System Integration Controls Lessons Learned from ERP Projects Applied to e-Business Systems

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e-Business systems are being developed within many organisations. As a result of competition and time pressure, e-Business systems are confronted with the same kind of project and control issues that ERP systems faced before them. In 1999, Gartner estimated that 75% of all e-Business projects fail. This article deals with the complexity of e-Business systems and explains to what extent key elements such as change management, training and controls need to be designed and implemented in order to increase the chance of success.

Introduction

As a result of increasing competitive pressures, businesses need to have control of efficient and effective transaction processing systems. In the 90s, Enterprise Resource Planning (ERP) software was regarded as the means by which to achieve this. Although this offers a practical solution, few businesses have been completely successful in the implementation of such complex and integrated systems. By the year 2000, e-Business has increasingly come to be regarded as a solution. e-Business enables businesses to further develop automated processes. e-Business does, however, rely on complete and accurate data from underlying systems and depends on controls in new process-based software packages such as Customer Relationship Management (CRM), Business to Business procurement (B2B), Business to Customer (B2C), and Product Data Management (PDM). Unfortunately, the software in such tools is still underdeveloped; the types of controls required to have the software function reliably and effectively are not fully understood.

This article first of all explains why ERP projects have failed to realise the benefits they promised. It then compares the implementation of e-Business applications with that of ERP systems. It also deals with some of the new control criteria for the support of business processes concerning customers and suppliers. Furthermore, it looks at possible strategies and the role that KPMG's SIC methodology and related tools can play in the development of solutions for e-Business controls. After all, businesses must be able to use good controls in both their e-Business and ERP systems in order to be successful.

Most e-Business systems are high volume systems

Despite the hype, only a small proportion of businesses is currently involved in e-Business. The excitement is based on the new business opportunities, as illustrated by companies that generate a relatively large increase in revenues. However, such exponential growth is only possible in the early phases of market development. Once the market has fully developed, a number of challenges arise, such as the management of large volumes of information. Most e-Business propositions are based on a combination of the following two factors:

1. improve services;
2. reduce transaction costs.

Services can be improved in many ways. A business may provide better access to its services or products or make them more transparent. It could provide additional information with its products (B&Q, a UK based DIY retailer, for example provides weather information, product selection and hints and tips on the front page of its website). Additional features may include product tracking (as provided by Federal Express and its rivals), or on-line product customisation (like Dell offers). Each service requires additional processes and an accurate and complete registration of data, in order to satisfy the customer (business or consumer). A key element concerns the level of integration between the front-end system and supporting systems. Note also that e-Business applications must support outside organisational changes as well as internal organisational changes. It is hard to predict the way in which customers and suppliers will actually use your e-Business system (for example they may be more interested in an excellent browser facility to find the product they need than in the price of the product).

The introduction of B2B and B2C systems is strongly motivated by the reduction of transaction costs. The costs involved in the approval of a purchase, the production of a purchase order and the matching of the purchase order to the invoice are quoted variously at $50 to $200. This figure varies, however, depending on the type of purchase and the efficiency of the organisation's internal processes. Clearly, the businesses with a high transaction rate will be the first to invest in e-Business in order to benefit from the savings. It is also worth noting that to generate

savings, businesses will need to eliminate the majority of human process support – sales clerks and buyers will no longer be administrating orders on behalf of managers.

From this brief analysis, we may conclude that the introduction of e-Business systems is likely to increase the volume of data and the complexity of processes. Organisations with high transaction rates will benefit most. The systems need to be integrated with existing company systems.

An analogy for e-Business – high volume transaction systems

In the early 1990s, a software package called SAP R/3 took the world by storm. Like its rival Enterprise Resource Planning (ERP), it was to bring huge benefits to businesses by standardising and integrating company processes supported by a single application infrastructure. In general, SAP and similar products by competitors such as JD Edwards, Oracle, Peoplesoft and BaaN have improved the efficiency of data processing and the level of control in business systems. Success, however, has been limited. Very few projects have been able to generate savings or achieve the level of business efficiency that was originally predicted. There have been many publicised failures: a business would implement an ERP system which would then cause a breakdown in internal control and lead to substantial financial losses. The impact of this on a company's reputation, its customer loyalty, and staff morale can further damage its financial performance in the future. An increasing number of companies mention application system failures as a reason for poor performance in their annual financial statements. In the author's experience there are many more who have suffered from a poor systems implementation and have not disclosed the fact. This might be expected since such a disclosure would reflect badly on the management of the company.

As is shown further on, there are many parallels between ERP systems and e-Business systems. It is therefore important to consider the factors which contribute to the failure of an ERP systems project. It is difficult to come to an objective assessment. The number of parties involved in a major ERP implementation, the project's length and the care for one's reputation all influence post-implementation project reviews. Not all projects suffer from the same influences, though. This article is based on our experience with over 50 companies (from multi-national groups of 40,000 users to single instance 20 user systems) to determine a number of general problems encountered in ERP implementations.

The main challenges have been:
1. change;
2. training/education;
3. system complexity;
4. lack of expertise regarding functionalities;
5. lack of understanding of controls in an integrated system.

Change

ERP systems have brought about a change: from departmentalised ICT systems – which might have been interfaced – to a single applications platform which integrated all departments. Before ERP was introduced, each department was able to customise the system to suit its particular needs, even if this created problems for other departments. Many of these problems were solved by means of human interfaces: staff members who establish reconciliations, parallel databases and re-enter a considerable quantity of data. With ERP, however, business users had to take into account not only their own requirements but also those of other people in the organisation. An overlap between one's own work and that of the unknown other was never an issue before. Inadequate management of the human aspect of this change gave rise to conflict and sub-optimal performance. In many cases, the ERP systems were customised (by generating additional codes rather than using the inbuilt configuration parameters) to support inherited processes. Many organisations also reduced the extent of human involvement in the process, often in advance of the ERP system's introduction, which increased resistance to change.

Training and education

Integration means that users are often presented with more options and fields than they require. This shows the importance of teaching user skills to staff. Such training generates a considerable overhead, especially for businesses with many users. Training generally took place before the system was put into use. Instruction on procedures included in the system's use, the required control procedures in particular, was limited. The importance of following procedure,

Case 1

A manufacturer of a complex engineering product, with long component lead times, implemented SAP R/3 as an ERP solution for its manufacturing, purchasing, supply chain, inventory and financial accounting needs. The complicated project was delayed twice before the system was put into use; this allowed for extensive training. One of the most significant changes to the business process concerned the introduction of a single MRP process for the entire company. Previously, several independent systems had been used for different types of components, so that the supply chain was controlled mainly by means of procurement schedules (rather than a manufacturing schedule). Goods were previously received directly by the production line (or nearby stores). Now they first had to be booked in the system on receipt before they were despatched to the production line. An increased production rate had put pressure on the business and staff quickly reverted to their old procedures. The level of stocking accuracy quickly fell to 10% and the MRP system was unable to project future requirements. The business was almost heavily penalised for overdue deliveries and it took one hundred people nearly a year to solve the problems. The company is still unable to perform a stock valuation using SAP, fourteen months after its implementation.

particularly when a person registers data required by other parts of the organisation, was also left virtually unexplained. Processes were consequently not adhered to after the ERP system had been put into practice. The following case description provides a typical example.

System complexity
ERP systems are incredibly complex. They have been designed to support nearly all types of business, to operate in most major countries and to respond to detected weaknesses. Such a degree of complexity makes it difficult to produce simple and efficient business processes. A high degree of complexity is generally a consequence of prototyping, trying to design a satisfactory answer to the 'what-if' question.

Lack of knowledge of functionality
System integrators such as major consultancies, and even the software companies themselves, struggle to understand this complexity. The rapid increase in the number of ERP solutions in the 90s meant that people involved in the first phase of implementation became consultants in the second phase. They often had received little formal training in the use of the software and were only able to offer their previous experiences. Even those with training tended to focus on one or two modules. They were not always aware of other module functions, or even of functions developed particularly for a country or a type of industry.

Lack of understanding of controls in integrated systems
The controls required by integrated systems were different from those required by the previous systems. Emphasis on authorisation of each individual transaction was replaced by the need for accurate master data, such as plans, budgets, contracts and prices. Effective monitoring supported the registration of data, using a set of customised reporting tools. This reduced the overall control costs and brought the controls on a line with the business objectives. Many businesses, however, were reluctant to abandon the 'warm blanket' of authorisation controls. Furthermore, few implementations specified a comprehensive framework for monitoring, and for control and reconciliation reports. This not only added to the control costs, it also substantially increased the impact of control failures. In case 1, the problems were increased because reports on invoices were not matched to purchase orders and because supplier delivery accuracy reports were wanting. As a result, it took them two months to recognise there was a problem.

Looking at the failure of ERP systems to achieve their objectives, a link can be seen with e-Business systems, as the following instance describes.

Two Swedish entrepreneurs started the electronic fashion shop Boo.com selling modish and expensive clothing brands. The implementation process was complex and delayed five months, due to technical failures and malfunctions before go live. The company wanted to launch their site in twelve different countries at one time, implying a marketing budget of 25 million dollar. The company already purchased a lot of spring and summer clothing, but because of the delay until November, customers only asked for winter clothing. Three months after the site was launched 70 of the 400 employees had to be fired. The complex Internet site, with three-dimensional images, proved to be to complicated for the average user. People had to have a broadband connection at their disposal to visit the electronic fashion shop. Six months later the online shop was declared bankrupt. 135 million dollar starting capital was diminished to only 500,000 dollar. The 500,000 dollar that had to be paid monthly for the photographs on the Internet site made the cost of the site run high.

Case 2

Applying the analogy to e-Business systems

Change
e-Business involves constant change. Firstly, it precludes the comfort factor of a paper-based system. Secondly it is immediate, it rules out delays which allow a person to check or change his mind. Rapid application development allows organisations to apply new business ideas, models and processes very soon after their conception. Even fundamental relationships such as that between customers and suppliers can be broken down by new intermediary forms. The high financial expectations regarding e-Business start-ups provide constant challenges to more established business models. This makes it hard to achieve process or even market stability.

Training and education
In theory e-Business systems are easy to use; browser technology and website design should make processes straightforward. However, the technology is only one part of the process; users will still have to learn which tools are available and when to use them. They may be faced with a greatly increased number of intranet- and internet-based tools which they have to use. One of the assumptions made by many businesses is that since the tools are self-explanatory there is little need for formal training. Consequently, the element of 'education' is missing – questions such as 'How do I use this tool to perform my job?', 'What customer information must I register?', 'What is the consequence of leaving out this information?' remain unanswered. Many organisations have made e-Business tools available but have not fully monitored their use. Nor have they ensured that all staff are aware of their presence and that they are capable of using them.

System complexity
e-Business systems often comprise more functions than their traditional business equivalents. For example, they may add 'order tracking' to the sales process. A company's services are brought together in a single portal, which leads to complex interfaces with existing systems. A universal look and feel to the websites are essential to their success, yet the underlying systems in various countries may have developed from completely different platforms. Functions such as 'order tracking'

and 'available to promise' are basic services. These do, however, require a high degree of sophistication from underlying ERP systems.

Many e-Business applications increase system complexity. Businesses will keep using their existing ERP systems for transaction processing. Since these do not suffice or are inconsistent, they will need to implement a middleware solution in order to have the e-Business applications communicate with the existing systems.

Lack of expertise regarding functionality
Most e-Business software solutions are underdeveloped. Many aspects of their functionality still need to be fully tested in a live situation. Not only does this mean that the software may contain bugs, it also means that few of the consultancies will be able to offer completely experienced staff for implementation support. The situation is similar to that in the middle of the nineties, when there were only a few genuine experts in ERP consulting to meet the enormous demand for expertise.

Lack of understanding of controls in integrated systems
ERP systems still included a human effort in the supply chain. One organisation's ERP system would generate orders, to be reviewed by its staff. These were then sent to a second organisation, whose staff reviewed them in turn. As far as e-Business is concerned, the human role can be eliminated so that systems are integrated internally and so that one organisation's systems are integrated with those of another.
The absence of human intervention makes it even harder to carry out traditional authorisation controls. Insertion of the controls into the process will increase the transaction costs and remove one of the advantages of e-Business. Nevertheless, the speed at which e-Business transactions take place, requires frequent monitoring of reporting/detection controls.

Comparison of control issues in ERP and e-Business systems

From this brief analysis it is clear that the control issues relevant to ERP systems also affect e-Business systems. There are other issues specific to e-Business:
* the demand for immediate solutions, motivated by competition and expectations of the benefits of e-Business;
* e-Business processes are still underdeveloped; it is likely that most systems will suffer from 'moving targets';
* the need to rely completely on electronic audit trails and other controls.

If we assume that the development of e-Business systems will meet with control problems similar to those experienced in ERP systems, then we should expect the following problems:
* e-Business systems are not delivered on time and often take twice as long as expected;
* scope cuts and scope creeps, with areas such as reporting and controls often omitted;
* the functionality fails to meet expectations and requires alternative solutions and adaptions;
* the inability to control master data, leading to inaccuracy and damage to the integrity of data, and systematic process control failures.

In e-Business, the impact of these problems on the organisation will be immediate. After all, the results will be instantly visible to customers, suppliers and other third parties, with all its consequences to turnover and reputation.

In conclusion, companies must pay more attention to controls in e-Business systems projects than they have done in ERP systems projects.

The types of controls required to allow new e-Business systems to function reliably and effectively, are poorly understood.

Some control considerations for e-Business

Before we consider an action plan we need to take a closer look at some control basics. In traditional systems, controls can be divided into two categories: *Preventive controls* are carried out before the event so that errors are precluded. Preventive controls typically involve a validation (i.e. a transaction is checked against predetermined criteria or parameters to verify its correctness and is not allowed to proceed if it fails the tests). The great advantage of a preventive control is that nothing can go wrong, whether or not the control is actively carried out. This allows passive management of the control. In e-Business this can also be a disadvantage because the party outside the organisation will be immediately aware of any delays. *Detection controls* are carried out after the event. They establish whether an error has occurred. Detection controls typically involve some form of report, reconciliation, or monitoring process. They require active management, i.e. management must regularly check the output and follow up any unusual findings. If the control is not carried out, errors can pass unnoticed.

Although preventive controls are clearly more effective than detection controls, their usefulness can be limited. Case 3 shows an example of how a preventive control may be circumvented. A detection control, particularly a report on order values and order frequencies, or even Bentham's Law, would identify the transaction as a possible control bypass and allow for a manager to investigate.

An employee has a maximum purchase order limit of USD 1,000. For higher purchases, he requires additional authorisation from a senior manager who 1) is extremely busy and 2) will ask awkward questions about the expenditure. The employee places twenty separate orders of USD 800 and makes a total purchase of USD 16,000.

Case 3

Level of trust	Control characteristics
0% - None	All expenditure is authorised at the outset for each and every transaction. Purchasing expenditure is monitored strictly in relation to budget.
25% - Partial	Purchases in excess of a certain limit (e.g. USD 1,000) are authorised. Lower purchases are subject to monitoring and investigation if differences are found.
50% - Balanced	Authorisation is given on a contract/relationship level for most major suppliers. Once this has been agreed there is no authorisation for individual purchases. Reports allow for monitoring of actual expenditure against expected expenditure. Differences are investigated. All other items are managed by means of corporate purchasing cards.
75% - Open	Employees are allowed to make purchases. Rules are applied by process/organisation unit/cost centre and expenditure is monitored on these levels. There is no specific purchase authorisation.
100% - Total	Purchasing expenditure is monitored and results are used to improve the use of company funds by employees.

Table 1. Suggested degrees of balance between trust and control.

In an e-Business environment, preventive controls which require manual authorisation will very likely be hard to implement. They don't accord with the 24 x 7 hour nature of many B2B and B2C applications. Nor do they harmonise with the concept of an effective workflow to prevent the person on the other end of the network connection having to wait too long. Preventive controls will therefore rely on validation. Validation controls themselves depend on accurate parameters which must be kept up-to-date. This can be extremely expensive and time-consuming. For example, a B2C site such as Amazon.com probably has over one million line items for sale; even with a level of accuracy of 99% with respect to price data, they will still have 10,000 incorrectly priced items. Price comparison software, which is becoming more sophisticated, increases the chance that incorrect pricing will be exploited. Many of these e-Business applications will rely on underlying ERP systems whose level of data quality may not be particularly high.

Efficiency of control

The costs of any control should be lower than the expected benefit of limiting risks by carrying out the control. High transaction volumes increase the need for detection controls instead of authorisation controls.

This can be put in a different way. For a business process to be control-efficient, all unnecessary controls should be eliminated. A minimum rather than a maximum level of control should be aimed for. This needs to be considered in relation to business culture. In some heavily controlled organisations, the control burden is such that many of them are not properly carried out. To the insider, controls will seem ineffective. In lightly controlled organisations the burden should be limited to an extent that each control can be carried out correctly and on time. This is known as the balance between trust and control.

Trust versus control

A key consideration in a control infrastructure is the required level of trust. The higher the level of trust, the lower and cheaper the level of control required. Each transaction flow will be proportional to the degree of trust required. Table 1 shows suggested degrees of balance between trust and control.

Before B2B was developed, most organisations would have been on the None or Partial level. We would expect organisations to move towards the Balanced level in order to take advantage of B2B technology. The Open and Total levels are included as a consideration of the limits of authorisation in a B2B world. These probably go beyond the level achieved by model organisations such as CISCO and are beyond the reach of most companies in their current stage of development.

Requirements for controls design in e-Business

Summary of control issues:

1. e-Business systems projects are in many respects similar to ERP systems projects; attention must be paid to the risks inherent to the project and to the design of controls in an early stage.
2. Manually performed controls will increasingly involve detection/monitoring controls instead of preventive/authorisation controls. This will require a shift from passive to active management.
3. In order to achieve efficient controls in e-Business, a business must aim for a minimum level of controls rather than apply as many controls as possible.
4. Particular attention needs to be given to data quality.

Any action plan for the design of controls will take the above factors into consideration.

Planning for controls design in e-Business applications

An action plan has to contain the following elements:

1. a robust control culture is developed;
2. controls design is an integral part of the e-Business application development process;
3. controls design is based on a risk analysis of the strategic business objectives of the e-Business application;
4. data quality and data conversion are seen as essential elements of the controls design strategy.

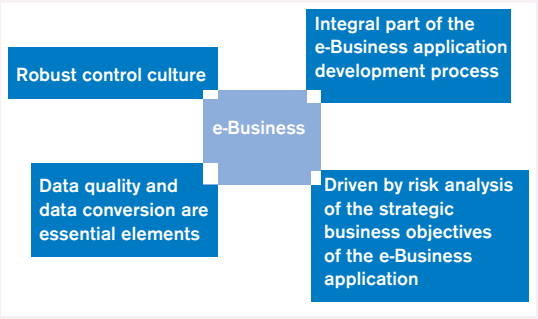

Figure 1. Control framework components.

Robust control culture
The two components of a robust control culture are:
1. The balance between trust and control in each e-Business application system is well understood.
2. Staff feel responsible for the controls which they 'own' and apply them diligently.

There are no magic ingredients with which to acquire this. If the other steps are taken, however, the acquired focus on process controls will make certain that they become embedded in the business.

Controls design as an integral part of the e-Business application development process
This means that control requirements are seen as part of the functionality. They are taken into consideration when the scope of the solution is assessed and tools are specified, as part of the design and the listing of requirements, and throughout the implementation (testing, training, data conversion). As manual procedures, controls are often integral to the design. They are tested, documented, and practised along with the computer system process elements.

Strategic business objectives determine control design
Each e-Business application should be focused on a particular business need – whether it involves the simple replacement of a traditional business channel by an internet trading channel, or a completely new method of providing goods and services to a customer.

The first step is to understand these strategic objectives and make sure that they are clearly documented. The second step is to analyse the risks to these objectives. For example in B2B there will be traditional procurement risks, but new contractual risks will also arise. The third step is to develop an understanding of the process risks. Using the B2B example, these risks could arise from: setting up new suppliers as B2B suppliers, the maintenance of the catalogue, etcetera. The final step is to create an understanding of the control possibilities of the application.
The combination of these allows the documentation of each key process and identification of risks concerned. This constitutes an essential platform for the evaluation of controls solutions. The most efficient way to design control solutions is to first address strategic business risks relating to the process. Thus, the most important risks have been addressed. Moreover, as a by-product, these controls should also address many of the process risks. By considering an entire process it is easier to identify duplication of controls.

Control solutions have to be practical. The effort involved in carrying out each control must be considered at the design stage. Using the example of Amazon.com's catalogue, it is clearly impractical to manually review prices for each order that the company receives. Even a review control of product prices in the catalogue may be impractical due to the sheer number of items. It may require a detection control to provide certainty with respect to pricing accuracy. For example, price margins at the time of the order can be checked. A supervisor can then be called in if margins deviate, supported by a follow-up procedure.

A client, who joined a B2B joint venture, has 75 different procurement systems as a result of acquisition and as a result of the absence of a consistent application systems component in the ICT strategy. It now has to implement middleware to control purchasing data in all these systems, and to ensure data accuracy and quality through approximately 50 interfaces.

Case 4

Data quality and data conversion
Since manual controls are difficult to achieve in e-Business applications, companies will rely on the accuracy of key master data: customer, product, supplier, and contract information. For most companies this information will be generated by a range of traditional systems. The level of accuracy of data in these systems may be poor as data were managed by means of user override/intervention.

Case 4 indicates that the data may exist in different formats and that even basic information shows little consistency.

Data accuracy is essential for the support of many validation controls. These will be the only reliable form of preventive control in many e-Business applications.

KPMG's SIC methodology – a solution for controls in e-Business

KPMG developed the Systems Integration Controls methodology to support the implementation of application controls in ERP systems. The methodology is designed to fit in with the standard implementation phases of most ERP projects, helping to ensure that controls can be integrated into the implementation of an application system.

This methodology consists of six phases:
1. *Project initiation* – establishing the role and scope of application controls in a systems implementation.
2. *Assessment* – reviewing strategic business objectives and assessing the control requirements.
3. *Design* – designing application controls which will meet the strategic business objectives efficiently and effectively.
4. *Implementation* – ensuring that controls are adequately tested and documented, including the manual aspects of each process, and training staff in both system use and manual aspects of control.
5. *Follow-up and evaluation* – post-implementation assessment of the effectiveness of the controls and development of systems improvement plans, in order to reap the full benefit from systems implementation.
6. *Close-out* – reviewing the original control objectives and ensuring that they have been met.

Note how this covers many of the control issues described in both ERP and e-Business applications.

Track	Phase					
	Initiate	Assessment	Design	Implement	Follow-up/evaluate	Closeout
Business process controls	P-1 Prepare for engagement P-2 Prepare for project P-3 Define project P-4 Launch project	B-1 Assess business process controls	B-2 Design business process controls	B-3 Implement business process controls	B-3 Follow-up/evaluate business process controls	C-1 Closeout project C-2 Closeout engagement
Infrastructure security controls	P-1 Prepare for engagement P-2 Prepare for project P-3 Define project P-4 Launch project	S-1 Assess infrastructure security controls	S-3 Design infrastructure security controls	S-5 Implement infrastructure security controls	S-7 Follow-up/evaluate infrastructure security controls	C-1 Closeout project C-2 Closeout engagement
Application security controls	P-1 Prepare for engagement P-2 Prepare for project P-3 Define project P-4 Launch project	S-2 Assess application security controls	S-4 Design application security controls	S-6 Implement application security controls	S-8 Follow-up/evaluate application security controls	C-1 Closeout project C-2 Closeout engagement
IT operational controls	P-1 Prepare for engagement P-2 Prepare for project P-3 Define project P-4 Launch project	I-1 Assess IT operational controls	I-2 Design IT operational controls	I-3 Implement IT operational controls	I-4 Follow-up/evaluate IT operational controls	C-1 Closeout project C-2 Closeout engagement
Data conversion controls	P-1 Prepare for engagement P-2 Prepare for project P-3 Define project P-4 Launch project	D-1 Assess data conversion controls	D-3 Design data conversion controls	D-5 Implement data conversion controls		C-1 Closeout project C-2 Closeout engagement
Data interface controls	P-1 Prepare for engagement P-2 Prepare for project P-3 Define project P-4 Launch project	D-2 Assess data interface controls	D-4 Design data interface security controls	D-6 Implement data interface security controls	D-7 Follow-up/evaluate data interface security controls	C-1 Closeout project C-2 Closeout engagement

Table 2. SIC methodology phases, tracks and activities.

The SIC methodology also covers a wide range of controls issues. There are six tracks that run across all phases and allow focus of controls on the following:

1. *Business process controls* – covering the design of controls of business processes. Note that these can be applied to the e-Business application, the underlying ERP systems and any middleware which allows communication between the other two.
2. *Infrastructure security controls* – although not specifically discussed in this article, infrastructure security is a key issue in e-Business applications. SIC contains supporting materials from IRM's Information Security Services toolkit to support most common network and operating system software underlying e-Business applications.
3. *Application security controls* – most application control frameworks require the separate allocation of duties, which is applied at the application level. It is also worth noting that most computer/systems based frauds are committed by staff who have systems access authorisation in excess of their business authorisation.
4. *ICT operational controls* – crucial for the conversion from an ERP system to a 24 x 7 e-Business application. The addition of an e-Business application and middleware layer to a systems environment can change some of the control assumptions that an organisation has previously made.
5. *Data conversion controls* – to ensure that there are adequate processes regarding the conversion of master data, crucial for both ERP and e-Business applications.
6. *Data interface controls* – covering the scope, design and implementation of controls of the many interfaces that will be required to support e-Business applications.

At the heart of the SIC methodology lie control catalogues. These are extensive databases of expected controls in business applications, together with control solutions provided by common software packages. So far, these have mainly come from ERP, with solutions for SAP R/3 (up to version 4.6), JD Edwards (focusing on OneWorld), Peoplesoft, and Oracle. However, new solutions are being developed and tested for e-Business solutions such as Ariba for B2B, and Siebel for CRM. These provide users with an insight into the application control capabilities of leading software packages. Technical documents provide additional support so that expertise is not limited to controls already recorded, but allows staff to further design controls using the standard functionality of leading packages.

Conclusion

If e-Business applications are to succeed, they require a well-designed control framework. Lessons learned and methods acquired from ERP systems implementation can be applied to e-Business controls solutions. For an efficient and effective control framework, the controls designer must aim for a minimum of controls yielding maximum performance. In many organisations, a weak control culture will be the main obstacle on the way to success. KPMG's SIC methodology provides a framework and knowledge base for designing controls in e-Business applications, tackling the cultural issues as well as the technical software and controls design solutions.

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