Implementation Issues For SAP R/3 Accounting Software

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Abstract

This article seeks to identify the strengths and weaknesses of SAP R/3 from the auditor's point of view of information technology, to address the critical success factors and risks encountered in implementing SAP R/3, and to investigate the broad scope of information technology internal controls found in a client/server environment.

Introduction To Sap R/3

In a client/server local area network (LAN), the SAP R/3 software became one of the leaders in the computer software industry beginning in the mid-1980s. SAP R/3 was developed by SAP in Waldorf, Germany as a highly integrated management information system (MIS). Through the development and marketing of SAP R/3 in 1994, the parent company achieved its highest annual revenues of over one billion U. S. dollars (Bancroft, 1996). The earlier version of SAP R/3, R/2, was used by many German companies and large multi-national companies (MNCs) in the mainframe operating environments.

Most organizations run SAP R/3 on either a UNIX or Windows NT computer platform. This software is very highly integrated and its processing is real time. Therefore, the risk of data redundancy is minimized, and the accuracy and timeliness of the data is improved over batch processed mainframe applications.

SAP R/3 is packaged for sale in modules. Each module represents a general business software application. Another appeal of SAP R/3 is the fact that only the Basis Component module is required for initial installation. A company may decide to install only one module or many modules to establish its accounting information system (AIS). The AIS can process financial information using only one module. With many modules installed, the AIS will process financial information faster due to the interconnectivity of all the installed SAP R/3 modules. The current version, of SAP R/3 contains the following modules:

- Basis Component (BC)
- Human Resources (HR)
- Financial Accounting (FI)
- Controlling (CO)
- Fixed Asset Management (AM)
- Project System (PS)
- Office and Communication (OC)

Readers with comments or questions are encouraged to contact the authors via e-mail.

- Plant Maintenance (PM)
- Quality Management (QM)
- Production Planning (PP)
- Materials Management (MM)
- Sales Distribution (SD)

Through these modules, SAP R/3 can provide support for all of the basic business functions for virtually any organization. In fact, with the growth of business process re-engineering throughout companies in the United States and around the world; SAP R/3 has been one of the key 'enablers' for the workforce and flattened management structure.

The business entity is divided into six critical operating units: the client, companies, business area, controlling area, plant, and warehouse. The client can be defined simply as the highest unit within the organization. Companies are sub-units of the client, usually subsidiaries that are separate and distinct business units. A business area is a sub-division of a company, for example a department, product category, or sales territory. Controlling areas provide a 'roll-up' of cost centers by responsible manager. Plants are used in the logistics module (MM) to identify operating facilities, this arrangement may include the specific identification of individual warehouses. Finally, warehouses are physical storage facilities used by the organization.

At the core of SAP R/3's capabilities and functionality is the Basis System (BC). Ernst and Young's, *Audit, Control and Security Features of SAP R/3* provides an excellent of overview of SAP R/3's primary features accordingly:

The structure of the organization in SAP - Upon installation, an organization needs to fit their organizational structure into the SAP structure.

System Profiles and Start-up Profiles - System and start-up profiles need to be set-up. These profiles influence the functioning of the entire SAP R/3 installation.

Authorization Objects - Authorization objects are used to check a user's authority to perform actions and access data in SAP R/3.

On-line Transaction Processing - The SAP R/3 system obtains entered data from the workstations, checks and validates the data in terms of the processing logic in the Dynpros, and updates the database.

Background Processing - Users may submit jobs for processing in the background partition.

Batch Input - Batches of transactions may be substituted and may run either in the background or in the foreground.

ABAP/4 - ABAP/4 is the fourth generation interpretative language in which all SAP R/3 applications are written. The Basis System is written in the C programming language.

ABAP/4 Query - ABAP/4 Query is the report writing software that allows users to generate reports quickly and easily without programming knowledge.

SAP Transactions - Functions in SAP R/3 are accomplished by means of transactions that call up input screens and initiate updates to the database.

Dynpros - Dynpros are the input screens used when processing SAP R/3 transactions. They include details of the processing logic to be performed on the fields.

Number ranges - SAP R/3 provides an "internal" and "external" numbering mechanism.

Matchcodes - Secondary indexes to enable users to find specific records when the primary key is unknown.

Tables - SAP R/3 is characterized by the use of thousands of application and control tables. The set-up of the control tables, to a large extent, determines the way in which a SAP R/3 installa-

tion functions.

ABAP/4 Dictionary - SAP R/3 needs an external database, but it makes use of its own ABAP/4 Dictionary. This gives it the functionality of that it is not available in different database software and enables SAP R/3 to use various databases.

SAP Information Model - SAP R/3 provides an information model that is used to understand the SAP R/3 system and data, and facilitate customization.

SAP EDI Capability - SAP R/3 supports Electronic Data Interchange (EDI) by supporting EDIFACT and ANSI X12 standards.

SAP R/3 Analyzer - The SAP R/3 Analyzer is a tool that can greatly help with the introduction of SAP R/3 to organizational personnel. It provides a comprehensive view of the current and required system and supplies the information concerning the required SAP R/3 modules and processes.

Customizing Application - SAP R/3 allows users to customize the SAP R/3 modules to suit the organization's requirements.

Backup and Recovery - Regular backups are necessary to ensure the recoverability of data, in the event of a disaster.

Logging and reporting - Errors and important events are recorded in the system logs. These logs should be reviewed on a regular basis.

One of the most important facets of SAP R/3 is its highly integrated structure. In essence, thousands of tables are constructed using the proprietary programming language ABAP/4 which all 'fit together' among the various modules that are being utilized. This highly integrated and efficient database virtually eliminates the need for additional links to other applications. This fact is of great significance to the large multinational companies who require uniform operating and financial reporting from their subsidiaries and affiliates around the world. High integration is one of the most important reasons why the software has become so popular in recent years.

Generally, the major advantages to using SAP R/3 include: (1) Flexible implementation planning and scheduling; (2) High degree of integration; (3) Easy maintenance of database files, transactions and tables; (4) Potential for effective security access and control features; (5) Portability of the software to different client server architectures; (6) General reliability from knowing the software is in use at many large international companies; (7) Continued support and new releases from the developer; and (8) Large amount of technical support and integration consultants who can assist with implementation, upgrades and ongoing maintenance.

However, as with the installation of any new software application, there are many risks to the organization as well. Because SAP R/3 is generally implemented simultaneously with a wide reaching Business Process Re-Engineering (BPR) effort, these risks might be magnified significantly within an organization.

Nancy Bancroft, a consultant specializing in SAP R/3, identified four major risks in choosing SAP R/3 (Bancroft, 1996):

Risk Number 1 - 1980's Technology Since SAP R/3 is based on early client/server technology, it does not take advantage of full object oriented (OO) design principles. Bancroft notes that Object Linking and Embedding (OLE) is used, but SAP R/3 does not fully utilize this technology to provide additional flexibility to workflow processes and integration.

Risk Number 2 - Lack of Flexibility SAP R/3 is highly integrated and thus allows for an endless number of data fields and tables to look at data in different ways. However, Bancroft feels that SAP R/3 is "structurally inflexible", meaning that the highly centralized and structured environment might not 'fit' the company's operating

style. In other words, centralized control of information processing allows companies to adhere to rigid, highly structured standards. While these constraints might not be needed or effective in a company that operates highly decentralized, laissez-faire business units.

Risk Number 3 - Complexity SAP R/3 is so highly integrated that it might very easily appear to be too complex for the average user. In the past, if a company has been successful in using a mainframe legacy system, and then chooses to install SAP R/3, it might appear to be too confusing, time consuming or frustrating to the individuals who will be responsible for installing, training and using the software. Again, these issues can be magnified exponentially, if the company's employees have participated in a large scale business process re-engineering project.

Risk Number 4 - Possible Lack of Fit with Corporate Strategy Bancroft (1996) believes that SAP R/3 is a very good fit for those companies, which have a traditional top-down organizational style. Due to the overall structural premise of SAP R/3, those companies who might be more 'bottom-up' might not have the goal concurrence necessary to allow SAP R/3 to be installed effectively. Interfaces and/or add-ons to other software applications will also make it difficult for installing future upgrade versions of SAP R/3. Internal programmers or expensive consultants might have to be utilized to design the additional functionality the company requires. Overall, Bancroft acknowledges that SAP R/3 will fit the majority of businesses which are willing to work within its limitations.

The major advantages and disadvantages of SAP R/3 were summarized by Forrester Research, Inc. in Cambridge, Massachusetts, a leading information technology thinktank and consulting firm. Forrester concluded that there were four primary advantages of SAP R/3 (Cameron, 1996). First, tight integration of the various software modules that allows the components to communicate talk to each other. Second, adopting a single view of the business; generally accomplished through the sharing of one primary database for the entire application. The emphasis is placed on eliminating database redundancy. Third, process orientation forcing companies to think in a management style that is highly conducive to a concurrent or post-business process re-engineering corporate culture. Through this overall efficiency would be increased and overhead and unit costs should be reduced. Fourth, rich functionality based on 'best practices' identified by SAP over its twenty plus years of existence. Forrester believes "there is little that SAP R/3 cannot do -- one way or another".

Chief Information Officers (CIOs) as well as operating managers might view SAP R/3 as the best solution to move the company away from old legacy system technology, centralize corporate data processing under uniform standards and eliminate incompatible, inefficient systems throughout the enterprise. If the current information systems operating structure of the company is filled with disorder and chaos, SAP R/3 will probably do an excellent job of centralizing and controlling systems development, application programming and daily production. Similarly, if your organization is in an industry that SAP R/3 possesses a best practice model, then a number of additional benefits would also be realized through implementing SAP. First and foremost, the organization does not have to 're-invent the wheel'. The company might be able to virtually replicate what the best practice is. Obviously, those processes and unique requirements of the implementing organization will have to be identified, prioritized and included in the implementation plan. These processes and requirements are some of the very basic reasons why SAP R/3 has become some immensely popular in the last few years.

Once an organization has decided to purchase SAP R/3, it should immediately begin to develop a systems implementation plan. The time and resources spent planning a large scale project, such as the implementation of a major information system like SAP R/3, are critical.

Poor project planning can lead to very significant cost overruns, disenchanted personnel and inaccurate customer expectations.

The Critical Success Factors In Sap R/3 Implementation

As with any AIS implementation, there are a wide variety of critical success factors that will ensure a timely, efficient and cost-effective installation. Furthermore, due to the very wide impact that SAP R/3 typically has on an organization, a significant amount of time will be devoted to planning its implementation. It is essential that the overall systems implementation plan be thoroughly examined by management, the internal auditors and any consultants who might be used to assist with the installation.

Systems integration involves pulling all of the roles of systems analysis, application programming, testing and actual production together. Accordingly, "the various components of the system are the building blocks available to the systems designer" (Lucas, 1992). After a software application is selected for purchase by a business, it must understand what will be necessary to get the application operational. For SAP R/3, the SAP Company has developed 'partners' to assist clients in the systems integration process. The majority of the Big 6 public accounting firms, and many information technology consulting firms have practices dedicated to SAP R/3. In fact, in the summer of 1996, the SAP Company, the developed and manufacturer announced that they will begin to offer systems integration services (Buck- Emden, 1996). One popular benefit of this service is the reduced implementation costs of SAP R/3; which can easily reach into the millions of dollars. This cost has been a frequent complaint of SAP R/3 purchasers, and should assist the SAP Company with further market penetration.

Corporate Culture Assessment

At the heart of the SAP R/3 implementation plan is a broad baseline assessment of the company's overall ability and willingness to change. While some organizations might be very accepting of advances in information technology; others may not. Many businesses have used business process re-engineering efforts to be a 'calling time' for employees. At this time, employees begin to realize that they must change, become more flexible, and broaden their individual skills. Since many employees are usually involved in the set-up and design of SAP R/3 tables, their support and enthusiasm for the project must be evident.

Management Support

Second, there must be wide-scale support for the SAP R/3 implementation effort. Critical support must come from executive management. However, it is also critical that middle-level managers give their support to this type of project. If the message from the senior management ranks are not supported by their direct reports, then the project will be slowed down, not effectively implemented and/or misunderstood by the end users. All of which, will harm the overall implementation effort. This type of support is usually gained from a systems steering committee.

The systems steering committee is typically responsible for the feasibility study, changeover (conversion) plan and master plan of a computer or software installation (Weber, 1988). Members of this group include representatives of executive management, key user groups, and possibly external 'partners' or consultants. For the purposes of systems integration, it is important to focus on the changeover plan. This component details the actions, tasks, sub-tasks, time frames, and critical milestone dates for the migration to SAP R/3. The systems steering committee must also develop a mechanism for quick and decisive decision making. Many issues and concerns will inevitably arise during the system integration process, and the organization must be capable of dealing with them in a timely and efficient manner. Regular meetings (weekly or daily) of this committee

must be scheduled. The committee members must be committed to attendance and the goals and objectives of the committee. Furthermore, executive management should designate an integration champion, this individual will have overall responsibility for overseeing the entire implementation.

A Well Organized, Detailed and Controlled Plan

The SAP R/3 implementation plan must be very well organized, reasonable, prudent and capable of being accomplished. The tasks must be in sufficient detail that performance can be monitored and analyzed. The individual(s) responsible for completing the task must be identified. Additionally, time budgets, target start and completion dates, as well as actual start and completion date should be established and agreed to by all necessary parties. Periodic status reports should be furnished to the systems steering committee. Obstacles, delays, difficulties, and changes in personnel of a significant magnitude should be explained. These items should be provided to operating and information systems management, as well as the information systems steering committee, so that all parties have a common understanding of the SAP R/3 systems integration project status.

Control must be an embedded management process in the implementation of SAP R/3. Without control, management will be incapable of keeping the project on course and limiting the many opportunities for cost overruns and mid-course adjustments.

Communication Efforts and Standards

The communication process must be ongoing and non-static, if the integration process is to be successful. The communication process includes the status reports mentioned above. Problems will surely develop, and they must be anticipated, communicated and resolved promptly. Some organizations might find it beneficial to hold open meetings, where individual users would be allowed to express their particular concerns. In other organizations, it might be effective to utilize a weekly newsletter describing the personnel involved in the integration, key milestones that have been accomplished and important tasks that still need to be completed. This effort ensures that the nature and complexity of the management change process is re-iterated and constantly conveyed.

Selecting the Project Implementation Team

The individuals responsible for implementing SAP R/3 are crucial to the overall success of the integration project. Five significant questions must be asked, such as: (1) Do they have the necessary technical skills (e.g. ABAP/4)? (2) Do they have practical proven experience with SAP R/3? (3) Are they committed to the project's objectives and goals? (4) Do they concur with the implementation timetable? and (5) What are the costs and benefits of trying to use internal resources?

The answers to these questions will very likely vary slightly for each organization. Nevertheless, a number of useful suggestions can be offered. The competency of the individual programmers will need to be to verified. Often this can be done through standard reference checking. Additionally, the amount of 'hands on' experience that the consultants have with SAP R/3 is important. This experience can also be assessed by checking with a number of prior employers or clients. Regarding the timetable for implementation, one important component is the actual contract between the parties. Financial incentives might be advisable for early and/or timely completion of certain portions of the project by the agreed upon target dates. As well, penalties may be included in the contract to protect the organization from problems caused by delayed implementation.

All individuals working on the implementation project must 'buy in' to the process and the related time requirements. Many projects encounter 'unforeseen' difficulties that lead to delays in the actual implementation date and

even resignations of management staff. Furthermore, internal resources may be very useful to the implementation effort. Certain systems analysts and application programmers, who have been with the organization for a number of years and have worked with the end users, and can now assist them with database table development and act as effective liaisons with external consultants. In the end, it is vital to have the proper team of people assembled for the implementation, through review and planning will also be helpful.

One of the most pivotal roles in systems implementation is the project manager. This individual must be an excellent leader, an effective communicator and a rational business person. The majority of the daily management tasks will be this individual's responsibility. According to Bancroft, "The successful project manager integrates concerns that could otherwise fall between the cracks, and communicates with all those involved. These apolitical issues require a sensitivity to the three perspectives --- technical, business and change management" (Bancroft, 1996). While a constant balancing act exists, there is an immense amount entrusted with the project manager.

Analyze the Effects of Process Changes

While many organizations implement SAP R/3 concurrently with a large scale business process re-engineering effort, it is important to analyze the effects of these changes. For instance, a company may change the way raw materials are ordered, products are distributed or customers are billed.

These core business processes will have a direct impact on the underlying programming that is done. As well, if processes were redefined prior to the systems implementation plan, it is important that the project team have current information available to them at all times. These decisions should be made very early in the planning process. Since SAP R/3 is based on a highly integrated database, many applications and employees could easily be effected by one small change to a program or table.

Comprehensive Training

Comprehensive training will be necessary at various levels within the organization. An overall, detailed training program should be developed as there will be different training requirements for each type of user group. Initially, the systems steering committee will need to become familiar with the SAP R/3 infrastructure, functionality, and processes. Users will require formal and informal training. Some users might have undergone job changes; such circumstances need to be anticipated. The timing of training is also very important. It needs to be sufficiently in advance of "go-live", so that users will have ample time to experiment and learn the new systems. Also, it must not be too early, so that new skills and system features could easily be forgotten.

Organizational Commitment

While organizational commitment could be considered as part of the above described Management Support section, there are a few important distinguishing characteristics. The workforce must understand that moving to a technology such as SAP R/3 is very likely to change how the organization does business for the long-term. Due to its highly integrated nature, SAP R/3 should encompass most of the organizations' information requirements. Thus, most companies don't expect this application to be up graded in five or ten years. Employees will therefore need clear instructions that this information system will clearly influence their jobs, and that they will be provided the necessary training.

Many critical success factors are needed to successfully implement SAP R/3. The vast majority of them are critical to all technology management projects. However, due to the shear magnitude of a full scale SAP R/3 implementation, the stakes are that much higher for

the overall success or failure to the company. It is absolutely essential that all of the critical success factors described above be followed for a systems integration project. Experience has shown if 'short cuts' are attempted then the implementation will more than likely fail.

General Controls And Exposures In Client/Server Computing

Each company will face various exposures when installing SAP R/3. These risk areas have be segregated in three distinct divisions: general risks and exposures in a client/server environment, overall systems integration risks, and specific SAP R/3 risks.

Clearly, corporate information must be effectively controlled and protected. Managers of all types must have required information (based on data) in order to make decisions. As global competition forces companies to do business more efficiently and effectively, company data and information becomes more of a critical asset. With all information systems, the company must balance three distinct information considerations: availability, confidentiality, and integrity. For illustrative purposes, availability refers to determining when individuals should have access to data and how they should be allowed to access it. Confidentiality "refers to the need to keep data or information from being public" (Fites, 1989), and integrity is "the property that relates to authenticity, accurateness and completeness" (Fites, 1989).

Next, a cost-benefit analysis should be performed based on the previously noted criteria. This rationale dictates that the cost of protecting an asset should not exceed its related benefit. Logically, certain exceptions must be made. For instance, the confidentiality of patient's medical records in the healthcare industry is of paramount concern.

Additionally, since SAP R/3 can run on various distributed platforms, it would be impossible to delineate all of the risk associated with the individual operating systems. For reference material, a variety of publications are available from the Information Systems Audit and Control Association (ISACA) and the Institute of Internal Auditors, Inc. (IIA).

General Risks And Controls In A Client/Server Environment

Distributed processing systems such as local area networks (LANs) and wide area networks (WANs) have increased the number of exposure areas that previously existed in the traditional mainframe environment. Since the use of information technology is widespread, management researchers have identified the pros and cons of using such technology, its effects on personnel, and the related business risks that it presents to the organization as a whole. Nevertheless, "Widespread implementation of information technology, however creates two conflicting forces in most organizations. On the one hand, lower-level managers are armed with databases, terminals, microcomputers, and will have rapid access to a larger pool of information. On the other hand, information technologies are being utilized to create large-scale centralized operations at the headquarters level" (Karake, 1992). Due to the fact that distributed systems are decentralized in nature, the number of potential exposure areas is much higher then with a single mainframe system.

One fundamental analysis that should be performed in any assessment of a client/server system is a threat analysis. For definitional purposes, a threat is "an indication of an impending undesirable event" (Fitz, 1992). With LANs (Fites, 1992) these threats are divided into the following categories: density of information, accessibility of systems, complexity, electronic vulnerability, media vulnerability and human factors.

Density of information refers to the ease at which information is stored and typically accessed, transferred and then stored again in another medium or in another location within an

organization. Compact discs, floppy diskettes, optical discs and other storage medium can be used to store very large amounts of information. If a perpetrator can access information stored on a network, then they can very easily transfer the data to one of the previously noted storage devices and have a copy of company information.

Accessibility of systems emphasizes the fact that networks have been designed to accommodate a large number of end users in multiple physical locations. Accordingly, there are many points of entry to a computer network, and the traditional internal controls that existed in a manual system will probably not be able to be verified in a similar manner.

Client/server technology is fairly complex, especially to the average lay person. Information technology professionals as well as operating personnel in the organization will have to become familiar with the network's set-up, configuration, operating system(s) and specific applications in order to be efficient and effective in their job roles. Similarly, the complexity of the operating environment may cause a high number of accidental errors and mistakes by personnel.

Since all computer systems run on and therefore rely on electronic signals, there are risks associated with the electronic infrastructure of the system, itself. Power failures and surges might disable the network. Other transmissions from external sources will also need to be considered. For example, two-way radios, telecommunication systems, and radar systems could impair network performance. Additional threats also exist from media vulnerabilities. While there are many areas and types of exposures in the client/server environment, there are also many types of internal controls that can help mitigate these risks.

Storage media can easily be erased by placing it near a magnetic field, and the stored data could also be partially corrupted or rendered unrecoverable. Therefore, extreme caution should be used when storing and accessing storage media. Finally, there are many human factors that also need to be considered as threats in a client/server environment.

Numerous human factors can be considered threats. It is very important for the individuals operating SAP R/3 to possess strong technical talents, background qualifications and inter-personal skills. These people are usually highly intelligent and have an excellent aptitude for information technology. After all, the use of such technology is their job. Management controls such as pre-employment screening, detailed job descriptions and required vacations can help minimize these threats.

Internal controls in the information technology field can be separated into three principal categories: preventative, detective and corrective. Preventive controls are those controls that prevent or minimize the likelihood of a risk actually happening. Detective controls are designed to alert the organization that there has been a breakdown in a particular type of control. Whereas, corrective controls assist the company in recovering from a computer threat.

All companies should have general/administrative controls established and enforced within the various divisions of the organization. Physical controls include locked doors, fireproof storage areas, employee ID cards, CCTV, motion detectors and back-up power devices.

These types of controls can be compared to an army's first line of defense; such controls provide the initial protection from the various threats previously described. Examples of general and administrative controls include, but are not limited to: employee awareness programs, conflict of interest policies, a code of ethical conduct, systems security clearance forms, and employee training.

While many of these items might appear to be simple good business practices; it is nev-

ertheless important to identify the fact that they are being performed and are a part of the company's overall corporate culture. An organization will also have to consider the people it hires as employees and consultants.

Initially, some important questions to ask are: What controls exist to determine the qualifications and quality of job applicants? Are criminal investigations and credit checks performed prior to hiring applicants? Are references verified? Is there a standard probationary period once employment commences? Are particular security clearances required for the job, as with most Department of Defense contractors? Do employees get rotated to different project groups or teams? Are job termination and separations dealt with on a timely basis?

Another very important category of preventative controls are access controls. The doctrine for access controls is to allow access to company information to only those individuals that have an absolute business requirement or 'need to know'. Specific security matrixes should be designed based on job descriptions and a segregation of key job responsibilities.

Detective controls help identify breakdowns in internal controls at their onset. For example, network error messages would alert the systems administrator to situations such as repeated, failed sign-ons. Other detective controls might register errors through the production of error reports. Processing controls can be used to terminate or abort processing when errors are identified. More specific examples include: reasonableness checks, range checks, hash totals, check digits and batch balancing procedures. The final category of controls are those which can be classified as corrective in nature.

Corrective controls are used to respond to a threat after a specific situation has developed or unfolded. One of the most prevalent examples in the client/server environment is to shut down a particular workstation, if the system administrator is notified about repeated and unsuccessful access attempts. Another example would be employee suspension or termination due to a breach of a fundamental corporate policy.

In order to have a highly effective information systems security program in a decentralized and distributed environment, an organization will have to design, install and test a diversified set of preventive, detective and corrective internal controls. Clearly, preventive controls will not be completely and absolutely effective in preventing threats. Different situations will likely arise where detective and corrective controls will also have to be used.

System Integration Risks

There are a number of important risks are especially important during a system integration project. Identification, analysis and mitigation of these risks will improve the overall likelihood of a successful project.

The first group of risks deals with the integration planning process. The following key questions should be asked at a very early stage: Is the plan well organized? Is it insufficient detail? Are there good performance indicators? Is there adequate project 'ownership'? Are the users sufficiently involved? Are the consultants competent and committed to the organization's objectives? Is the staff well trained? Are the time frames reasonable? Is there any type of contingency planning?

Another group of system integration risks deals with the integration process, itself. These risks would include: Are user issues identified and monitored? Is there a demonstration model available? Is there effective change control? Is the communication between all vested parties effective? Are there ample system, user and integrated tests being performed? Are they documented for future troubleshooting and tracking?

The above detailed examples are meant solely to be representative, and not completely

inclusive. Furthermore, the general controls and integration risks need to be analyzed in relation to the specific software application that is being installed.

Specific SAP R/3 Risks and Exposures

Due to SAP R/3's use as an enterprise wide application that covers virtually all core business processes, an identification of the applicable specific risks and exposures is particularly important. Furthermore, many users will also play the role of developers, as they will assist in the design and construction of the tables required by SAP R/3.

While these control concerns and key considerations affect the Basis Component (BC) module many of the same concepts would likely apply to the other SAP R/3 modules. A comprehensive listing of control concerns would need to be developed for all of the modules installed by the organization.

An Effective Audit Approach To Sap R/3

As auditors who hope to be involved in an audit of SAP R/3; the following five areas are necessary for auditor involvement:

1- *Systems Implementation Planning*

- overall review of plan
- assess assumptions, benchmarks and contingencies
- possible systems steering committee member
- advise to management about general advantages and disadvantages
- determine user ownership and accountability

2- *Internal Control Design and Review*

- initial design as a internal control consultant
- segregation of duties within the information services dept.
- the role of the database administrator
- identify 'incompatible functions' with end users
- provide consultation for the system under development

3- *Testing*

- teach users about unit testing (e.g. documentation etc.)
- design and possible perform integrated tests
- assure parallel simulation
- identify the accountable parties in the organization
- review or design a post-implementation review

4- *Risk Assessment/Vulnerability Analysis*

- identify the threats to the SAP system
- review controls that attempt to mitigate risks
- are the appropriate parties aware of the specific risks involved

5- *Disaster Recovery Planning*

- does a disaster recovery plan exist?
- is it efficient and effective?
- do personnel run 'mock' disasters periodically?

While an effective audit approach should normally involve the above described components, the possible areas of auditor involvement will vary between organizations based on the corporate culture and available audit resources. Also, it is highly likely that an average internal audit department might not have the skills to be actively involved in an SAP R/3 implementation. If this is the case, assistance should be sought from external audit specialists.

Nevertheless, it is very important that internal auditors get involved very early in the implementation process. Ideally, this auditor involvement should happen at the information systems planning level. Regular meetings with the CIO and the direct reports assist the auditor in maintaining an on-going communication and information sharing. This sharing allows the internal audit department to feel more like a team member than the 'got ya' group.

Once there is support for audit involve-

ment, a formal audit plan should be developed. Audit files and programs should be designed based on standard operating procedures for the organization, as well as the professional standards for internal auditing. To the extent possible, those individuals who do not have experience with the particular software application should identify technical reference and gather information from audit colleagues and consultants. In any event, the control objectives detailed in the previous section of this project can provide a good starting point.

A systems integration project like SAP R/3 will likely require a tremendous amount of time. In fact, the internal auditors may have to select those areas which either present the most risk or allow for the greatest pay back on their time. SAP R/3 will present some very challenging internal audit work, and may consume a large portion of the internal audit department's schedule.

Summary

SAP R/3 is one of the most popular enterprise wide integrated accounting information systems available. Its highly integrated nature has helped companies gain market share as organizations migrate away from mainframe systems to distributed computing.

UNIX, Windows NT, and other network operating systems may be used to run SAP R/3. While there are a number of risks and control issues within SAP R/3 itself, information technology and general internal auditors will also need to consider those risks that are part of the individual operating systems.

The scope of an SAP R/3 implementation project is normally very large and complex. The amount of planning and testing is equally as large and complex. For a systems implementation to be successful, a number of critical success factors have been identified by leading SAP consultants. The implementation effort will typically be very expensive and time consuming. It is paramount that this effort be performed efficiently, effectively, timely and completely.

There are also a wide variety of risks that face organizations in the client/server environment. Proper identification of these risks allow the internal auditor to work with management to mitigate them to the greatest practical and cost justifiable extent. As with other information systems, organizations should identify a balance between the three primary information considerations: availability, confidentiality and integrity. Subsequently, preventative, detective and corrective controls are used to minimize the assessed risks and control concerns.

Although some fundamental audit material is available from the Information Systems Audit and Control Association (ISACA) there is still a great deal that should be researched about SAP R/3. Due to the fact that many internal auditors are not computer audit specialists, it is important to have literature that is easy to understand and use. Devoid of excessive technical jargon future audit material should also be beneficial to senior and middle management. Particular areas for future audit work in SAP R/3 should include the roles of the database administrator and security administrator and interfaces between other widely used software applications. These areas would then allow the internal audit profession as a whole to identify specific 'audit best practice' information that could then be used to truly add value to our own individual organizations.

In conclusion, SAP R/3 is a dynamic and very interesting enterprise software application. Its complexities are numerous and challenging from an implementation perspective, as well as an audit point of view. Those auditors who become involved very early in the implementation phase and learn as much as possible about the specific risks and control issues in SAP R/3 increase the probability of a successful implementation of SAP R/3. 🕮

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