

Rapid Implementation of Enterprise Resource Planning Systems

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Enterprise resource planning (ERP) systems are integrated software systems for administration of all aspects of a business. A major hindrance to firms that wish to convert from existing legacy systems to ERP systems (such as SAP R/3) is that the process can take 12 to 18 months. This is an especially daunting length of time for small to midsize companies. Many ERP software vendors and consulting firms have developed methods for rapid systems integration, which, it is claimed, can cut implementation time to as little as 5 or 6 months. In this article, we explore the experience of 4 small to midsize companies who implemented SAP R/3 using Accelerated SAP (ASAP), SAP's rapid implementation process.

ASAP is a reference-process-based approach to implementing R/3. As such, it does not allow for extensive customization of business processes during implementation. Nevertheless, our study showed that R/3 can be implemented quickly and effectively in small- to medium-size firms. ASAP appears to provide the ingredients for a well-structured implementation project. By reducing project scope and complexity, it reduces consulting costs and project risks. By splitting the project into small units with clear short-term goals, it increases the motivation for the project team. Finally, it can form the basis for a continuous improvement effort in which business processes are tuned to the new ERP system.

enterprise resource planning (ERP), SAP, ASAP, rapid implementation,
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1. INTRODUCTION

Enterprise resource planning (ERP) systems are integrated suits of client-server software that provide all aspects of basic business information management including sales and materials planning, production planning, warehouse management, financial accounting, and human resources management. SAP is a major player in

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this market, along with PeopleSoft®, Baan, Oracle®, and J.D. Edwards (a subsidiary of PeopleSoft). Implementing any ERP system is a major challenge, particularly in businesses with complex legacy systems. Project completion times are long and costs are unpredictable. There is also considerable controversy over whether business processes should be designed first and the ERP system implemented to match them or the ERP system implemented first and business processes tailored to match them.

According to a recent empirical study [1], the average implementation time for successful SAP R/3 projects in Europe was 19 months in large corporations and 12 months in smaller companies. These are typical implementation times for other ERP systems as well. In response to the problem of long implementation times, most of the ERP vendors and many consulting companies that offer systems integration services have developed specialized implementation methodologies. For example, SAP offers Accelerated SAP (ASAP), Baan offers Target Enterprise and Dynamic Enterprise Modeling, Oracle offers Accelerating the Implementation Process, and J. D. Edwards offers Ontrack.

We recently evaluated the experiences of four small to midsize companies using ASAP to implement SAP R/3. The four companies studied were Crosfield BV, a company in the chemical industry; Mitek, a small but rapidly growing medical products manufacturing company; Nokia Switching Platforms (SWP), a business unit of Nokia group; and DMC Prints, a textile company with worldwide operations.

In these companies, fast implementation time, low project cost, and high return on investment (ROI) were achieved by the companies' restructuring their business processes based on R/3 reference models rather than spending preliminary time on business process reengineering (BPR). In this article, we summarize the experiences of the four companies and analyze the key success factors in making ASAP work. Although our case studies involve use of SAP's rapid implementation methodology, our results are likely to be applicable to any of the rapid implementation methodologies currently being offered.

2. ERP IMPLEMENTATION AND BUSINESS PROCESS REDESIGN

From its start, the movement known as "business process redesign" (or reengineering) paid little attention to the relation between process change and backbone information technology (IT) such as ERP systems. For example, Hammer and Champy's [2] discussion of IT focuses on such cutting-edge technologies as interactive video disk or wireless communications but makes no mention of backbone computing. Later, more balanced discussions such as that of Stoddard and Jarvenpaa [3] admitted that radical change was not only risky but in many cases simply could not be achieved given the realities of information systems (IS) implementation. Their recommendation was to create radical reengineering designs but to implement them incrementally.

Only recently has research appeared on the critical success factors for ERP implementation [4]. The conclusions reached are generally that ERP success is contingent on the same factors that influence any large-scale IT implementation. The conflict between radical process redesign and effective ERP implementation that

we highlight in this article has not been addressed in this research. Willcocks and Sykes [5], for example, stated that "the real value-adding opportunity has been to radically reshape how business is done and exploit the new automated, seamless ERP capabilities in the process" (p. 36). This statement begs the question of whether radical process redesign is really necessary for most firms undertaking ERP implementation, especially given the option of adopting the standard business processes supported within ERP systems.

3. THEORETICAL BACKGROUND

IS implementation has been analyzed from a number of different perspectives. Originally the system development view predominated, which analyzes and describes the different activities and steps of the system life cycle. This is primarily a technical perspective with little explicit role for human and organizational factors. As IS have become more complex and more central to the operations of every business, more attention has been devoted to the knotty problems of organizational change raised during implementation [6].

Lucas [7] analyzed the key success factors influencing implementation success and helped develop models for relating implementation and organizational change. Some well-known models are planned changes, the communication-network approach, and the sociotechnical systems approach [8]. In these models, the following factors play a critical role in implementation success: perceived needs, control over change, mutual understanding, expectancies, commitment, power, social change, and the nature of the human being [9].

4. ASAP METHOD

Along with most modern methodologies for IS implementation, the ASAP method bases its phases, activities, and tools on the sociotechnical approach. This is an approach in which social issues surrounding systems implementation are given equal weight with technical issues. The particular feature of ASAP that distinguishes it from related approaches is its emphasis on effective project management. Because the complexity of sociotechnical systems is strongly related to system size, ASAP relies on the notion of "divide and conquer." Under ASAP, the entire implementation project is divided into a number of small, largely independent projects that can each be implemented in about 6 months. ASAP reduces the project scope until individual projects can be completed within a limited period of time.

The remaining critical feature of ASAP is that it is a so-called reference-based implementation of the R/3 standard. SAP R/3 is built around a set of business processes that form the basis or reference point for those who implement it. Although these processes are designed to represent the best-known processes, they cannot readily be customized within the R/3 standard. ASAP is built on the assumption that R/3 will be implemented essentially as is, without the fundamental business process analysis that prior BPR entails. The ASAP strategy represents a middle course between two extreme approaches.

4.1 Strategies for Implementing ERP Systems

Every company planning on implementing an ERP system must decide whether it makes more sense to implement the software first or to redesign business processes first. There are basically two extreme strategies: the process-oriented approach and the IS-oriented approach. A third approach, which takes a middle course, we refer to as a reference-based approach.

In the *process-oriented approach*, a company redesigns its business processes first and then implements the ERP system. The process design, which should be oriented to highly efficient processes, then forms the foundation for the implementation. The company reengineers its business as it implements the ERP system, causing the company's employees to have to cope with organizational change and IS change at the same time. A disadvantage of this approach is the tendency toward long and complex projects involving wholesale change and significant risk of failure.

In the *IS-oriented approach*, a company chooses to implement an ERP system rapidly on the basis of current processes—that is, without systematically analyzing the processes ahead of time. The objective is early availability of a live ERP system through pragmatic implementation using the standard and with minimal process changes. By the time the ERP system is deployed, only some of the process changes will have been completed, and the processes will continue to be developed as part of ongoing improvement to the live system. One risk of this approach is that subsequent reengineering may require expensive customization or even that the best business processes cannot be supported. Figure 1 shows a graphic representation of these two extreme strategies [10].

Companies frequently decide against prior reengineering of their processes in the interests of having a short implementation time. The R/3 model, with its numerous reference business processes, can be utilized by companies as a reengineering tool that offers a selection of reference processes. We call this solu-

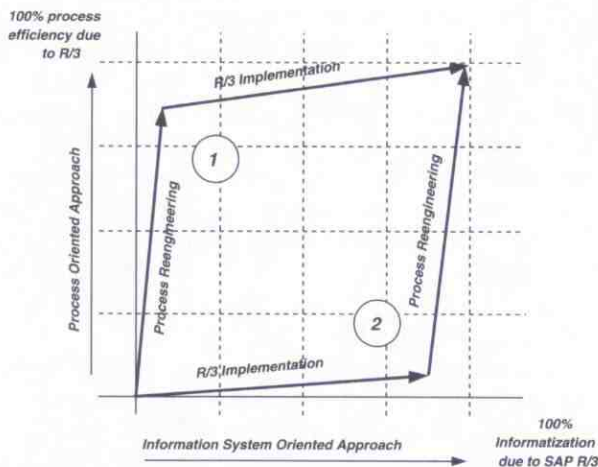


Figure 1. A comparison of the process-oriented approach (1) with the information system approach (2).

tion the *reference-based approach*. This approach, combined with the ASAP method, has the following advantages:

- *Reduced level of risk and predictable costs.* For small and midsize companies in which project budgets are very restricted, implementing an ERP system without prior BPR reduces project size and complexity. When project scope is defined by the premise of short project life and the greatest possible ROI, the budget can also be determined precisely in advance. As we show later, the projects at Crosfield, Mitek, and Nokia SWP demonstrate this fact; DMC Prints' project exceeded budget projections because of their need to adapt some R/3 processes to textile-industry requirements.

- *Ability to respond to rapidly changing business conditions.* All four companies studied were coping with rapidly changing business environments. At Nokia SWP in particular, project leaders believed that prior reengineering would have produced processes whose validity—given the longer project life—would have been questionable by the time the system went live. By adopting the reference-based approach, external project leaders could propose SAP reference processes during the project, and these could be implemented. Existing processes were then pragmatically adapted to the reference processes. The results were quick improvements followed by subsequent continuous reengineering to provide further improvements. Figure 2 shows the R/3 reference-based approach.

4.2 Principles of ASAP

The philosophy behind the ASAP method is not new, as it incorporates well-known principles of project management. However, companies constantly overlook these principles during ERP system implementation. For that reason, SAP has a series of requirements that its customers must meet before the ASAP method can be used successfully. These preconditions ensure that a business gives the implementation project the appropriate high priority.

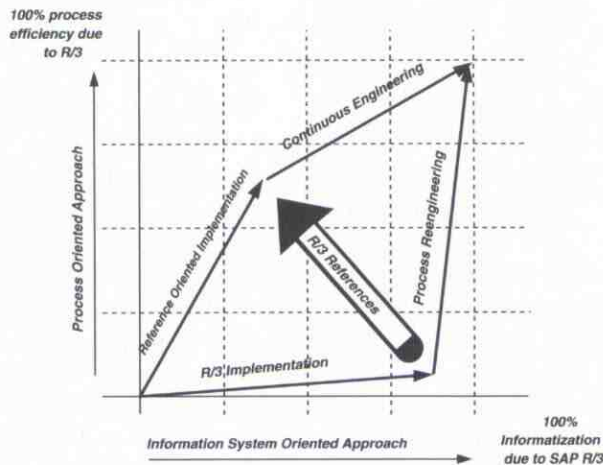


Figure 2. The reference-based approach with subsequent continuous reengineering.

- *Adopt R/3 standard processes without prior redesign and avoid software modifications.* Rapid implementation is incompatible with lengthy process redesign and software customization. Because the R/3 system contains processes that have qualified as best practices, they should be adequate for most businesses.

- *Create a dedicated project team and ensure efficient use of consultants with speedy decision making.* The most important people on the project team should be assigned to it full time. For all important decisions be made within 2 to 3 days, the SAP consultant(s) are given the authority to simply present an opinion on the most suitable solution to a particular problem and not to provide a detailed analysis of alternatives.

- *Define a clear project scope, allow no more than 6 to 9 months for project duration, and limit scope creep.* The scope and goals of the project must be defined prior to the start of the project, and must be realistic in light of the short project life and the employee capacities available. Modifications to the project should be handled in a second phase, not through changes in project scope.

- *Create a project technical team.* Especially in smaller companies, there is not enough in-house technical know-how. A technical team using skilled consultants should be assembled to handle the transfer of data and the interfaces to other systems.

- *Dedicate a project room for the entire project team.* Individual project teams should work together in a single project room so that they can coordinate informally as well as through formal meetings or reports. This can help prevent suboptimization of individual R/3 modules.

- *Adopt a big-bang migration strategy.* Migrating from legacy systems to R/3 all at once eliminates the need for building temporary interfaces and ensures rapid implementation.

The primary goal of Crosfield, Mitek, Nokia SWP, and DMC Prints was to achieve rapid installation of the SAP R/3 System. During the course of the project, all four companies came to recognize that additional improvements could be made. In light of the project budget and duration, however, they chose to adhere to the ASAP philosophy and to develop potential improvements in a second project phase. All four companies managed to avoid undertaking modifications to the standard software itself, making continuous improvement less difficult.

5. REASONS FOR ADOPTION OF PACKAGED SOFTWARE AND ASAP

As Österle [11] pointed out, companies choose packaged software for many different political, organizational and technical reasons. The two most important factors are, however, not technical in nature: First, companies are strongly dependent on their vendors of packaged enterprise software. It follows that companies will favor software vendors with a strong installed base, deep skills (including those of professional service companies), strong research and development investment, and financial strength. Österle's findings seem to be borne out by the current trend toward an increasingly concentrated industry structure in the packaged software market. Second, companies try to reduce the total cost of IS ownership by reducing the number of interfaces between IS. Thus, IS are subject to an internal network effect. As a result, one could conclude that (a) a software vendor with a broad functional range of seamlessly

integrated modules is in the long run more attractive to companies than a software vendor with a highly specialized set of add-on packages and (b) that successful packaged software will cover more and more functionality within an enterprise, that is, it will grow within a company and thus generate increasing dependency on the vendor.

Companies adopt the ASAP methodology for two main reasons. First, ASAP implements a divide-and-conquer strategy. It divides large projects into small manageable projects that in turn generate quick results. These early successes are very important for successful change management. The predictability of ASAP projects is also critical for projects with fixed due dates such as Year 2000 (Y2K) or the introduction of the Euro. Second, ASAP makes use of business process and IS standards. In ASAP, well-known standard processes are adapted to a company's context and then implemented with only minor customization. ASAP thus minimizes the costly design of new business processes—it simply refers to the reference processes stored in SAP R/3 and excludes costly software modifications of source code.

However, ASAP can be successfully implemented only under certain conditions. Companies can only apply ASAP when management is able to divide the implementation task into small and more-or-less independent problems, each of which can then be completed within 6 months or so. The coordination between the independent projects is mostly done via standardized master data (e.g., customer numbers) and custom data (e.g., company hierarchy), shared internal and external implementation skills, and shared methodologies such as ASAP. All four case study companies were able to divide their implementation needs into small, manageable projects. ASAP also precludes business process redesign in favor of implementing SAP R/3's reference processes. Case study company DMC Prints argued it had overrun its project budget by 46% mainly because the R/3 reference processes did not cover the required company-specific business processes. Finally, ASAP only works when classical project management preconditions are met, for example, top management support and incentive systems that support allocation of resources in the project.

6. FOUR COMPANIES AND THEIR REASONS FOR CHOOSING SAP R/3 WITH ASAP

A changeover to integrated standard software may be motivated by corporate strategy, the business processes themselves, or the state of existing IS. Our four companies (or in the case of Nokia SWP, a business unit) each had somewhat different starting points. However, all four were responding to corporate strategy in that their parent organizations already supported R/3 and were also facing Y2K compatibility problems with their current business applications. We describe briefly the situation of the four companies following. Table 1 summarizes the companies' primary reasons for choosing R/3.

6.1 Crosfield BV

Crosfield BV is a midsize company in a price-sensitive market. Founded in 1983 and located in Eijdsen, Holland, it is part of the global Crosfield Group with additional

Table 1
The Companies' Primary Reasons for Choosing R/3

	<i>Crosfield</i>	<i>Mitek</i>	<i>Nokia SWP</i>	<i>DMC Prints</i>
Strategy				
Political decision by the group	●	●	●	●
SAP is the market leader in integrated standard software	○	◐	●	○
Rapid identification of market changes	○	●	●	●
Necessity of cost transparency in price-sensitive markets	●	○	●	○
Process				
Customer and/or vendor links	◐	○	●	●
Integration along the internal supply chain	●	○	●	◐
Make realtime decisions	●	○	●	●
Increase in customer services and information availability	●	●	○	●
Transport and stored quantity optimization	●	◐	●	◐
High degree of convergence between processes and system	●	●	◐	○
Integration between finance and logistics	●	●	○	◐
Information system				
Scalability for high-growth companies	○	●	●	○
Year 2000 problem	●	●	●	●
Expiration of maintenance contracts on the old IS	●	◐	●	◐
System availability	●	◐	●	◐
Dependency on the system know-how of a few employees	●	○	●	●
Quality, up-to-the-minute status and integrity of the data	●	○	●	●
Internet capability	○	○	○	●
Client-server architecture	○	○	◐	●

Note. ● = major impact; ○ = no impact; ◐ = minor impact.

subsidiaries in Great Britain, Italy, USA, Brazil, India, and Indonesia. Imperial Chemical Industries (ICI), a British-based chemical multinational, purchased Crosfield Group in 1996. Crosfield BV is the Group's production plant for silicates and zeolites, with 190 employees and sales of just under 50 million pounds in 1997. The silicates and zeolites business is competitive and very price sensitive, and in the area around Eijsden, there are three to four direct competitors to Crosfield.

Crosfield BV operates in a market that does not allow high margins. The company had been increasingly encountering problems resulting from its existing IS, which over the years had grown into a mixed solution consisting of three platforms. Applications were either inadequately integrated or not integrated at all, resulting in inaccurate product cost accounting, inadequate product availability information, and a lack of timely information flow. Employees in order processing, for example, had to obtain up-to-date information on inventories and production by making telephone calls or sending a bicycle messenger to make a physical check of inventory.

Crosfield had considered migrating the current in-house applications to an IBM AS400 platform and making the code Y2K compliant. Although the estimated costs would have been only half those of an SAP R/3 project, this solution would have

meant investing in an aging system that not only did not meet current business demands but also was incompatible with the R/3 standard of the parent company ICI. A second alternative was using a less-than-fully integrated software package with less functionality than R/3. The costs would have been 70% of the R/3 project, but would have required substantial adaptation and coding on Crosfield's part, reducing compatibility benefits with new releases. In addition, Crosfield BV at Eijsden would not be adhering to the standards used in the group at large. Crosfield BV realized that only integrated standard software would solve the company's needs, and in view of ICI's use of R/3, it appeared to be the appropriate solution.

6.2 Mitek Surgical Products

Mitek Surgical Products, Inc., is a young company in a fast-growing market. Mitek is a leading company in the business of manufacturing medical instruments made from a unique nickel-titanium alloy (nitinol), which are used for affixing soft tissue to human bones (e.g., to repair tendon or ligament tears). Founded in 1985, its head office is in Westwood, Massachusetts, near Boston. Since 1995, it has been an independent division of Ethicon, Inc., a subsidiary of Johnson & Johnson. High growth and high margins characterize Mitek's market—it has sales of around \$40 million with 250 employees and has been able to increase headcount by 20% to 25% per year. Official company policy is to keep administration as small as possible, and more than half the employees work in field sales.

This company, which is covered in more detail in Case Study 1 (see Appendix), had grown remarkably in the past 9 years, but its IS had not grown along with it. Mitek's management considered four alternatives: keep the existing system; use a non-SAP solution; copy an R/3 system already implemented by CORDIS, another Johnson & Johnson subsidiary; or implement R/3 using ASAP. It chose the latter solution over less expensive solutions primarily because it seemed more likely to provide a long-term and independent solution. The non-SAP solution, although less expensive, was not chosen in part because R/3 was already the Johnson & Johnson standard, so management believed that eventually Mitek would have to move to R/3.

6.3 Nokia SWP

Nokia SWP is the Switching Platforms business unit of Nokia Telecommunications (NTC), one of two divisions of Nokia Group (the other division is Nokia Mobile Phones). Nokia Group, a Finnish company, is a high-growth company in a technology-driven market. The NTC division develops and produces hardware and software components for telecom network providers who operate mobile and fixed networks. This division also markets fixed networks in Europe and Asia. NTC has a world market share of about 30% and had sales in 1997 of about \$3.4 billion. The Nokia SWP unit, part of the Network Systems area of NTC, has only internal customers; it produces platforms for switching network data traffic. Nokia SWP has 1,500 employees.

Nokia SWP's 15-year-old IS had two standard software packages at its core: PRIMAS, running at the site in the city of Vantaa, Finland, and MAESTRO at the

site in Espoo, Finland. IT staff at the two locations were familiar only with their own system, and coordinating the development of the EDI interface to support the two systems was very difficult. This overall system was no longer flexible enough nor fast enough to keep pace with the business unit's growth and the demands of the market. For example, for reasons of system availability, data was exchanged between the two systems only twice weekly. What's more, the existing processes were not integrated between Nokia SWP's physical sites or between Nokia SWP and other business units of NTC.

Development of a production IS was not a core competency of NTC. In the past, too much effort had gone into adapting purchased systems. Consequently, neither in-house development nor expansion and adaptation of the old system were realistic options. Nokia SWP wanted a solid standard software package. R/3 satisfied the demanding requirements of this business unit: powerful enough to cover processes without modification, flexible enough to cope with rapidly changing demands, and a good fit between the standard software and the group's IT strategy.

6.4 DMC Prints

DMC Prints is a small yet highly decentralized company engaged in the coloring of textiles. It is a division of DMC Inc., which is a wholly owned subsidiary of the French DMC Group. DMC Prints, with about 150 employees, has locations in New York, Los Angeles, and Orangeburg, South Carolina. Margins that can be achieved in this market are low, and because of increasing price and quality competition, sales have been declining. DMC Prints, which is covered in more detail in Case Study 2 (see Appendix), was having to cope with an old IS running on two platforms with nonintegrated applications. Major changes that had been made to the original standard software over time meant that easy upgrading was not possible, and only a few employees were familiar with the systems.

The company considered three alternatives: upgrading their current system, implementing a dedicated textile-industry solution, and choosing a new standard integrated package. The deciding factor against upgrading was that the latest upgrade of the existing system was not yet in widespread use, and DMC Prints did not want to be a pilot customer. The second solution proved difficult as few suppliers were producing textile-industry software solutions. The standard integrated packages evaluated were Peoplesoft, Power Cerv, Oracle, and SAP. SAP was chosen without regard to the ASAP method, one factor being that DMC France was using SAP R/3 in the finance area.

7. SUMMARY OF THE ASAP PROJECTS

In this section, we present an overview of the experience each of our four companies had with ASAP. We present separately (see Appendix) more detailed descriptions for two of the companies: Mitek and DMC Prints.

All four companies were able to complete the ASAP installation in 5 to 6 months. In the case of Nokia SWP, a two-phase installation was required to replace the two main IT subsystems, so in essence, Nokia performed two ASAP installations back to back. The four companies' project teams had similar structures, composed of a

steering committee representing top management, a managing core team, and individual teams representing different business areas. The biggest single cost to the companies, not surprisingly, was consulting, which ranged from 46% to 74% of total costs. The consultant to employee ratio ranged from 1:2 to 1:6.

Crosfield BV, which was essentially trying to bring its order processing and materials management into the computer age, was initially concerned with both costs and implementation time. Costs for the R/3 installation came to \$600,000, with 63% of those costs going to consulting. The savings due to better managed inventory levels, however, is estimated at 25%, which translates to \$500,000 per year. The better integrated information flow allows Crosfield to respond more quickly to market developments, and the order acceptance unit is now better able to provide immediate information to customers. Integrated processing reduces errors and customer dissatisfaction.

Crosfield feels that the ASAP approach, without BPR, was the appropriate strategy for a company of its size. According to Jack Vrancken, the project leader, "We would [have] needed eighteen months, not six months, for a combined BPR and R/3 implementation, and we would [have then had] to prepare our staff to deal with a new system *and* new processes" ([12], p. 7).

Mitek achieved integration of its finance department with its new production facility in Utah as well as integration of production with planning and manufacturing. Mitek also brought the project in 13% under budget. The main difficulties faced were the inability to allocate employees full-time to the project and the lack of clearly defined processes, as described in Case Study 1. The project leader at Mitek, Dexter Strong, said that "Traditionally, we didn't think in processes, but the growth of the company gradually made it necessary. With the R/3 implementation, we had to organize our company to be process oriented" ([12], p. 18).

Nokia SWP was also able to bring in the project 12% under budget. Nokia's strategy was first to use ASAP to replace the smaller MAESTRO system located in Vantaa and then to perform a second-stage ASAP to replace the PRIMAS system in Espoo. Phase 1 took from January 20 to May 22, 1997, and Phase 2 from June 3 to December 2, 1997.

With R/3, the availability of information has increased greatly, allowing this business unit to identify and react faster to market changes. The amount of paper used, the routing of paper documents, and multiple entry of data have all been drastically reduced. Orders can be forwarded by the purchaser direct to vendors without having to print them out, and the production department no longer has to be involved in invoice verification.

The project leaders, Claus Bonsdorff and Kimmo Paavola, identified the transfer of old data, programming of interfaces, and end-user training as being areas that were especially time consuming. Nevertheless, because of Nokia SWP's success, NTC believes that the ASAP approach is well-suited to further R/3 conversions. "We had to implement quickly!" said the project leaders; "If we had first spent a long time assessing and redesigning the processes, the basic conditions would have changed radically again by the time we did the R/3 implementation, and the work would have been for nothing" ([12], p. 26).

DMC Prints overran its budget by 46% due to higher than anticipated consultant costs and travel expense, as described in Case Study 2. "The R/3 System contains

best practices, thanks to which many companies no longer have to do any fundamental thinking about their processes" ([12], p. 37) said Alan Barbet, the CFO, who made a large time commitment to the project. "Unfortunately, R/3 did not offer sufficient functionality for our specific business, so that we had to make great effort to get by as far as possible with the standard. This problem affected the whole project" ([12], p. 37). Many of the company's integration problems have been solved, however, and improvements are being worked out with SAP. Table 2 provides a summary of these four projects.

8. OBSERVATIONS ABOUT THE ASAP METHOD

The following general observations follow from our experience with these four companies' experience with ASAP:

- *Flexibility.* All four companies believe that R/3 offers them the ability to meet their future needs. One project leader noted that his company is finding many ideas within the R/3 system that will simplify processes; another stated that the system's flexibility allows easy process changes through subsequent customization [13].

- *Time and project scope.* The companies' experiences show that there is too little time during a 4- to 6-month project for in-depth thinking about reorganization of processes, introduction of new management concepts, or the design of complex reporting structures. These and other change initiatives have to be handled through continuous reengineering and follow-up projects.

Table 2
Summary of the ASAP Projects of the Four Companies

Project Characteristics	Crosfield BV	Mitek, Inc.	Nokia SWP		
			Phase 1	Phase 2	DMC Prints
End of project	~ May 15, 1998	Sept. 29, 1997	June 2, 1997	Dec. 1, 1997	Aug. 1, 1997
Duration	> 6 months	> 5 months	4.5 months	10 months	~ 6 months
External consultant	SAP Netherlands	SAP USA	SAP Sweden, etc.		HJM
Consultant ratio	~ 1:2 external:internal	~ 2:1 external: internal	~ 1:3	~ 1:6	~ 1:3 external: internal
Consultant days	~ 270	~ 620	745	720	~ 600
R/3 modules	SD, MM, FI/CO, partial PP	SD, MM, PP, FI/CO	SD, MM, PP, QM, FI/CO		SD, MM, FI/CO
No. of users	~ 40	~ 40	500 nominal	120 regular	~ 55
Project budget	~ 1,200,000 NLG ^a	~ \$1,500,000 ^b	na ^c	~ \$1,250,000 ^d	

Note. ASAP = Accelerated SAP; SD = sales and distribution; MM = materials management; FI/CO = financial/accounting and controlling; PP = project preparation; QM = quality management; NLG = Netherlands Guilders.

^a~\$600,000. ^b13% under budget. ^c12% under budget. ^d46% over budget.

- *Project success factors.* The one overriding priority for a successful ASAP implementation is adherence to the project plan. Because of the intensity of an ASAP project, care must be taken to motivate and manage the impact on employees by positive promotion of a good project climate; put the right employees on the project, including middle managers; prepare end users for having more responsibility; and provide sufficient end-user training. With regard to the last item, companies considering ASAP should keep in mind that the regular workload still has to be handled while training is in progress. Our experience suggests the following critical success factors for each project phase:

Project preparation:	Ensure management commitment.
Business blueprint:	Understand R/3 processes as best practices; avoid modifications.
Realization:	Provide sufficient internal employee capacity and make decisions quickly.
Final preparation:	Concentrate on the most important business processes.
Go live and support:	Plan for the workload involved in the transfer of existing data and the training of end users.

- *Predictability of project length and cost.* It was more important to company managers to be able to accurately specify the project budget and project duration in advance than to have complete process reengineering. However, for an ASAP project to be successful, a company still needs a rough understanding of its processes before the project begins, and it also needs to know which processes it plans to support in the future. By establishing a fixed scope and choosing reference-based implementation, time and costs can be estimated using the SAP tool Project Estimator.

Costs are dependent on a variety of factors. External project costs can be greatly affected by the use of internal staff. Nokia SWP, for example, kept consultant costs at 46%. Lack of planning for difficulties in mapping R/3 processes, such as that illustrated by DMC Prints, can also lead to cost overruns because of additional external support time. Companies need to be aware that ASAP does not allow for any new processes to be designed and that reworking and redesign does not occur until after production start-up. Finally, companies that are spread out geographically need to allow for appropriate travel expenses, which can run up to 10% of project costs. Team members must be able to interact directly during the project.

9. CONCLUSIONS

ASAP is business process, reference-based approach to implementing SAP R/3. This approach offers the benefits of R/3 process knowledge and information integration without the costs and risks (and potential benefits) of process redesign prior to systems implementation. ASAP demands a limited project scope and short project duration, which helps to guarantee timely project completion without budget overruns. It also supports a continuous improvement effort by helping to build in-house knowledge of processes through use of reference processes and a common process language.

- Our case studies show that small to midsize companies can achieve rapid implementation of SAP R/3 using the ASAP method. Among the factors critical to success are these:
- Adopt R/3 standard processes without prior redesign and avoid software modifications.
- Create a dedicated project team and ensure efficient use of consultants with speedy decision making.
- Define a clear project scope, allow no more than 6 to 9 months for project duration, and limit scope creep.
- Create a project technical team.
- Dedicate a project room for the entire project team.
- Adopt a big-bang migration strategy.

Although this study focuses on SAP R/3 and the ASAP method, we believe that its conclusions are applicable to other ERP systems and to other rapid-implementation methodologies. More study is needed before we can compare methodologies and ERP systems themselves in terms of how easily and effectively they can be implemented using an expedited approach that does not involve process redesign.

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APPENDIX

Case Study 1: Mitek Surgical Products, Westwood, Massachusetts

Business: Surgical instruments, manufacturing and training.
 Market: Rapidly growing.
 Company: Founded 1985; rapidly growing.
 Parent: Johnson & Johnson.

Existing IT System

In 1989, Mitek had 10 employees and sales of \$2 million. At that time, the company installed an integrated standard software package called "Visibility," on a VAX platform. As time passed, the architecture of Mitek's old information system (IS) remained simple: a LAN with approximately 40 users and a central VAX server.

In 1994, Mitek acquired a part of Medicine Lodge, Inc., in Utah. The IS in Utah, supplied by the company Macola, did not support the planning and financial processes of Mitek. Because of rapid growth in its markets, Mitek wanted to implement a scalable system that would be able to handle the functional requirements of the coming years.

Mitek wanted the new system to accomplish the following:

- Replace a business IS that was no longer adequate.
- Support significant growth without having to hire more employees in administration.
- Reduce warehouse inventories (and thereby costs) through integrated management of business activities.

Existing Business Processes

Mitek's old IS did not support process thinking. Mitek never saw this as a problem, however, because the company was relatively small. Employees were familiar with the company's business processes and rarely needed to speak about them explicitly. However, as a result of the acquisition in Utah, it became more difficult for the employees in Massachusetts to get a clear view of the business. Many different channels, including fax, telephone, e-mail, and regular mail, were used to exchange purchase orders, invoices, inventories, and product specifications. Mitek sought to remedy this situation by putting in place explicit, concrete, and standardized processes between the plants in Boston and Utah.

Project Scope

In its implementation of R/3, Mitek focused on the supply chain. The following R/3 modules were included in the scope of the implementation: Sales and Distribution, Financial/Accounting and Controlling, Materials Management, and Production Planning.

The original plan was, in the first instance, to implement only the functionality that was available with the old system. As understanding of the potential of the integrated R/3 system grew, the project was redefined as an initiative of the business units. This change brought about an expanded focus for the implementation. The goal was to achieve more business benefits as part of the ASAP implementation.

In the course of the project, Mitek recognized the necessity of either reducing the project scope or postponing production start-up. Mitek's decision makers chose to keep to the deadline for production start-up and cut various requirements, such as product cost accounting, forecasting, and sales reporting, from the project scope.

A total of about 40 employees use the system. The required infrastructure (one server and some new PCs running Windows® NT) comes from Compaq and was installed and running within 2 weeks.

Project Team and Project Organization

Because administration had a small staff, employees could not be assigned full-time to the project. Depending on the phase that the project had reached, the employees were able to devote 20% to 80% of their time. The ratio of consultant days to internal employee days came to around 2:1. R/3 consultants were working on a full-time basis.

The top level of control was a steering committee comprising a representative of top management and the project leader. Project management was shared by Mitek's IT manager and an external senior SAP consultant. The project staff was recruited from Mitek's middle management; on the project, they represented the functional organizational units of the company.

Project Time Line

Mitek's business is subject to seasonal swings, with October and November being the strongest sales months. Employees would therefore need to spend more time on regular daily work during peak periods, so the project was on a very tight schedule. The project start date was February 1997. The time allowed for the individual ASAP phases is as follows: Project Preparation, 1 week; Business Blueprint, 4 weeks; Simulation, 7 weeks; Validation, 7 weeks; Final Preparation, 4 weeks.

Costs and Consultant Time

The implementation of R/3 cost around \$1.5 million. Not included are the working days invested by Mitek employees in the project. The total cost breaks down into \$1.1 million for consulting, \$200,000 for software, and \$150,000 for hardware.

Mitek required the following amount of effort, calculated in consultant days, in the individual project phases: Project Preparation, 24 days; Business Blueprint, 70 days; Simulation, 122 days; Validation, 247 days; Final Preparation, 150 days. An additional 10 consultant days were required during and after the go-live phase.

Results

Although Mitek's implementation of its R/3 System using ASAP was a success, the company was unable to achieve any significant improvements in its business processes because it was still operating as it had before R/3 was implemented. After R/3 had been live for 6 months, the R/3 System forced the decision makers at Mitek to formalize their processes and business policy. As a result, Mitek needed a consultant for an additional 3 months (2 days per week). Both in production and in sales, for which Mitek is also still looking for a solution, a variety of errors occurred in the business processes that the company did not correct until after production start-up.

Mitek is still convinced of the value of ASAP and the R/3 System. It was critical of the fact that ASAP is marketed as a complete solution even though implementation through production start-up was only the first step at Mitek and needs to be followed with additional work. An SAP consultant advised Mitek's project leader to include "stabilization measures" in the 1998 budget; however, what has become necessary is a complete redesign of individual business processes.

Benefits

Mitek employees from various areas of the company cited the following qualitative improvements directly associated with the SAP R/3 implementation and already being felt in the company's daily operations (as of January 1998):

- In the finance area, the production facility in Utah is now integrated into the Mitek IS.
- More information is now available for and about production, and the production department is more fully integrated in the planning and manufacturing processes.
- Planning and material requirements planning (MRP) are now much simpler with R/3. Previously, MRP could only be performed once a month. Today, MRP is run whenever necessary.
- Although in sales, no substantial reduction in effort had been achieved by January 1998 (in fact, the employees now have to enter even more data), this additional effort allows more detailed analyses in financial and cost accounting. An awareness of integrated processes still has to be developed through change management.

Mitek plans to build on those initial improvements and to continue to reengineer its processes. Additionally, Mitek will take advantage of more of R/3's potential for reengineering business processes in a follow-up project.

For its excellent performance in implementing R/3 under time and under budget, the ASAP project team received an award from Johnson & Johnson.

Case Study 2: DMC Prints, New York, Los Angeles, and Orangeburg, South Carolina

Business: Textile coloring and sales of European products.

Market: Highly competitive; sales declining.

Company: Small but decentralized.

Parent: DMC Group, France.

Existing IT System

The heart of DMC Group's old IS was a 10-year old IBM 9370 mainframe and an IBM AS400. The company processed domestic business on the IBM 9370 located in Orangeburg using software developed in-house in Germany 8 years previously. The company processed orders to be filled with European products on the IBM AS400, located in New Jersey at DMC, Inc. Business with Europe was processed on an aging J.D. Edwards System.

In addition to the large systems, the existing IT system included a series of PC applications:

- A PC in New York was used to consolidate the orders for Orangeburg and Europe.
- Order data from the IBM 9370 was exported to Tasco software for production tracking and reporting.
- An adapted DB2 database was used to query sales order status.
- All other business processes, such as purchasing or warehouse management, were handled manually using Excel or Lotus spreadsheets.

Applications were not integrated, resulting in redundancy of function and data at several locations. In addition, DMC Prints was in the position of administering different system platforms with different languages. Although some software had started out as standard release, major changes had been made over time so that easy upgrading would not be possible. In addition, only a few of the company's 150 employees were familiar with the systems.

Existing Business Processes

Multiple entry of data in different systems at different times had become the norm at DMC Prints. As one example, customer service representatives took orders over the phone and wrote them down on paper. These orders were then faxed to Orangeburg, where staff entered the orders in the mainframe system. Often the handwritten notes were incomplete and required telephone follow-up; in addition, errors in interpreting the faxed orders led to incorrect data entry. Multiple data entry into different tracking systems not only created opportunity for error, but also resulted in lack of timely information across all offices. The PC-based DB2 database, for example, rarely had current information on sales orders. Delays and errors that resulted in lowered customer satisfaction were seen as a serious hindrance to success in this narrow-margin market.

Project Scope

The DMC Prints implementation of R/3 focused on order processing, materials management, cost accounting, financial accounting, purchasing, and management reporting. The company included the following R/3 modules: Sales and Distribution, Financial/Accounting and Controlling, and Materials Management. DMC Prints replaced the entire existing IS with SAP R/3.

However, because of specialized needs inherent to the textile business, the company could not rely on the R/3 standard processes in some areas. For example, textiles ordered by a customer must meet uniform quality criteria, and for technical reasons, uniform quality can be assured only for certain lengths of material called *batches*. Thus, orders are filled on the basis of batches. The R/3 standard did not contain the functionality for dealing with this and other specialized features of the business. The project team was, however, able to develop a "workaround" pieced together from existing reference processes, and this strategy avoided changes to the code.

Project Team and Project Organization

At times the project team consisted of 15 employees spending 100% of their time on the project. To ensure integration between modules, the entire team worked alternately in New York and in Orangeburg, incurring significant travel costs. The ratio of consultant days utilized to internal employee days was 1:3.

The top level steering committee consisted of the CEO and CFO of DMC Prints plus the CIO of DMC Group from France to keep the project consistent with the interests of DMC Group as a whole. Both DMC Prints officers were heavily involved in the project, with the CFO in particular devoting 60% to 80% of his time to the project in the final-preparation and go-live phases. Project management was shared by DMC's IT manager and a senior consultant from HJM, an R/3 consulting partner. The project staff consisted of a leader in each functional area, several staff members from the different locations, and one or two SAP module consultants. On the project, they represented the functional organizational units of the company. In addition, a group of "superusers" was recruited from the employees on the project team. Their task would be to train the end users in the new processes.

Project Time Line

The project at DMC Prints started on February 10, 1997, and went live in late July 1997, with considerable difficulties. Because DMC Prints could not use the standard processes, the project team needed much more time and consultant support than planned. Consultants were so heavily engaged in process definitions that training of employees and transfer of system know-how suffered. At the live start-up date, DMC was not able to ship orders using the R/3 system. Fortunately, August was a month of low business volume; otherwise, project management would not have been able to keep with the project plan.

Costs and Consultant Time

The project budget of around \$1.3 million was deliberately calculated by DMC Prints to be tight. As it turned out, the project overran the budget by 46% (\$600,000). The largest area of overrun was \$400,000 used for process changes, of which 75% was consultant costs. Another overlooked area was travel-related expenses: Costs for travel and hotels amounted to 10% of the total external costs. Detailed costs were as follows: R/3 Consulting, \$931,000; Software, \$266,000; Hardware, \$228,000; Other consulting and interfaces, \$228,000; Travel, \$190,000; Training, \$95,000. Overall, consultants contributed 603 days to the project. Following production start-up, an additional 75 days of SAP consulting support were needed.

Results

With the exception of the commitment of management, the conditions for a short implementation project at DMC Prints could hardly have been less favorable. First, complete reliance on the standard processes was not possible because of the textile industry requirements mentioned previously. In addition, DMC Prints had to do some fundamental thinking about its business processes, which were very different over the several systems that made up the old IT system, and this analysis took time.

Initially, project management tried to handle process definitions across the various locations with staff-level employees, not wanting to take area managers away from their regular work. That approach proved to be a mistake in that the demands on the selected employees were too great and the resulting process definitions did not always reflect the company's best practices. The outcome was demotivation of the project team.

Another challenge to the ASAP strategy was the geographic separation of project team members. One of the basic conditions for an ASAP implementation is that team members work together directly. Those in charge did not realize before the project began that the physical presence of the entire project team at the various locations was necessary for a successful project. Cost overruns for travel resulted, and employees had difficulty coping with frequent travel and absences from home—particularly employees with families.

Because of the unanticipated time required on process definition, the superusers, who were responsible for educating end users, received only a minimum of R/3 training. The result was that end users were not sufficiently trained to operate the system without difficulty by the time the system went live.

Benefits

With the new system, the company has seen improvements in connections to the European part of the group as well as the following quantitative changes:

- A cutback of eight employees was possible due to elimination of redundant data entry.
- A 25% reduction has been made in error frequency in order processing.
- IT support costs have been reduced.
- Warehouse inventories have been reduced by 10%.
- Order processing is simpler because three steps in the process have been eliminated. Orders go directly into the Orangeburg system from the sales sites.
- Administrative costs for fax and telephone have gone down.

DMC Prints estimates a savings potential of about \$700,000 annually as a result of the live operation of SAP R/3, although those savings could not be realized in the 1st year after start-up. DMC Prints has also solved the Y2K problem and now has sufficient system potential and flexibility to continue improving its business processes.

Despite the difficulties, the company views the R/3 implementation project as a success and given the conditions, a great achievement. SAP is now working with DMC Prints on an industry-specific solution.

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