanding of how the company intends to run their business within the R/3 System is achieved.

A Business Blueprint comprises the following structure elements in a hierarchy:

- Organizational Units;
- Master data;
- Business scenario;
- Business processes; and
- Process steps.

The major milestones of the business blueprint phase are:
- Workshops to gather business requirements with the customer's functional leads;
- Creation of the detailed business blueprint document;
- Determination of changes to initial project scope and time schedule (if applicable); and
- Project phase review and sign-off from customer.

Phase 3: Realization - In this phase, all the business and process requirements gathered in the Business Blueprint are implemented. System configuration is done step by step in two work packages, Baseline and Final configuration. The consultants validate and update the configuration and demonstrate processes. The project team updates the work instructions (business process procedures, for example) and performs unit and integration tests. For success in this phase of the project the following are required:
- Minimize the number of changes to setup and scope as such changes significantly affect testing and training;
- Communicate clearly that your project and IT teams will be responsible for ensuring data quality and integrity of data migration;
- Ensure your project leads are present during all or large parts of system validation and acceptance testing; and

- Review all output documents – for example, invoices, purchase orders, and reports as well as financial statements before sign-off

The major milestones of Realization phase are:

- Software installation and customization based on the business blueprint;
- Data migration (if applicable);
- Validation of system setup;
- System testing;
- Definition of training and cutover plan; and
- Project phase review and sign-off from customer.

Phase 4: Final Preparation - In this phase, testing and end user training is completed with system management and cutover activities to finalize the readiness to go live. Furthermore, the Final Preparation phase serves to resolve all critical open issues. Upon successful completion of this phase, you will be ready to run your business in your live SAP ERP System. The following are required for success in this phase of the project:

- Officially announce to all stakeholders the training and cutover plan and the schedule; and
- Make sure each user participates in the relevant training.

The major milestones of Final Preparation phase are:

- Key-user and administrator training;
- System readiness for going live; and
- Completion of cutover activities.

Phase 5: Go Live and Support – This phase achieves the transition from a project-oriented, pre-production environment to successful and live production operation. The going-live and support phase consists of two distinct sub phases. First, the project is completed with a formal project closing. During this time, the software is used productively in day-to-day operations, all issues and problems are resolved, transition to the production support team is finalized, knowledge transfer is completed, and the project is signed off. Subsequently, the continuous improvement sub phase begins during which the production support team provides on-going support and assistance for post go-live. It

covers solutions for those activities which are standard in a productive environment: business changes; technology changes; or changes in the user community. For success in this phase of the project the following are required:

- Involve your executive steering committee in the project closing meeting for final project acceptance; and

- Make sure your functional leads of the project.
  – Monitor how end users work to ensure correct and consistent use of the software
  – Record all issues and required enhancements to performance, functionality, and usability to be discussed during the review and optimization conference

The major milestone of Go Live and Support phase is full production implementation of SAP ERP software.

CRITICAL SUCCESS FACTORS

Critical Success Factors are the limited number of areas in which results will ensure successful competitive performance. There is a plethora of research and data available for critical success factors contributing to a successful ERP implementation. In 1979, Rockart[6] was first to apply CSFs to ERP implementations. Since then Bancroft and Seip, 1996[7]; Clemons, 1998[8]; Holland et.al., 1999[9]; Kale, 2000[10]; Parr et.al., 1999[11]; Sumner, 1999[12]; Nah et.al., 2001[13]; Gargeya and Brady, 2005[14]; T.R. Bhatti, 2005[15] have presented studies on CSFs related to ERP implementations. The above mentioned literature was studied and CSF model for SAP ERP implementation by Esteves and Pastor 2000[16, 17], was selected for content analysis in this project. This is because Esteves and Pastor unified the CSF list based on various studies and created a unified model. This model is explained in detail below based on organizational and technological perspective along the ASAP phases.

Organizational Perspective

Sustained management support. Various studies on ERP implementations have shown that for any ERP implementation to succeed sustained support from top management is critical. An organization goes through a major transformation during ERP implementation, and the management of this change must be carefully planned (from a

strategic viewpoint) and meticulously implemented. Sustained management support is more relevant at the beginning and at the end of the implementation. The reason is that at the beginning senior management should help in the rollout of the project, analyze the business benefits, define the mission and scope of the project and provide the resources needed for the project. At the end, there is the need to encourage the system usage and help in the commitment of user involvement. The role of management to resolve conflicts and bring everybody to the same thinking, and to build cooperation among the diverse groups in the organization, often times across the national borders in case of companies having divisions in various countries should not be underestimated.

Good project scope management. Poorly defined specifications and a lack of change control procedures are one of the prime causes of ERP project failure. Project scope management is more relevant at the beginning when managers define the scope and in the last two phases because the scope is usually revised and changed. Senior management must ensure project scope changes are managed and documented in a formal manner. This includes, but is not limited to, delays in the schedule or requests for additional money.

Effective organizational change management and business process engineering. Any organization implementing SAP software must consider the organizational, human resource and business process issues associated with an implementation. Whether implementing specific components or wall-to-wall functionality, it is certain that the implementation will result in changes to some or all processes and potentially changes to job roles, responsibility, departmental boundaries, and organizational structure. Any initiative which requires or brings about change carries with it a risk that the change will not be accepted by the organization (for a variety of reasons) and as a result will prevent full realization of the planned benefits. OCM and BPE are more relevant in the second phase. In this phase the business blueprint is defined, and the business processes are documented. There is the need to understand how the organization intends to run its business within the SAP system and the changes in the organization.

Project team composition. A typical SAP implementation team consists of Project Manager, Project Leads, and SAP consultants (number depends on number and size of modules being implemented, typically one to two consultants per module being implemented for a midsize company), technical team, and testing team. Project team composition is more relevant in the first phase because it is when the project team is established, although it can be re-structured along the implementation phases and according to the implementation needs.

User involvement and testing is reported as one of the most important CSF in SAP ERP implementation by Bancroft et.al., 1996[7]; Bingi, Sharma, & Godla, 1999[19]; Esteves & Pastor, 2000[16]; Kale, 2000[10]; Nah et.al., 2001[13]. User involvement is relevant in the phases where their know-how is important to achieve a good customization of the system to organizational needs. They participate in the defining of business requirements, help in the analysis of the SAP configuration and in conversion of data and the testing of the system. Baronas and Louis[18] stated that "by involving end-users in decisions relating to implementation, workers may become more invested in the success of the implementation and more satisfied with the system through the social-psychological mechanism of perceived control." Testing can be done by end users or by a quality assurance team depending on the setup at the company.

Project champion role is the role of project sponsor and/or project manager. The project sponsor is devoted to promoting the ERP project and has the ownership and responsibility to obtain the project resources; the project manager is required to plan, lead and control the project on the run in its several tasks. The project champion role is relevant in all phases. It is less relevant in the third phase than in the others because this phase is dedicated to configuration tasks and here the role of the champion is to guarantee that everything goes according to the plan.

Trust between partners. During SAP ERP implementation different parties involved are the client or the company implementing the SAP ERP system, and the implementation partner which brings the SAP ERP implementation knowledge (e.g., IBM, Cap Gemini,

Accenture, Deloitte, SAP etc.) and, in some cases, some independent consultants. It is very important that trust is maintained between them throughout the implementation. Although it is more relevant at the beginning when all the stakeholders involved in the project should share their goals and knowledge and at the end when they have to analyze and again share their knowledge to finish the project with success.

Strong communication inwards and outwards. One of the reasons behind ERP implementation failure is poor communication between the team members. Poor communication may include failure to announce the reason for the up and coming effort, and continuing to advise the organization of the progress and importance of the ERP implementation to the company. Poor communications prevent different parts of the organization from assessing how they will be impacted by changes in processes, policies, and procedures. Communication is more relevant in the first two phases where there is a strong need of communication between senior management and the project team in the definition of project plan and scope, and in the final phase where there is the need of strong communication with the whole organization to start the go & live of the SAP system.

Formalized plan and schedule. Good planning and scheduling is the key to a successful SAP ERP implementation. Planning starts with the feasibility study, identifying the goals and planning, an approach to implementation which includes software, hardware, and personnel. Scheduling is very important to be able to finish the implementation within a certain time frame without going out of the scope of the planned project. Also, scheduling can be used as a good monitoring tool to quantify the progress of the implementation. Planning and scheduling relevance decreases during the implementation project. A good project plan will ensure better monitoring and coordination of activities during the whole implementation phase.

Adequate training program. Business users (end-users) training is necessary to make sure business ownership is within business units, not the technology team. Some of the companies train the employees from within the company on SAP software. They do that

to manage the systems themselves after the implementation partner has left. A training program becomes more relevant in Final Preparation phase because it is here where the training program of end users starts, but in the initial phases there are also training concerns related to project team training and to prepare end users.

Preventive troubleshooting, although not a very exciting part of implementation is important. Tracking and fixing problems before they go into production can save lot of time and money. Preventive troubleshooting is more relevant in the last phases, especially in the fourth phase during which issues arise when the system is being tested.

Usage of appropriate consultants is important since the consultants should be well versed in the SAP modules being implemented and have knowledge / work experience in the industry in which company operates. This prevents costly mistakes from occurring which could have been avoided otherwise. This CSF is relevant especially in the first phase where managers have to decide the how and when, and the number of consultants that they will incorporate in the project team.

Empowered decision makers include a group of people with business and technical knowledge at an expert level. This group of people may be senior level project members from within the company or from the implementation partner. In real world situations, most companies expect that their provider will proactively suggest best practices based on what they've learned from projects with other clients. Empowered decision making is more relevant in the middle phases because there is the need to quickly decide things and thus accomplish project plan/schedule on time.

Adequate ERP implementation strategy. A good implementation strategy is required for a successful implementation. A poor implementation strategy will not only result in higher implementation cost but may lead to a product that can break the company processes. Implementation strategy is more relevant in the first phase because it is in this phase that the SAP implementation strategy should be decided.

Technological Perspective

Avoid customization. SAP AG provides products that are industry specific and this eliminates the need for costly customization most of the time. These products are tested working solutions which are industry specific. Customization or any changes to the customized product is not supported by SAP AG. Avoiding customization has the same relevance along all the phases. Customization should always be taken into account when managers are making decisions.

Adequate ERP version. As the new version comes out, SAP AG stops supporting the older version after certain period of time. Selection of SAP software version is very critical as a company may not want to select an older version which won't be supported by SAP AG or jump into a latest version which has not been tested in the market thoroughly. Adequate ERP version has the same relevance in all the phases. From the beginning until the end of the project implementation, SAP AG recommends that the project team follow the upgrade of SAP software releases and should consider the adoption of new ones.

Adequate software configuration. Software configuration should be geared towards creating a seamless and integrated value chain. This is more relevant in phase three, when the SAP system is configured and more than 8,000 tables must be parameterized. The software configuration should follow the business requirements defined in the previous phase.

Adequate legacy systems knowledge is less relevant at the first phase because this phase is related to the preparation of project implementation. In the next phases the need of knowledge of legacy systems is more relevant in order to minimize the effort of configuration and help in conversion of data and the creation of interfaces.

CASE STUDIES

In this field project 20 SAP implementations are studied. Ten of them are implementation failures and half are successes. The first ten case studies presented are implementation failures.

Hershey Food Corporation

The Hershey Company engages in manufacturing, marketing, selling, and distributing various chocolate and confectionery products, food and beverage enhancers, and gum and mint refreshment products. Its chocolate and confectionery products include chocolate bars and drinking cocoa mixes, high-cacao dark chocolate products, handcrafted chocolate gifts, and natural and organic chocolate products. The company sells its products through sales representatives and food brokers, primarily to wholesale distributors, chain grocery stores, mass merchandisers, chain drug stores, vending companies, wholesale clubs, convenience stores, dollar stores, concessionaires, department stores, and natural food stores. It principally operates in the United States, Canada, Mexico, Brazil, Japan, Korea, the Philippines, India, and China; and markets confectionery products worldwide. The company was founded in 1893 and is based in Hershey, Pennsylvania[20].

The consequences of SAP ERP system implementation at Hershey Foods were so bad that during Halloween, big customers like Wal-Mart and Kmart were loading up candy from Hershey's competitors. Mid-September 1999 order processing problems resulted in a 19% drop in Hershey's third quarter earnings. Computerworld[21] described Hershey's ERP implementation as catastrophic failure. One of the main reasons for this debacle was that users of the new SAP ERP system at Hershey Foods didn't get enough time to learn the new system and didn't understand how the integrated processes of an ERP system impacted their daily roles and responsibilities. The original plan was to implement the system in four years which was compressed to two and half years by the Hershey's management. To make things worse SAP ERP implementation went live in July 1999 just before the business peak season for Hershey starts. Hershey employees needed to correctly follow the business logic built in the SAP software. They needed to understand how various models worked and interacted with each other. Hershey was not only implementing SAP ERP system but also a CRM system from Siebel Systems and a

logistic system from Manugistics[22]. All this went live at the same time just before the peak business season started. Since the user training was inadequate, Hershey's employees suffered from information overload.

The company could have very well avoided this trouble if only they thought of going live with ERP system during those occasions when the business process in the whole market experiences a slow period and at the same time providing ample time for user training.

Levi Strauss & Company
Founded in 1853 by Bavarian immigrant Levi Strauss, Levi Strauss & Co. is one of the world's largest brand-name apparel marketers with sales in more than 110 countries. Levi Strauss & Co. employs approximately 10,000 worldwide, including approximately 1,010 at its San Francisco, California Headquarters[23].

SAP ERP implementation problems prevented Levi Strauss from fulfilling orders for a week during the second quarter of 2008. They ran into technical issues going through the implementation process, which interrupted shipping for about a week. These shipping problems, combined with other economic issues, caused the company's net income to drop 98% relative to the same quarter in 2007[24]. Levi's launched its US-based ERP initiative in spring of 2008, and experienced difficulties connecting and integrating various legacy systems. Fundamental internal control errors were discovered after the system went live. Apparently, auditors determined these problems could have resulted in a materially significant impact to Levi's financial statements if not corrected. The company had anticipated these problems as they provided advance shipments to wholesale customers in the first quarter of 2008 that would normally have been shipped in the second quarter. Even though the company's management had anticipated these issues they underestimated the magnitude of the impact it would have. In any case, it shows the lack of preparedness on the part of management.

In another school of thought several observers have suggested that the company used the SAP ERP implementation failure as an excuse to deflect attention away from deeper and more significant financial challenges. In the second quarter of 2008, the economy had already started to slow down and that may also have contributed to poor financial results

of the company in second quarter of 2008. Dennis Hewlett of ZDNet[24] suggests that there is no doubt there were issues related to the SAP ERP implementation but assigning so much emphasis when the company had already anticipated an issue is stretching credulity.

Retail industry analyst, Paula Rosenblum[24] suggested that compensation is the key to ensuring successful IT projects. This would also prevent scapegoating as you tie every single involved party's compensation to the success of a new implementation. Start with systems selection and drive all the way through to post-implementation support. The business executives, the actual line staff, and the IT group should all have responsibilities, including executive level support.

Fox Meyer Drugs
Fox Meyer Drugs had a market cap of about $5 billion and was the fourth largest pharmaceuticals company in USA before it filed for bankruptcy in 1996 due to a failed SAP ERP implementation. The SAP ERP implementation project at Fox Meyer also known as Delta III began in 1993 with a goal to increase efficiency using new SAP ERP technology and was implemented in 1994 -95. In 1998, trustee of Fox Meyer filed a lawsuit against SAP AG and Anderson Consulting, its SAP implementation partner for $500 million each[25, 28].

There were various factors contributing to SAP ERP implementation failure at Fox Meyer and SAP ERP software was the least of them. Christopher Cole, COO at Pinnacle summed it up as a management failure[26]. Although Fox Meyer's top management was committed to the implementation of the new system but, apparently, users were not. There was a morale problem among some of its warehouse workers. The Pinnacle warehouse automation integrated with SAP R/3 threatened their jobs. With the closing of the three warehouses, the transition to the first automated warehouse was a disaster. Disgruntled workers damaged inventory, and orders were not filled, and mistakes occurred as the new system struggled with volumes of transactions.

The scope of Delta III project changed in the middle of implementation with Fox Meyer signing a large contract to supply the University Health System consortium (UHC). This

contract exacerbated the need for the unprecedented volume of transactions on their HP servers (HP 9000) which Fox Meyer could not cope up with.

Fox Meyer management relied heavily on the implementation partner, Anderson Consultants, and other external consultants and had little or no control over the implementation. This resulted in mismanagement of the project scope and cost. To make things work many of these external consultants were inexperienced. According to Caldwell[27], Anderson Consulting used "trainees" for the Delta III project as a training ground. Also, Fox Meyer claimed that SAP AG used them as a guinea pig for its new SAP R/3 software.

Fox Meyer also made a mistake of implementing another complex warehouse software system called Pinnacle in parallel with SAP ERP system. This made the whole implementation very complex. Fox Meyer's top management, who boasted a $40 million cost cutting per year, or Anderson Consulting should have pulled the plug on the project when things started to go out of hand. They could have scaled back on the scope of the project - perhaps foregoing the UHC contract, or postponing it to a later phase in the project[27]. A phased implementation would have been less risky and would have given the implementation team a chance to test transactions. Using just one vendor in the first phase would have reduced the risks and complexity of the project. The warehouse automation multiplied the project risk, and interactions between R/3 and Pinnacle's automation took FoxMeyer into uncharted water. Finally, Fox Meyer should have avoided the morale problem in the warehouses by training the employees, helping them develop new skills, putting some of them on the implementation team and using other change management techniques.

Los Angeles Unified School District
Los Angeles Unified School District (LAUSD) is one of the largest school district in the country with 77,000 to 78,000 employees of which approximately 36,500 are teachers. The school district has about $7.5-billion budget annually[29]. LAUSD implemented SAP ERP Business Tools for Schools in first quarter of 2007. It was a payroll system which replaced their 40-year old payroll system which consisted of patchwork of databases that required 20,000 adjustments by hand every month. The new SAP ERP payroll system

implementation was a disaster with a $46-million cost overrun over the initial budget of $95-million. The new system had many flaws and was generating wrong paychecks. This led to a rift between teachers and the school district with the teacher's union advocating teachers boycott student meetings and the union filing a lawsuit against the district[33]. In December 2008 LAUSD's SAP implementation partner Deloitte paid $18-million in damages to the district[30].

There were multiple mistakes that led to this implementation failure. LAUSD's SAP ERP payroll implementation was complex because besides usual employment issues schools dealt with, there were concurrent employment issues as each employee could have multiple personnel assignments. This was a non-issue technically for SAP AG as they have worked with similar specialized user groups like ASUG K-2 community and their software could handle this. This led to the belief that there were flaws in functional / business side of SAP implementation due to self-contradictory scheduling rules. Moreover, the union and administration didn't work together in implementation which would have simplified the rules with union involvement. Also, the system was rolled out too quickly, and without sufficient testing. The union had requested that the system be run in parallel prior to full rollout, but the school district chose not to for budget reasons. LAUSD's implementation partner Deloitte also didn't do their job right. Deloitte's consultants didn't extract the complete and correct information from the school district. LAUSD's Superintendent Brewer didn't demonstrate leadership abilities with his early handling of a poorly functioning new payroll system as the problem went on for month's[31]. LAUSD's top management was inefficient and incompetent for this complex implementation and to make things worse it appears Deloitte (the implementation partner) brought unqualified resources (i.e., personnel) to the project.

Waste Management Incorporated
Waste Management, Inc. was founded in 1894 and is based in Houston, Texas. Waste Management, Inc. provides integrated waste management services in North America. The company offers collection, transfer, recycling, disposal, and waste-to-energy services. In 2005, Waste Management started looking for a new revenue management system. Waste

Management had grown by acquiring small companies and had various old legacy systems working concurrently.

SAP AG proposed its Waste and Recycling product and claimed it to be an out-of-the-box ERP system with no customization required. SAP AG assured Waste Management that its software would meet their needs without any customization or enhancements and would be implemented throughout the company within 18 months[32].

The SAP Revenue Management ERP implementation was anything but a success. Waste Management filed a $100 million lawsuit against SAP AG on March 20, 2008 after months of failed meetings to resolve the issues at hand. Waste Management complained that the SAP system that was used for waste haulers in Europe didn't work well for them in United States. In the lawsuit filed in Harris County, Texas Waste Management said SAP AG made false promises about the potential of their product and duped them into buying it. They put the blame even on SAP Americas' president and CEO, Bill McDermott, stating that he participated in rigged and manipulated demonstrations which were based on fake software environments which didn't work well in real environment[32]. There were significant gaps between the SAP software's functionality and Waste Management's business requirements. Later on in the project implementation phase Waste Management discovered that these gaps were already known to the product development team from SAP AG in Germany even before the SLA was signed. Also, SAP AG's claims that they have well-trained personnel with the requisite expertise, experience and knowledge of the revenue management software for waste and recycle industry were false according to Waste Mangement[33].

Some experts put blame on Waste Management's management as they, being the owner of the project, should have checked whether the metrics the vendor has put together makes any sense. If they were not capable of doing it themselves then they could have hired some consulting firm to do the legwork for them. Also, there is the possibility that Waste Management's management team didn't provide the SAP software implementation team with timely and accurate business requirements and decision empowered users and managers.

As of now, accusations are still flying between Waste Management and SAP AG about documentation, depositions and delays in bringing the case before a judge. That proposed 18-month implementation now sounds like a dream scenario.

Hewlett-Packard Company
Hewlett-Packard Company headquartered in Palo Alto, California provides a range of products, technologies, software, solutions, and services worldwide. The company's Enterprise Storage and Servers segment offers storage and server products in industry. Its HP Services segment provides a portfolio of multi-vendor IT services, such as technology, consulting and integration, and outsourcing services. The company's Imaging and Printing Group segment provides consumer and commercial printer hardware, printing supplies, printing media, and scanning devices, such as inkjet and Web solutions, laser jet and enterprise solutions, graphics solutions, and printer supplies[34].

In May 2004, in order to integrate with its central SAP ERP system Hewlett-Packard Company (HP) implemented an SAP ERP system at one of its biggest North American divisions – Industry Standard Servers (ISS). ISS had revenues of $7.5 billion in 2003. The project was led by Christina Hanger who had already migrated five systems before this. Hangar's team at HP had anticipated some setbacks therefore they had developed a contingency plan[35]. HP put together a contingency plan for three weeks' worth of extra servers and took over an empty portion of an HP factory in Omaha to stand by for any overflow of orders that needed special configurations (for example, an unusual component or software combination) and could not be stockpiled ahead of time. The SAP ERP system went live in June and problems started to surface immediately. Within a month, 20% of server orders couldn't be entered. The problem was that data modeling issues between the legacy system and the SAP system prevented the SAP system from processing some orders for customized products. Total financial impact of this to HP was about $160 million ($120 million order backlog and $40 million in lost revenue) which was far more than the $30 million implementation cost. Hanger's team was unable to adequately test orders that could be configured by customers because the product marketing team had not fully scoped the breadth of configurations that customers would

want. When the system went live, some of these custom configurations went through and others did not. Those that weren't placed in a dead zone, sat idle until they could be entered manually. The contingency plan, although in place, was not sufficient and soon the HP factory in Omaha was overwhelmed with orders they couldn't deliver. CIO and Executive Vice President of Global Operations Gilles Bouchard didn't think that the data modeling problems between the legacy and SAP systems was the source of the $160 million impact. He blamed HP's inability to keep pace with orders in the supply chain once the problems were discovered.

Shane Corporation

Shane Company, based in Centennial, Colorado has 23 stores in14 states. Shane is one of the ten biggest U.S. jewelry stores. Shane's revenue for 2007 and 2008 were $275 and $210 million respectively. Shane's products include loose diamonds, rings, earrings, pendants, necklaces, and bracelets[36]. Shane filed for bankruptcy protection in January 2009 and told a U.S. judge that company's decline was triggered partly by delays and cost overruns from a $36 million SAP ERP inventory management system[37].

Shane had planned for implementation to happen in one year at total cost of $10 million which took three years and $36 million to complete. With the new implementation Shane had expected a better demand forecasting system and instead it got a system that generated a wrong mix of inventory and ultimately led the company to the path of bankruptcy.

Analysts who have followed this SAP ERP failure have put the blame on Shane Company's top management and their implementation partner Ciber Novasoft[38]. It appeared that Shane was using SAP as a scapegoat for its failed implementation. SAP software is very well tested in the retail industry as this implementation happened in year 2005-2007 not in the 1990's. Later, Shane acknowledged that implementation problems were related to its system integration which was done by Ciber Novasoft. Shane's management was inept in decision making and failed in defining business processes. This resulted in bad alignment between business and IT and hence a very expensive failed implementation.

Select Comfort Corporation

Select Comfort Corporation develops, manufactures, markets, and distributes adjustable-firmness beds and other sleep-related accessory products in the United States and Canada. It is popular for offering mattresses under the Sleep Number brand name. Select Comfort is based in Minneapolis, Minnesota and currently has a market capitalization of around $50 million as of the second quarter of 2009. During 2006 and 2007 the company's market share was more than $1 billion[39].

In June 2006, Select Comfort hired Maytag's former CIO to run its IT department who started its SAP implementation and hired an implementation team comprised of internal resources. In December 2008 (news release), the company immediately ceased all activities associated with the implementation of SAP-based IT applications[40]. These steps were taken due to budget overruns and project prolonged beyond the predetermined deadlines with no end in sight.

Michael Krigsman, CEO of Asuret - a software consulting company blamed the SAP implementation on the following strategic failures[41]:

- Select Comfort replaced a working Oracle system without apparent justification in spite of the fact that their existing system was doing the job. This diverted their resources from their core business to an unnecessary IT initiative.
- It implemented SAP with in-house resources, an inefficient strategy for a company of this size and IT maturity. They should have hired an implementation partner with knowledge and experience of SAP implementation.
- A splashy CEO, rather than a hands-on CIO, appears to have developed IT strategy.

Whirlpool Corporation

Whirlpool Corporation engages in the manufacture and marketing of home appliances worldwide. Its principal products include laundry appliances, refrigerators, cooking appliances, dishwashers, mixers, and other small household appliances. It markets and distributes its products under various brand names, which include Whirlpool, Maytag, Kitchen Aid, Jenn-Air, Roper, Estate, Admiral, Magic Chef, Amana, Inglis, Acros, KIC, Ignis, Bauknecht, Brastemp, Consul, Eslabon de Lujo, Laden, Polar, and Supermatic.

Whirlpool sells its products to retailers, dealers, distributors, builders, and other manufacturers. The company was founded in 1906 and is based in Benton Harbor, Michigan[42].

Whirlpool Corporation implemented its SAP ERP system in 1999 and decided to go live with it on Labor Day weekend of 1999. Just before the go live some red flags appeared in the system. Two batch-processing transactions were taking a long time to feed into the decision-support database and customer service system[43]. Whirlpool and its implementation partner Deloitte decided to go live as they thought a long Labor Day weekend will be a good opportunity, and fixing those errors would have taken one more week. Moreover they didn't anticipate these errors to create any big issues. This bad decision by management resulted in a crippled shipping system that left appliances sitting in warehouses and stores with six- to eight-week delays for receiving orders. Things seemed to be running smoothly days after the launch when 1,000 system users processed appliance orders. But by September 18, with 4,000 users, performance started to deteriorate. The problem was reportedly resolved by first week of November 1999. The pinch of this was felt by the Whirlpool dealers who missed the delivery dates by 4-8 weeks and in many cases saw their order canceled or customer moving to competitor's products.

American LaFrance
American LaFrance is a premier manufacturer of emergency vehicles since 1832. The company has headquarters and manufacturing facility in Charleston, South Carolina. ALF also has manufacturing facilities in Ephrata, PA and Hamburg, NY. ALF is known for manufacturing fire trucks. ALF was bought by Freightliner in1995 and was spun off in December 2005. On January 28, 2008 the company filed for Chapter 11 bankruptcy blaming IBM and a failed implementation of SAP's Enterprise Resource Planning (ERP) system[44].

When ALF was spun off as an independent company from Freightliner in 1995 it used the Freightliner's IT system for its accounting, inventory, payroll, and manufacturing process services until it had its own stand alone IT system. In parallel to using Freightliner's IT system ALF outsourced the building of its new SAP ERP system to

IBM. ALF's management didn't take the ownership of new SAP system and relied totally on IBM for implementation. Therefore, there was a lack of communication and business process knowledge transfer between ALF's business users and IBM consultants.[45] IBM implemented what they thought seemed to be right for ALF without actually knowing all the business facts. The result of this was by the time ALF's management really figure out what was going on the project management had turned into a complete mess. There were problems in reconciling data between the Freightliner's legacy system and the SAP ERP System. This resulted in incorrect or incomplete inventory, purchasing and customer data; insufficient user training on the SAP ERP System; and missing financial information including accounts payable detail, incomplete or inaccurate accounts receivable data, and inaccurate beginning general ledger balances. All these IT problems resulted in business paralysis and resulted in filing of bankruptcy for ALF[46]. As the manufacture of highly-customized Emergency Vehicles requires the availability of a large number of inventory SKUs at key points in the production process. The conversion from the Freightliner system to the ERP System resulted in the inability to account for inventory on a reliable basis. This, in turn, severely limited ALF's ability to deliver completed products to its customers. Consequently, ALF's inability to deliver vehicles had an immediate impact on ALF's cash flow and created a liquidity crisis[47]. This could have been easily avoided if ALF's management had taken ownership and responsibility of the implementation project. Also, IBM was at fault for not involving the ALF's business side users and employees who had the business knowledge in business process defining phase.

After reviewing the ten SAP implementation failures the implementation successes in ten diverse companies will be evaluated.

Vienna City Administration
Vienna is the capital of the Republic of Austria and Vienna City Administration (VCA), Vienna's municipal institution, manages the city's activities through its 70 central departments and 23 local municipal district offices. It has 36,000 employees in nearly 70 central departments. In 2006, VCA started implementing the SAP Public Sector Collection and Disbursement application for its centralized receivables management activities and the SAP Real Estate Management application for its building and facility

management. By 2009 VCA anticipates that nearly all of its 70 central departments and over 8,500 staff will be using SAP software[48].

SAP implementation at VCA has been a big success resulting in increased process efficiency, improved customer care, and creating a uniform technology platform on which to base standardized, optimized administration process. All the milestones to date have been met because of effective collaboration among VCA departments, with SAP Austria serving as the general contractor for implementation support. VCA developed the blueprint and defined its processes under the auspices of all departments involved in the project, including Accounting Services, Legal and Administrative Real Estate Matters, Building and Facility Management, and Customer Service.

To achieve effective collaboration within the project team, VCA realized the importance of speaking a common language, using common terminology, and formulating objectives clearly. When defining processes, technical support was obtained at an early phase to help distinguish what is feasible from what is not. Also, staff was involved beyond the design process so that they could understand and realize why certain procedures are being examined and questioned, and they must accept that there is a need for change. Intensive testing of the full processes and not just the partial processes was done and this also contributed to the successful implementation.

VCA put a great emphasis on change management and training during end-user instruction at the municipal departments. They involved mid-level civil employees in defining the requirements of a standardized clearing system. As a result, VCA took a wide spectrum of demands into account, which greatly simplified the later technical rollout.

Air Products and Chemicals Incorporated

Air Products and Chemicals, Inc. offers atmospheric gases, process and specialty gases, performance materials, and equipment and services worldwide. The company was founded in 1940 and is headquartered in Allentown, Pennsylvania. By 2000 the company had become a holding company in which groups conducted their operations with little interaction with one another[49].

Using SAP ERP applications Air Products successfully unified its wide array of business units and became a single organization with a consistent set of business practices. Selling, general, and administrative (SG&A) expenses were reduced from 14.3% of revenues in 2004 to 11.8% in 2007. Inventory (days on hand) had a 10% reduction, and employee productivity had a 10% improvement in the same time period after SAP implementation. Operating return on net assets (return on capital) increased from 9.5% in 2004 to 12.5% in 2007. Air Products management considers a single implementation across the whole enterprise to be a requirement for success. Factors that contributed to successful SAP implementation at Air Products are:

- Strong governance structure and processes which includes senior management participation in implementation and engaging well with the SAP and implementation partner[48].
- Avoiding the customization of SAP software and rather adopting the business processes around the software. They achieved this by focusing on change management and by using data entered through SAP only.
- Designing for a single global implementation Air Products required all business areas to capture the same information.
- Air Products management team put a lot if effort into planning and executing training. They immersed power users into the implementation team and used them as training resources for their counterparts in business groups.

Border State Industries

Based in Fargo North Dakota Border State Industries (BSE) distributes products to several different categories of customers. BSE distributes electrical and electronic products and services to the construction, industrial, utility, and data communications markets. The company has a distribution partnership with OSRAM SYLVANIA. BSE also carries data networking equipment in its product catalog. The company operates more than 50 branches serving customers in 15 states, primarily along the northern and southern borders of the nation. It also has a location in Juarez, Mexico. BSE was established in 1952 and at present employs more than 1,200 people and is wholly owned by its employees through an employee stock ownership program[50].

BSE engaged IBM and SAP Consulting to implement the new ERP software to support the company's business processes for sales and distribution, materials management, finance, controlling, and human resources. The software went live on February 1, 1999 – nine months after the start of the implementation.

In 2004 BSE upgraded its SAP software to support more e-commerce activity, automated special price agreement processing, and terminal-based credit-card processing – completing its upgrade on time and within budget. Later, in April 2007, BSE embarked upon yet another SAP software upgrade, adding more functionality from SAP ERP as well as from the SAP Customer Relationship Management application and the SAP NetWeaver® technology platform.

ROI analysis of the SAP software deployment at BSE showed that SAP software deployment paid for itself in the first 2.5 years, and continues to deliver a 37% annual return, and has proven to be a strong success.

One of the success factors for SAP implementation was that BSE adapted their business processes to benefit from the standard best practices recommended by SAP rather than replicate their legacy business processes into the SAP software. In their earlier SAP ERP implementation at BSE, SAP AG had done lots of customization, which had resulted in project delays and budget overruns. Involvement of senior management was another success factors for implementation. BSE appointed one of its vice presidents (VP) to oversee the implementation. The VP worked closely with IBM and SAP Consulting and regularly met with the BSE board to keep them informed on progress[48].

The VP also engaged many of the most senior managers within BSE and solicited their active involvement in the implementation of the SAP software. Although BSE executives acknowledge now that day-to-day operations suffered while these managers were involved with the implementation of the SAP software, they nevertheless conclude that the close involvement of senior management is one of the key reasons for the implementation's ultimate success.

In summary, two key lessons emerged from BSE's Implementation experiences. First, customization can be costly and, ultimately, unnecessary – it should be avoided whenever

possible. Second, the input and involvement of internal business experts – the people who know the company's business – are crucial to the success of the implementation.

Air France

Air France (formally *Société Air France*) is a French airline based at Charles de Gaulle airport in Paris, France and is one of the largest airlines in the world. It is a subsidiary of Air France-KLM Group. Air France serves 20 destinations in France and operates worldwide with scheduled passenger and cargo services to 150 destinations in 83 countries. Air France's corporate headquarters are located at Roissy-Charles de Gaulle, Paris[51]. Air France-KLM is the European leader in air transport with more than 74.5 million passengers and €24 billion of revenues in 2008-09. Air France has been a SAP ERP customer since 1998. In May 2005 Air France kicked off a project to upgrade the SAP R/3 4.0B system to mySAP ERP, which provides ERP Central Component (ECC) 5.0, the main component within mySAP ERP solutions. In December 2005, the upgrade project was completed on time and under budget, according to Antoine Bihler, head of SAP Competence Center at Air France. Working closely with SAP and its partner, the systems integration division of IBM, Air France considers the upgrade project a success. "It was 10% less than budgeted, and we worked very well with SAP and IBM,'' Bihler said[52].

Critical success factors in Air France-KLM Group implementation were management vision, thorough testing, and training metrics. It was management's initiative early on to standardize on a single ERP system as a strategic initiative. Air France-KLM management early on in the implementation fostered a greater understanding and collaboration between management, business units and their stakeholders, external technology providers and business partners. The company developed, in total, 1,600 test scenarios (600 test cases in material management and 1,000 test cases in financials respectively). The automated testing tool Mercury and trained consultants from IBM were used to build and expand the test cases through Air France competence center and its business analysts. Air France-KLM Group took two practice runs of the preproduction system before going live. Finally, the company provided both classroom and e-learning sessions to about 2,000 material management and financial users detailing the functional

changes with the new system. Emphasis was put on user feedback and efforts were centered on improving the menu structure, citing the enhanced look and feel of the transaction processing of the system.

China Everbright Bank

China Everbright Bank (CEB) with products and services in banking, securities, insurance, and investment management is a major force in China's banking sector. With headquarters in Beijing, China CEB has 10,000 employees and total assets of about $1 billion. In 2003 the company decided to replace its legacy IT systems with state-of-the-art accounting management software to help it achieve its growth goals. CEB implemented SAP in three phases. Phase I was started in early 2004, in which SAP ERP was implemented. Later that year, all accounting solutions went live at 300 branches across the country simultaneously. HR payroll, trading back-office operations, and reporting and analytics solutions went live in fall 2004. In 2005 Phase II was implemented in which SAP for banking solution portfolio was implemented. Finally in 2005 CEB implemented SAP Travel Management application with workflow and portal functionality. All these implementations were on time and within budget[48].

Critical success factors in CEB's SAP ERP implementation were as follows:

- Close cooperation between SAP AG and CEB, consulting services support from Accenture, and technical support from Lenovo.
- Integration of CEB's business processes across the different SAP solutions during the design and implementation phases of the project.
- Adapting best practices supported by SAP.
- Finally, total commitment to the project by CEB, which included sponsorship and guidance by senior management and close collaboration between the company's IT and business groups, was the factor behind successful SAP implementation.

Finnish Food Processing Company

Finnish Food Processing Company, HK Foods, is one of the largest slaughtering, cutting and meat processing companies in Finland consisting of eight sites in south-west part of the country. Its turnover in domestic market is 2.2 billion FIM with number of employees

2800. In addition to that there are 1000 more employees and 0.7 billion FIM turnover in Estonia. Market shares per product group in Finland vary from 20 to 57 per cent[53].

HK Foods implemented SAP ERP system in three different phases over a period of three years starting in 1997. The implementation was a big success as far as project schedule was concerned but the cost of implementation went over budget. All in all the implementation was a success as per the feedback of users and management. Critical success factors and lessons learned from the implementation were that the balance between internal employees of the company and consultants as well as high exchange rate among project personnel was maintained. An optimal balance between the company forces and external consultants could be two company people against one external consultant. This is not only to keep the knowledge in house, but also to take full use of consultants during the time they are on the project. A good balance facilitates the transformation from project to competence and support team. This all can be achieved by strong management commitment and support to the project and creates an environment to retain these trained employees and consultants.

Tata Steel
Headquartered in Jamshedpur, India, Tata Steel is among the top ten steel producers in the world with an existing annual crude steel production capacity of 30 million tons per annum (MTPA). Established in 1907, it is the first integrated steel cmpany in Asia and is now the world`s second most geographically diversified steel producer and a Fortune 500 Company[48].

In 2001, Tata Steel started implementing an SAP ERP system with the primary goal of improving its financial accounting, costing, procurement, and plant maintenance. The primary objective was better revenue management through improved gross margins. SAP implementation at Tata Steel was a success with increased online order confirmations from 55% to over 90%, reduced finished-goods inventory from 29 to 23 days of sales, lowered MRO inventory by 24%, and reduced breakdowns in the Hot Strip Mill by 768 hours.

Critical success factors in Tata Steel's implementation were that the SAP implementation was backed up by appropriate change initiative measures and organizational realignment with support from top management. A great deal of effort was put on extensive and comprehensive training as well as proper communication on process changes throughout the organization.

Telefonica

Telefonica, with headquarters in Madrid, Spain, is one of the world's largest telecommunications companies by market cap. Its activities are centered mainly on the fixed and mobile telephony businesses, while its broadband business is the key growth driver underpinning both. It operates in 25 countries and its customer base exceeds 260 million globally. Telefonica's growth strategy is focused on the markets in which it has a strong foothold: Spain, Europe and Latin America. Telefonica Movistar Venezuela (previously BellSouth) a division of Telefonica started, in 2003, an evaluation process over several solutions in order to replace its IT system. From June 2003 to June 2004 they implemented a SAP ERP system. Implementation was a success and Telefonica used this implementation experience to implement mySAP ERP application in its divisions in rest of Latin America[54].

Critical success factors and lessons learned from the implementation were training in accordance to the necessary business processes in order to maximize the benefits that the tool can provide. Telefonica fully involved the decision makers of each business unit during the re-design process and gap analysis authorization. Technical personnel with experience in mySAP ERP were involved to make the implementation process easier.

Taikang Life Insurance

With head office in Beijing, China, Taikang Life insurance was established on August 22, 1996. It has 32-plus branches and employs about 12,000 across China. Its products include coverage for medical care, pensions, critical diseases, and accidental injuries; policies that pay out dividends; investment-linked insurance; full coverage insurance, among others. Total assets of Taikang Life Insurance are more than US$ 7.1 billion.

To further improve the basic financial operations and stay in line with international practices, as well as strengthen budget management, cost control, risk control, decision-

making support, investor relationships and supervisor relationships, and improve work efficiency and data authenticity, Taikang Life Insurance decided to replace the old UFIDA NC ERP with a new SAP ERP product in 2004. Taikang Life Insurance successfully completed its ERP system replacement in early November 2005. The SAP ERP modules implemented include accounts receivables, accounts payables, general ledger, asset management, inventory, accounting management, materials management, document management, and workplace management[55].

A critical factor contributing to Taikang Life Insurance's SAP success was that the independent software vendors and system integrators with broad industry experience and advanced technologies were selected. The implementation strategy was to adopt the approach of overall design, distributed implementation and fast dissemination. Reasonable expectations for the project scope and balanced enhancement of management and operability were kept. Project management involved executives and a good project manager was chosen. Project management structures and decision-making methods were made for grassroots participation of key business groups' involvement on the project team. Management of the project schedule and of problems should guide users and manage expectations. Project implementation strengthened end-user training and stress knowledge transfer. Workshops and seminars for IT and financial system maintenance staff were held regularly in order to achieve rapid improvements in China's insurance industry informatization.

Wyeth
Founded in 1926 and headquartered in Madison, New Jersey Wyeth operates as a research-based pharmaceutical and healthcare company in the United States, the United Kingdom, and internationally. Wyeth sells different products and services under its pharmaceuticals segment, consumer healthcare segment, and animal health segment. Since the 1990s, Wyeth has begun to modernize its disparate information systems into a single integrated enterprise system. In 2000, the company implemented an SAP system to integrate its global supply chain.

Wyeth's successful approach to the implementation includes keeping the team lean, relying heavily on internal resources, senior management support, and effective

communication at all levels, and multiple training methods. The intensive relationship
and interactions between the enterprise system and managerial capability are critical
factors. Wyeth's implementation experience shows that managerial IT skills are the only
IT resource with a potential to provide firms sustainable competitive advantage, among
other IT resources attributes such as proprietary technology, capital requirements and
technical IT skills[56].

RESULTS AND DISCUSSIONS

In this globally competitive environment companies need to constantly improve business performance by improving their business processes. Since the 1990's more and more companies are turning to enterprise resource planning to replace obsolete process and improve business performance. Now the IT implementation dynamics have changed such that companies expect a breakeven ROI of two to three years. Doing the implementation right can be rewarding; failing can be devastating. Therefore, it is very important to know the critical success factors of implementation and make sure full emphasis are put on these.

Critical success factors as identified by Esteves and Pastor 2000[16, 17] are discussed based on the twenty SAP ERP implementation case studies presented earlier.

First, the ten implementation failures and what critical success factors were lacking that resulted in their implementation failures are defined.

Hershey Food Corporation

>   User Involvement and testing

>   Adequate training program

>   Planning and scheduling

>   Adequate ERP implementation strategy

Levi Strauss & Company

>   Preventive trouble shooting

>   Adequate legacy system knowledge

Fox Meyer Drugs

>   User involvement and testing

>   Good project scope management

>   Trust between partners

>   Usage of appropriate external consultants

Los Angeles Unified School District

Effective organizational change management and business process reengineering

User involvement and testing

Sustained management support and contribution

Adequate training program

Usage of appropriate external consultants

Waste Management Inc

Business Process Engineering

Trust between partners

Usage of appropriate external consultants

Project team composition

Hewlett-Packard Company

Adequate ERP implementation strategy

Shane Corporation

Sustained management support and contribution

Effective organizational change management and business process reengineering

Select Comfort Corporation

Sustained management support and contribution

Project team composition

Whirlpool Corporation

Formalized plan and schedule

Good project scope management

American LaFrance

Trust between partners

Sustained management support and contribution

User involvement and testing

Strong communication inwards and outwards

Adequate legacy system knowledge

Analysis of these ten ERP implementation failures reveal that lack of sustained management support / contribution and user involvement / training and testing seems to be the most prominent causes for failure. Other factors right behind were lack of appropriate consultants and trust between implementation partners, and effective organizational change management and business process reengineering. Finally, lack of planning and scheduling, adequate ERP implementation strategy, preventive troubleshooting, good project scope management, project team composition and strong communication inwards and outwards were also reasons behind some implementation failures. No major technical reasons were found to be contributing towards implementation failure except for adequate legacy system knowledge in one instance.

Executives of the company implementing SAP ERP system need to realize that it is as critical to their business success as anything else can be. Management needs to be involved in every aspect of the implementation starting from business case development, providing appropriate resources as and when needed, and by resolving personnel and other issues that may arise. User involvement and training is another most critical aspect of implementation. These internal users or power users have the business knowledge and know how about how day to day transactions work and how the business is integrated. Their involvement is critical in business process development and gap analysis between the legacy system and the new ERP system.

Next the ten implementation successes and what critical success factors were present that resulted in their implementation success are reviewed.

VIENNA CITY ADMINISTRATION

Trust between partners

Strong communication inwards and outwards

Project team composition

User involvement and testing

Adequate training program

AIR PRODUCTS AND CHEMICALS INCORPORATED

Sustained management support

Trust between implementation partners

Avoid customization

User involvement and training

BORDER STATE INDUSTRIES

Avoid customization

Sustained management support

Project team composition

AIR FRANCE

Trust between partners

Sustained management support

Adequate training program

User involvement and testing

CHINA EVERBRIGHT BANK

Trust between partners

Sustained management support

FINNISH FOOD PROCESSING COMPANY

Usage of appropriate consultants

Project team composition

Sustained management support

TATA STEEL

Sustained management support

Effective organization change management and business process reengineering

User involvement and training

Strong communication inwards and outwards

TELEFONICA

User involvement and training

Project team composition

TAIKANG LIFE INSURANCE

Project team composition

Good project scope management

Adequate training program

Empowered decision makers

WYETH

Sustained management support

Project team composition

Strong communication inwards and outwards

Adequate training program

Analysis of ten ERP implementation success stories reveal that sustained management support / contribution, adequate training program and right project team composition are the critical success factors contributing to successful SAP ERP implementation. Other critical success factors right behind were user involvement and testing and trust between

implementation partners. Finally, good project scope management, usage of appropriate consultants, empowered decision makers and avoiding customization were contributing critical success factors in some of the successful implementations.

The table below lists the outcome of the content analysis of SAP ERP implementations in twenty companies all across the globe.

Critical Success Factor	Implementation Failures Contributing CSFs	Implementation Success Contributing CSFs
Organizational Perspective		
Sustained management support	4	7
Good project scope management	2	1
Effective OCM and BPE	3	1
Project team composition	2	6
User involvement and testing	4	5
Project champion role	0	0
Trust between partners	3	4
Strong communication	1	3
Formalized plan and schedule	2	0
Adequate training program	2	4
Preventive troubleshooting	1	0
Usage of appropriate consultants	3	1
Empowered decision makers	0	1
Adequate ERP implementation strategy	2	0
Technological Perspective		
Avoid customization	0	2
Adequate ERP version	0	0
Adequate software configuration	0	0
Adequate legacy systems knowledge	2	0

Table 1: Number of contributing Critical Success Factors.

SUGGESTION FOR ADDITIONAL WORK

The scope of this Field Project is limited in identifying the Critical Success Factors for a successful SAP ERP implementation. These factors were identified based on content analysis of articles reporting SAP implementations in twenty companies all over the world. For additional work it will be prudent to get the surveys from the management and the business users of the companies and see if they concur with the findings of this work. It also needs to be determined what critical success factors they emphasized at different phases of implementation.

In this project a successful implementation has been identified as the one which was completed within time and budget and gave a predetermined ROI. Implementation is only the beginning of the adventure with a new ERP system. A well chosen system will, with time, become the pillar of company's operations. It will set the standards and epitomize the best business practices. In order for this is to happen, companies need to choose an option that will not only suffice for the time being, but which will have the potential to accommodate the various growth paths the company has as it evolves. Choosing an option that works for now, but does not allow for growth may seem cheaper, but when one factors in the amount company will eventually spend to extend the system and make changes to functionality; a company will end up paying more for this temporary solution than for a system that can grow. It is a real challenge for a company to plan and execute a long term implementation strategy as both the internal business scenario and the software from the vendors are evolving continuously. A study should be done to identify how companies have performed over a long period of time (period extending beyond the initial ROI goals). Success of companies who have performed well and built upon their initial implementations should be studied. It needs to be determined the factors these companies emphasized upon implementation that led to their long term success and growth.

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