- With new technology it is very important to make sure that the gap between what is offered and how it is supported by IT is not too wide. In this regard Nicastro (1994) points out that: "the gap between the client/server potential and the reality is especially wide in the area of end user support." She suggests that in order to meet the needs of both IT and the end users, an effective service desk must provide a number of functions, such as: (a) fully automated service, (b) single management function, (c) access, (d) consistent interfaces, (e) umbrella technology, (f) integration, (g) cost-effective delivery, and (h) organization wide consistency.

- Training of IT professionals and end users in the abovementioned factors are very important in order to change the mind frames of all participants before entering into a relationship. As was mentioned, this will ensure sound communications and proper involvement within the relationship. The question that immediatly arises, is whether culture can be changed purely by training people. Things to note about the abovementioned definition of culture include: firstly, to change culture you need to change the beliefs, attitudes and values underlying behaviour; secondly, since it is concerned with commonly held beliefs, the target for change needs to be the organization as a whole or a fairly autonomous part of it; thirdly, the beliefs, attitudes and values associated with a culture will have achieved stability over a long period of time, and therefore are likely to be deep-rooted. If one is prepared to accept these assumptions, it follows that "planned culture change is an uphill battle requiring leadership, time and plenty resources!" (Towers, op cit.)

- Although training is one important method of establishing a supportive culture, sound relationships have in themselves the *power* to establish and enhance a supportive culture. This follows from the very nature of the abstract dimension of a relationship as discussed in section 3. Viewing the 'relationship' as the structure in Giddens' structuration theory, it is also clear that the continuous enactment and constitution of structures (i.e., relationships) by the human agents (i.e., IT and end users) imply a continuous growth - the relationships which would certainly benefit by 'proper' education of users and even of IT personnel.

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INFORMATION SECURITY MANAGEMENT: THE SECOND GENERATION

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Abstract

Information security has moved a long way from the early days when physical security, together with a set of backups, formed the backbone of a company's security controls. Today, information security is all about policies, standards, awareness programs, security strategies, etc. The aim of information security management efforts is to enhance confidence in the effectiveness of the information services within an organization. Unfortunately, this confidence is restricted to the organization itself and can only, with great effort, be passed on to external parties.

Today, business partners need to link their computer systems for business reasons, but first want to receive some sort of proof that the other partner has got an adequate level of information security in place. A security evaluation and certification scheme that can instill confidence and assurance, regarding information security status, to external business parties will solve a lot of problems for the commercial world.

This approach to Information Security Management, to proof adequate information security to external parties, is termed in this paper as; The Second Generation of Information Security Management.

Introduction

"We assume the bank will keep our money in a safe, use armoured vehicles for transport, only permit authorized people to complete a transaction, and audit all transactions. Furthermore, we require banks to adhere to accepted banking practices and open their books to independent review." [2] Doing this well may give one bank the competitive edge over its competitors, but more so, failing to do so may lose the bank valuable business. This latter case, i.e. failing to proof compliance to accepted practices, is a new phenomenon in the field of information security, but is growing to become a very important one.

Information security is moving very rapidly towards a stage, where proof of adequate security, to potential business partners, may help a company winning new business contracts, but on the other hand, a lack of information security may contribute to losing some business contracts.

The challenge of defining and introducing a security evaluation scheme that can certify an adequate security status, is termed in this paper as; *The Second Generation of Information Security Management.*

The objective of this paper is to;

- prove that the commercial world needs some information security evaluation scheme that can provide assurance to internal as well as external parties that adequate security controls are installed and
- to define a set of criteria which such a security evaluation scheme must satisfy to be successful.

In the rest of this paper, the evolution of information security will be addressed to provide some background information, a number of information security evaluation and certification techniques will be discussed, a set of criteria will be defined to provide a guideline for the definition of future, second generation security evaluation schemes and finally, a brief discussion on possible implementation schemes.

The Evolution of Information Security

Information security has been influenced largely on two fronts over the years; firstly, the scope of information security keep on expanding and secondly, the ultimate responsibility for information security has also moved over the years.

The Scope of Information Security

Information technology has advanced radically over the last thirty years and basically moved through three stages. Computing started with central mainframe computers in the 60's and only the information technology personnel had access to the facilities. From the middle seventies onwards; PCs, information sharing, departmental computing, local area networks, etc. were introduced. Many new, non-information technology personnel, were introduced to computers and computing, but all access to information systems were restricted to authorised employees within the boundaries of the organization. Today, many organizations want to embark on inter-company electronic trading and want to link their IT-facilities.

The scope of authorised access to information systems of an organization has expanded from within the computer room, to within the boundaries of the organization to outside the boundaries of the organization.

During these three stages, information security has moved from a situation where, a specially built room provided adequate security to all data processing activities, as it was called in those days. The operations personnel were mainly responsible for providing adequate security. They had to introduce some physical security controls, ensure that back-ups were made. that printouts were distributed in a secure way, etc. From the mid-seventies, just about every employee in the organization had access to some information systems and the information security blanket had to cover all of them. The scope of information security has thus expanded drastically, but was still restricted to the boundaries of the organization.

Although the scope of information security has changed over the years, the objective has always stayed the same. Information security controls were installed to minimise the chances of a threat having an adverse effect on the information or information services of the company, or to minimise the impact if something did happen. The objective of all the information security management efforts has always been, and still is, to provide *confidence* in the security of the information services of that particular organization. Many companies even perform a computer audit to provide assurance to their management that their internal controls are effective and efficient. All these efforts of information security management and computer audits, can only provide confidence or assurance domestically.

Today, as organizations want to embark on inter-company electronic trading, the information security blanket will have to expanded even further than company boundaries. Companies are afraid of linking their computer systems to Internet or the computer systems of a business partner, because of the possible security implications. Any organization would like to receive some or other *assurance* that other businesses have adequate control and security as well. [5]

The Responsibility for Information Security

In the s, information security was limited to physical security to a large extent. The operations manager was mainly responsible and the associated budget was very small. With the move of computing into the business areas, away from large central mainframes, information security concerns have not moved with the new distributed environments. Business management, in general, do not want to accept the responsibility for information security. This leaves the IT manager responsible for security on the business system applications on networks and main- or midframe computers. [3]

The responsibility for information security has at least expanded to another level, to that of IT management. Top management, who should actually be ultimately responsible for information security, because information is arguably the most precious asset of any organization, is in most cases not involved at all.

Top management is ultimately responsible for the well-being of the organization, and should thus accept the responsibility for information security. This has happened in some instances, but lack of top management involvement, is seen as one of the biggest drawbacks to obtain effective

information security in most organizations.

The responsibility for information security has moved through the years from the bottom upwards. Initially, the operations manager was responsible and later years the IT manager has accepted this responsibility. Maybe, this can be seen as one of the reasons why top management are reluctant to accept this responsibility, because they are use to delegate responsibility downwards and not to accept any responsibility coming from the bottom.

Top management sees their responsibility as; gaining market share, increasing product quality, investigating new business possibilities, etc. As soon as it become apparent that effective information security can give one company the competitive edge over the other, or winning new clients, top management will get actively involved. Otherwise, if it can be proved that the lack of information security was responsible for the loss of market share or the loss of potential new clients, top management will be forced to get involved and ensure that the information security situation improves. In both cases, once top management realizes that the well-being of their organization depends on their information security status, they will surely ask for some assurance that adequate security is in place.

On the other hand, in the cases where top management are actively involved, they increasingly demand assurance that controls are operating as intended, that the costly investment have generated real results. [5]

For many years, all information security management efforts were focused on providing an acceptable degree of confidence domestically, or *inwards*, in the information services of an organization. This can certainly be called the first generation of information security management and will definitely continue with great enthusiasm.

The dawn of the second generation of information security management has certainly arrived, i.e. to provide assurance or confidence of adequate information security controls to external parties, or *outwards*.

In both cases, whether inwards or outwards, the demand for assurance of adequate information security controls will increase. This assurance will be provided in the most effective way through an extensive security evaluation and certification scheme. The commercial world will welcome such a scheme with open arms.

In the next section, existing evaluation and certification techniques will be discussed. An attempt will be made to prove why none of them, at least in current form, can fulfil the role of providing outward assurance and confidence of information security controls to external parties.

Information Security Evaluation and Certification Techniques

A number of evaluation and certification techniques, models and schemes exist that can be linked to information security. The following will be discussed in more detail:

- Trusted Security Evaluation Criteria schemes,
- ISO 9000 (BS 5750), the leading international quality assurance scheme,
- The Code of Practice for Information Security Management (BS 7799) and
- self-evaluation.

Trusted Security Evaluation Criteria

The Trusted Computer Security Evaluation Criteria (TCSEC), first published in 1985, were the first criteria to achieve wide acceptance. They still serve as a yardstick for developing secure products. [4] The Information Technology Security Evaluation Criteria (ITSEC), published in 1990, and the Canadian Trusted Computer Product Evaluation Criteria (CTCPEC), 1993, were the European and Canadian answers to TCSEC respectively. An American reaction to ITSEC followed in 1992, by means of the Federal Criteria. Currently, all these parties are harmonizing these criteria and the draft Common Criteria are currently available for review.

Evaluation criteria refer to *products*, e.g. an operating system or *systems*, e.g. a collection of products assembled to meet the specific requirements of a given application. [4] Not all criteria mentioned above evaluate both products and systems, e.g. TCSEC, only evaluate products.

In all evaluation criteria, three aspects are addressed, i.e. *functionality* (the security features of a system), *effectiveness* (to ensure that the mechanisms used are appropriate for the given security requirements) and *assurance* (the thoroughness of the evaluation). TCSEC considers all three aspects simultaneously in the definition of its security classes, whereas ITSEC allows to address them independently. [4]

In the case of an ITSEC evaluation, a clear, definite *Target of Evaluation* (TOE) is defined. The TOE defines the product or system that need to be evaluated clearly. A *security target* is also defined for the system or product under evaluation. The security target specifies the security functionality of the TOE, i.e. what are the security objectives of the TOE. The TOE is then evaluated to ensure whether it satisfies the security target, and if successful, a certificate states that the TOE meets the security target.

These certified products and systems provide very secure building blocks towards a secure IT-environment, but do not in itself provide the secure environment. In the opening paragraph of this paper it was stated that one expects your bank to store your money in a safe. This in itself does not make the bank a good and trustworthy bank, even if the safe has passed all safety standards. A number of other procedural and documentational controls also need to be adhered to. Thus, as the very strong safe is only a building block towards a secure banking environment, an certified product or system is nothing but a secure building block towards a secure IT- environment. The evaluation process used in trusted security evaluation criteria is investigational to a large degree, that means that the product or system under evaluation is examined and tested. [4] A certificate of compliance is issued following a successful evaluation.

The ISO 9000 Series of Standards

The ISO 9000 Series of Standards is a series of international quality assurance standards, that apply to the quality management system and the process used to produce a product. [6] ISO 9000 establishes a basic set of quality system requirements necessary to ensure that the organization's process is capable of consistently producing products that meet the expectations of the customer. ISO 9000 does not address information security directly, but many security related issues are addressed by ISO 9000, e.g. security policies, risk analysis, continuity planning, etc. The ISO series of standards was published in 1987 and has been adopted by many countries and is rapidly replacing prior national and industry-based standards. The European Community (EC) has adopted ISO 9000 as its standards for quality assurance. This places a lot of pressure on all producers world-wide that wish to trade in European countries or even compete with European companies in other markets.

The ISO 9000 is a generic model for quality assurance in design/development, production, installation and servicing. The requirements of the standards have to be interpreted by each organization wishing to be registered formally as evidence of meeting its requirements. ISO 9000 makes use of an audit oriented evaluation method, which means that mainly documentation, procedures and processes are evaluated. ISO 9000 also issue a certificate following a successful evaluation.

Today, about 110 countries worldwide have accepted ISO 9000 as their quality assurance standards. It is estimated that about 100,000 companies are currently ISO 9000 compliant and the estimation is that by the turn of the century, 250,000 companies will be ISO 9000 compliant. [9]

ISO 9000 has taken off like a wild bushfire and the growth is forecasted to be exponential. Many organizations are ISO 9000 compliant purely for the marketing value of it. Many companies realize that their ISO 9000 certificate has won them contracts, non-ISO 9000 compliant companies find it more and more difficult to compete in the international market. The ISO 9000 certificates are used by companies to create confidence among their clients in their ability to deliver goods and

services that meets the clients requirements. [9] Top management of most modern companies know exactly what ISO 9000 is all about.

Code of Practice

The Code of Practice for Information Security Management is a reference document for managers and employees who are responsible for initiating, implementing and maintaining information security within their organization. [1] The objectives of the Code of Practice are; firstly, to provide a common basis for companies to develop, implement and measure effective security management practice and secondly, to provide confidence in intercompany trading. [1] The Code of Practice was published in 1993 and in 1995 a British Standard - BS 7799, based on the Code of Practice, was published.

The Code of Practice intends to serve as a single reference point for identifying the range of controls required for most situations encountered in industry and commerce. In today's world of increasing electronic networking between companies, it is good to have a common reference document. This common reference document provides an enabling mechanism for establishing mutual trust between networked sites and trading partners, and a basis for facilities management between IT users and service providers. [1]

A Set of ten categories, spanning the entire IT-environment, that are in general use in most companies are identified in the Code of Practice. Under each of these ten categories a comprehensive set of security controls are listed. Not all of these controls are applicable to every IT-environment and should be used selectively, according to local circumstances. "These generally accepted controls are often referred to as *baseline security controls*, because they collectively define an industry baseline of good security practice." [1]

If the Code of Practice is accepted by trading partners, inter-company trading will be able to be conducted on a more confident level if the trading partners know that their security controls are based on a common or similar code. Another advantage is that, once the concept of baseline security has been accepted, the basic principles, policies, standards, and procedures can be installed. No lengthy risk analysis or cost-benefit analysis is required. A further advantage is a clear statement of information security requirements also provides a yardstick for auditors. [3]

As, in the case with ISO 9000, the Code of Practice has been accepted with great enthusiasm. [5] The Code of Practice is currently being drafted into an ISO standard. No formal evaluation and certification scheme for the Code of Practice exists currently, but a certification and accreditation scheme for compliance to BS 7799 is under consideration in the United Kingdom.

Information Security Self-evaluation

Obviously, the ideal solution would be some IT security self-evaluation scheme. This is some scheme where the current installed information security controls can be evaluated by the organization itself to prove whether they have achieved adequate protection, or not. This will provide management with a checklist against which they can test their own current controls and approach in the area of information security.

Various organizations use various techniques and approaches to evaluate their own information security status. These techniques vary from pure 'gut-feel' approaches, where a very high level security screening is done, to more formal approaches where the information security status of the organization is 'measured' according to a definite methodology or against specific checklists.

Although self-evaluation holds many advantages, unless the criteria, to evaluate against, are well-defined with strict, definite conformance testing, the results will always be treated with some suspicion and will never be accepted outside the organization. This fact is underlined by the European Computer Manufacturers Association (ECMA) stating, "when criteria are ill-defined and ambiguous, any evaluation process (including one by a third party) will be arbitrary... and potentially very costly." [2] Self-evaluation can be very useful, but only for internal usage.

IT-Environment Security Evaluation and Certification Scheme

In the beginning of this paper, it was mentioned that an security evaluation and certification scheme, of an entire IT-environment, will be very useful to provide assurance of adequate information security controls installed to, firstly, own management and secondly, management of external parties.

Four techniques or approaches to IT security evaluation and certification were described in the previous section. None of them provide the ideal solution, but combining some of the strong points of each of them, may help to define the criteria for effective IT-environment security evaluation and certification scheme.

Trusted IT-products and Systems

Neither of TCSEC, ITSEC or the Common Criteria will provide the ideal evaluation scheme. Leon Strous commented [7] that security evaluation criteria are not only intended for application in the evaluation and certification of IT-products and systems, they must also contribute to an integral, consistent, analytical pragmatic and cost-effective approach to IT-security within the user environment. The focus of security evaluation criteria is currently on IT-products and systems. IT-systems and products only form part of a much broader IT-environment and this is really what need to be secured. The following quotation supports this statement, "it must however not be forgotten that the general issue is: the security of information and information processing, that supports the users main business process." [7]

From this, it can clearly be seen that security evaluation criteria, in its current form, will not be able to provide this comprehensive evaluation scheme that is envisaged. Although, it must be stressed clearly that ITSEC, TCSEC and, in the future, the Common Criteria will still provide the *secure building blocks* to help an organization towards information security in the entire IT-environment.

An alarming fact, that must be mentioned here, is that "few (if any!) commercial sites use products as they were evaluated." [2] This proves that the implementation and operation guidelines of trusted products and systems, need to be audited.

In the banking environment, mentioned at the start of this paper, the safe provides a secure storage place for money and other valuable articles. The fact that it is a very strong safe, and certified so by one or other standards institute, does not guarantee that the valuables and money stored in it is secure. The banking personnel must abide to some administrative and managerial procedures, e.g. who is allowed to have access to a key, where is the key stored, etc. Trusted products, e.g. a safe, do not provide security in it's own, but contribute to it, if the associated procedures are correctly followed.

From this discussion, the first criterium to a secure IT-environment can be formulated as follows:

> **Criterium 1: Trusted IT-products and systems, as evaluated and certified according to TCSEC and ITSEC, will not ensure a secure IT-environment, but will contribute to it as secure building blocks.**

The Technique of Evaluating an IT-environment

Charles Cressson Wood mentioned [8] that one of the biggest problems haunting information security efforts, are lack of an adequate infrastructure. With this he means; policies, procedures, responsibility statements and related matters. This is precisely the advantages of ISO 9000. The establishment of a concrete organizational structure, clear definition of responsibilities, improved quality of communication and internal information, maintenance of up-to-date systems documentation, better control over organizational and system growth, formal problem management and resolution process, and standard processes for training workers. [8] This view is supported by Leon Strous, who commented that current security evaluation criteria fall short on their ability to real-life environments. According to him, the key words to security in real-life IT-environments are 'administration' and 'organization'. [7]

ECMA [2], further underlined this point, by stating: "our recommendation is to look to an existing quality program, where ISO 9000 seems to be the leading international contender, to fulfil the need for security evaluations." Information security specialists will receive more of top management's attention if they make more use of the ISO 9000 approach. [8]

In our banking example, strict organizational and administrative procedures are defined and practised for the execution of all transactions and tasks, and all these banking practices are reviewed and audited.

From what was mentioned in the previous paragraphs, and if one looks at the support that ISO 9000 received from top management around the world, then a similar audit oriented approach to information security seems to be a definite answer. The second criterium to a secure IT-environment can thus be formulated as follows:

> **Criterium 2: An audit oriented evaluation approach is needed to ensure that all IT security policies, procedures, functional and related issues, within the IT-environment, are introduced and practised as prescribed.**

The Scope of the Evaluation

As the Code of Practice becomes more popular, many organizations will want to be seen to comply with the Code of Practice. Positive assurance are thus needed that the necessary compliance procedures and systems are in place, and that they are correctly operated. [5]

The Code of Practice addresses some of the shortcomings identified earlier, e.g. all of policies, organizational structure, responsibilities, administrative procedures, etc. are addressed in the Code of Practice. The entire IT-environment can thus be included in the evaluation process, and not merely isolated products and systems. Further, the Code of Practice provides a clear yardstick for auditors and the security baseline is a useful parameter against which to conduct an audit. [3] At this stage all Code of Practice audits, for compliance to the Code of Practice, are largely limited to internal audits, thus for self-assurance. Some consultants do perform audits at one company and then provide the necessary assurance of compliance to another company, that require the necessary assurance, and visa versa.

The Code of Practice addresses ten categories, these are [1]:

- security policy
- security organization
- assets classification and control
- personnel security
- physical and environmental security
- computer and network management .
- system access control
- system development and maintenance
- business contingency planning
- compliance

According to the authors of the Code of Practice, these ten categories cover the entire IT-environment that would require any baseline controls. This IT-environment, as referred to in this context, can be either an entire organization or a subset that can be properly delimited for this purpose. Typical delimitations would be either organizational (a division, a business area, etc.), geographical, or both. [5] Any IT-environment evaluation should cover all aspects within an entire environment. Criterium three can thus be formulated as follows:

> **Criterium 3: The evaluation scheme should span an entire IT-environment and should not be restricted to isolated products and systems.**

Levels of Security

The Code of Practice suggests the baseline security controls that should be in place in most organizations. In some cases, stronger controls, outside the scope of the Code of Practice, may be required. [1] The Code of Practice only addresses baseline security controls, which represents the minimum. Whether this minimum will satisfy all trading partners, is an open question?

This identifies another very relevant aspect, i.e. what level of security is needed and/or acceptable? Surely, this will differ depending on circumstances and from one situation to another. Both TCSEC and ITSEC introduced different levels of security, e.g. C1, C2, B1, etc. One the other hand, ISO 9000 and the Code of Practice utilizes a binary approach, i.e. either compliant or not.
The ideal evaluation scheme, should make provision for more that one level of security. This will enable some companies, that require more stringent controls than prescribed in, for example the Code of Practice, to get evaluated and certified as such.

> **Criterium 4: The evaluation scheme, should make provision for more than one level of security.**

Self-evaluation

At this stage, most Code of Practice audits can be classified as examples of self-evaluation. The definite set of criteria defined in the Code of Practice makes it possible. Some software packages already exists to help an organization in this self-evaluation process of compliance to the Code of Practice. Gary Hardy [5] also calls for clear standards and criteria against which controls can be evaluated, "one harmonised set for both auditors and IT professionals".

Although self-evaluation depends on very strict and definite criteria, the results will in most cases be queried by a second party. The criteria, no matter how precisely defined, will always be open to some interpretation that could lead to some subjectivity. Not withstanding that, the results from a self-evaluation exercise will always be very useful internally.

> **Criterium 5: The standards and criteria defined need to be precise enough to enable self-evaluation, for domestic use.**

In this section, a set of five criteria has been motivated and defined that should feature in any IT-Environment Security Evaluation Scheme. Such a scheme will play a prominent role in the second generation of information security management, where assurance of sound information security practices can be produced to management, both internally and externally.

Conclusion

Many companies are becoming aware of the increasingly importance of information security. In many of these companies, top management are actively involved, but in many companies this is not the case. In the era where inter-company electronic trading is taking off, the security status of business partners is a real point of concern. A definite need exists for companies to provide the necessary assurance, that adequate information security controls are in place, to either own top management (internal) or to concerned management of potential business partners (external).

After studying different evaluation and certification schemes, a set of five criteria has been defined that should form part of such an IT-Evaluation Security Evaluation Scheme (IT-ESES).

These criteria can be summarized in a definition for IT-ESES:

> **An audit oriented evaluation and certification scheme that evaluates all relevant aspects, e.g. organizational, managerial, administrative, functional, etc., in an IT-environment, that possibly utilizes trusted products and systems, and that utilises clearly defined criteria that will enable self-evaluation.**

As mentioned before, the Code of Practice is currently being considered by ISO/IEC JTC1 SC27 as an international standard. A certification scheme for compliance the BS 7799 (the U.K. standard based on the Code of Practice) is currently under consideration. It is thus very premature to think of an international certification scheme for the Code of Practice, but that will certainly be a bold step in the right direction. Such an evaluation and certification scheme may sound very impossible at this point in time, but this is what the commercial world wants. "Aim for the sun and you might hit the moon."

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PROJECT MANAGEMENT IN CASE

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Abstract

Thoughts are exchanged on Project Management in practice, specifically regarding projects analysed and systems developed with the Composer by IEF CASE tool. The information engineering methodology (IEM) that is being used includes all aspects around the project and the roles and responsibilities of team members.

Project management is NOT just acting according to the book in analysing a business area and developing a system. Use books only as guidelines. It is being pro-active and to manage a team to implement a solution according to the users' requirements. The importance of standards has to emphasised as well.

A proper analysis cuts down on maintenance time and effort after a computerised system has been implemented. The data model, which is the output from the analysis project, becomes the input for the construction project ... in the same CASE tool.

Abbreviations

BAA	Business Area Analysis
BSD	Business System Design
BSI	Business System Implementation
CASE	computer-aided software engineering
CRUD	create, read, update, delete
DBA	database administrator
DLC	development life cycle
FPA	function point analysis
IEF	Information Engineering Facility™
IEM	Information Engineering Methodology
IRM	Integration Resource Management
JAD	joint applications development
QA	Quality assurance

Introduction

Where does a project start? It starts with the approval of a request for a solution. The project scope must be documented and this is when the project manager is appointed. Along with this appointment the *user* project manager is identified as well.

According to the book one has to start off with the analysis, report on the feasibility and then design, construct and implement the solution. To be more practical, first you have to realise that each project is unique. What has worked for another project may not work for your project, though you should still follow a generic plan and fill it in as you progress.

You may be lucky to be able to select your team members, though more often you have to take who is available. After the office has been set-up, every team member has to study the project standards, e.g. Naming Conventions. This is extremely important for the team to be able to speak and understand the same language amongst each other but also with other developers and the maintenance team. Standards are NOT rigid rules; it is a basis or a guideline to work with. Now the team has to be organised and responsibilities assigned to team members with the relevant skills.

Often skills may be needed that can not be taught in formal training and then a consultant is appointed as an extra team member.

Table 1: Examples of Roles and Responsibilities

Roles	User	Analyst	Project Manager	DBA	IRM
Responsibilities					
Initiate project	X				
Scope project	X		X		
Interview users		X			
Define model		X			
Analyse processes		X			
Facilitate QA reviews					X
Report progress	X		X		
Design database				X	
Design dialogs		X			

It is amazing how much more effective a team operates if everybody knows what is expected from everybody.

Analysis

Identify and contact people that may provide input to the analysis process.

Now we start to touch the CASE tool. Questions are prepared and afterwards the answers are analysed and entered into the analysis toolset of Composer by IEF. It will depend on your type of project whether you conduct interviews or facilitate JAD sessions or both. The project we completed just now is a tool to support information architecture functions, the entry-point of all development projects. It provides a centralised corporate, as well as hierarchical view of where projects, applications, business objects and objectives of our company reside. It is a specialised field and therefore it was more worthwhile to interview strategists and information managers of different business units separately, opposed to facilitating JAD sessions with groups of users. It was more personal and valuable information was gathered in this manner.

How can CASE tools help this project phase?

After the interviews, a visual layout is designed from the data. The following day can the business expert already review if all the input was interpreted correctly.

After each session this data model grows and becomes more complete. When sign-off time comes, a proper QA session is arranged with the integration resource management section to confirm standards, conformity and to ensure that duplication is managed in a controlled environment. The bottom line is - everybody speaks the same language.

Deliverables

Documentation needs to be done and approved at various checkpoints during the DLC. The most important document about your project is the project definition or project charter. This is done up front *about* your project and can't be done from within the tool. As nobody enjoys doing documentation, the tool comes in handy with some diagrams. The descriptions and activities were entered during the analysis phase and can now just be extracted in a presentable format and circulated for approval or passed of information. The CRUD matrix and dialog flows can also be accessed through the tool.

A feasibility study report is compiled after the analysis to document the decisions that are made in workshops held with the following sections: capacity planning, business efficiency, networks, business continuity, software support, operations and production. It includes the acceptance of the continuation of the development project and confirms the implementation platform. You have to involve people from other sections from the start in your project. It won't help much that you have this brilliant hi-tech system but the production and network's sections can't help with the roll-out throughout the company. What if the capacity planning section tells you what there isn't space for your users' precious data?

The approved data model is called the business model and is the direct deliverable of the BAA. It will now be scrutinised to optimise normalisation and to add special design features. The crux of this CASE tool is that the analysis is used as INPUT for the design and construction phase. Multiple business systems may be identified for possible implementation. These BSI projects can run simultaneously or be completed in sequence.

The implemented system is the ultimate deliverable!

Checkpoints

Reviews should be conducted throughout the project to ensure quality and to confirm that the contents are according to the user's specifications.

Types of meetings:

Business user reviews	- confirms requirements, accepts prototype, confirms test scripts, approval
Management reviews	- determine scope of BAA and BSI
Integration reviews	- QA, scrutinise design, query duplication
Function point count	- determine productivity figures
Technical reviews	- focus on performance and operational requirements, prepare for production

Why is time keeping important?

You have to practise to schedule better and more realistic. You need history to become more experienced. A baseline is established in the company and each new project can be measured against these productivity figures. A function point count is done on each project on two occasions: after the analysis (the FPA can be used to schedule the construction phase) and after implementation. Better results are achieved when detailed time allocations are reflected against the activities.

The project manager would monitor the project and co-ordinate skills and knowledge rather than tasks. It is the project manager's responsibility to enable the team to do their work and straighten out problems before it can impact the schedule.

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THE INDEPENDENT ONLINE: A CASE STUDY OF INTERNET PUBLISHING

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Abstract

The independent online is the Internet service of Independent Newspapers, South Africa's largest newspaper group. This paper is a case study of the events of the past year, including the lessons, successes and failures in establishing the independent online. The independent online contains content from daily newspapers, weekend editions and national publications brought together into a categorised newswire. Currently more than 350 stories are added each day, with 100 additional items forming the weekly archives and company information. Search engines, back issues and a variety of specialist columns have been added to the site to provide readers with a variety of areas of information. Although the site has been live for almost one year, the past few months have seen the introduction of new hardware, redeveloped software, the establishment of a permanent facility within the building and considerable effort directed towards marketing and promotion. Future plans include presentations, training sessions, interactive games, specialised news delivery, advertising opportunities, website development and activities directed towards the youth market including school involvement and youth training. It is hoped that this paper will serve as a guide to those considering establishing a web presence in order that the pitfalls and problem areas can be identified and avoided

Background

The newspaper industry

Newspapers worldwide are experiencing declining circulation, particularly in the youth market. There is no easy solution to this problem and while many media companies have invested in the Internet, recent suggestions are that these projects have not delivered on their promise of increased revenue and improved productivity.

The newspaper industry is in fact a highly sophisticated information delivery network, not merely print production. Television companies, radio stations and newspapers are all closely tied to deliver information to audiences, and in many cases they are owned by the same multinationals.

Media is a fast changing industry and no longer limited by national boundaries and geographic location.

While there are those that feel that electronic publishing is a threat to print, others see it as a complimentary offering. There are ways of presenting information electronically which could not be achieved in print, similarly the convenience of print is unlikely to be achieved through electronic devices.

Each media company will take a different stance along this line and the nature of their business will determine whether the different media survive side by side. Right now, the debate rages and it will probably only be in the next 2 or 3 years that the market matures sufficiently for long term decisions to be made.

It is estimated that there are currently more than 6,000 newspapers published on the Internet, and while 1996 saw an explosion of titles, there is every suggestion that it is slowing down. Questions are being asked about the commercial viability of such start-ups, the impact on print, the reach to new audiences etc.

It remains an unknown, and while the media grapples with other problems, the Internet side of the business may not always be seen as a strategic necessity, and border on closure.

This paper does not give any conclusive answers to these problems, but considers the *independent online* in light of these problems and attempts to offer suggested actions.

Publishing and the Internet

As more of the media houses have migrated to electronic printing and publishing, so the nature of the information allows for easy transfer to other media. Electronic submission has moved closer to electronic distribution and eventually to electronic production.

This is not just an extension of the electronic networks, but a shift in focus from media houses as the distribution points to positions of origination.

We have all seen film scenes of journalists dictating copy down telephone lines or sending them via telex or telegraph to awaiting inputters for page setting and so on.

Technology changed this process only fairly recently with fax machines, acoustically coupled input devices and notebook computers. But the final product was still the same - copy in, print out. The main difference being the speed with which the whole print cycle could respond to incoming news.

To put this in context it took 5 days for news of Lincoln's assassination to reach London, it took less than 5 minutes for news of Kennedy's assassination, and the Gulf War was viewed in real-time.

The British press reporting on the Titanic cried 'All Saved', because they had no real news to go on.

In fact, there is still evidence of events being staged around print media deadlines, but the immediacy of delivery will inevitably change this.

The recent Minister of Finance's Budget speech is released to the Press early on the morning of the delivery in Parliament. Once he begins to speak the Press are released because by the time the Minister finishes speaking there is still a time delay before the speech is presented to the public. Not so with the Internet. We delivered the Minister's speech within 12 minutes of release from Parliament. This did not contravene any rules, but highlights the opportunities which this new medium presents.

The Internet remains unproved and its take-on has been almost entirely due to the electronic capture of material for print. There are few publications, if any, which have not grown out of existing print. Even HotWired, which is said to be commercially viable in its own right, grew out of its highly successful print version - Wired.

As a separate medium, it is too new and experimental, and in most cases remains R&D spending.

That does not mean that it will not become so, but it is following the characteristic growth curve of development and has yet to reach maturity.

The fact that news is the single most popular reason for surfing the Internet does suggest that the media has the edge in terms of an audience, but the commercial aspects have yet to be resolved.

In South Africa, with low literacy and other social difficulties, the newspaper readership is less than 5% of the population. Radio has by far the largest reach with an estimated 87% of the population, and television more than 50%. Electrification and telephone connections present a massive investment in order to make these services available to the entire population. Barely more than half of the population currently have electricity and Telkom is seeking international partners for a projected 4 million line installation scheme.

Despite the emergence of e-trading overseas in a variety of guises, the general public are not as yet willing to accept the risks. That is not to say that it will not happen, and happen fast, but for the time being it is consolidation of position, watch and wait. Once again, South Africa's sophisticated banking services are utilised by the minority and although the country has a history of adoption of technology, the take-on of Internet-based commerce is likely to lag behind developed countries.

The independent online

The *independent online* is the Internet service of Independent Newspapers, South Africa's largest newspaper group, and has been in existence for almost one year.

It is a group-wide project delivering material from daily and weekly publications with additional company and marketing information.

Currently there is no content created specifically for the online service, the material is 'lifted' from the production servers, formatted and delivered.

- The initial proposal to senior management was made in April 95 and development began in May.
- The service went live on August 1, 1995 and to date has won 4 awards, and has established a regular world-wide readership.

The site depends upon high content and low maintenance, with minimal graphics content and is aimed at the "average user". (While this may sound like an easily defined term it isn't, but we are using the term average user to mean someone

dialing in from home using a PC and Windows or similar. This means connection speed of 14400 or 28800, and probably with only a moderate skill level.)

Its existence depends entirely upon the content of the print publications and the voluntary involvement of editorial staff to prepare more specialised areas of the site.

Future development in commercial viability and content differentiation will be governed by the areas of the business, as acceptance of the media develops.

The remainder of this paper looks at these and other issues over the past year, and considers the options for future growth.

Building the independent online

Resources

The service began with running on a Pentium machine with the Linux operating system and some home-grown software to manage the news delivery.

A 'news tree' was constructed to categorise material according to subject rather than originating publication.

Access to the news services was required, and the material was available only after the normal editorial processes completed.

The server also acted as the mail server for Cape Newspapers and is connected to the backbone network. The Internet connection is via the Johannesburg centre of the Wide Area Network, and is controlled by the IT department.

Any additional resources had to be funded or in some way acquired.

There was no physical space allocated and the entire operation was housed in the DP department workshop.

Support and commitment

While there was a degree of support from management, it was essential to enlist support throughout the organisation through influence rather than authority.

Any new technology has its early converts or detractors, and the degree of commitment to this project varied considerably.

Some felt that it was a distraction from the real job of producing newspapers, some that it was an essential step for the future while others remained ambivalent.

Many of the senior management and editorial staff had little if any exposure to the Internet.

Over the past two years, the group has undergone considerable change in terms of the publishing environment, and while this was the necessary basis upon which to build the Internet site, there remained a resistance to additional change

Since Independent Newspapers is a group of autonomous companies each with competing publications, consensus is a difficult achievement.

The organisation

Independent Newspapers in South Africa, originally the Argus group, is now owned by Dr Tony O'Rielly and the Independent Newspapers with its head office in Ireland. The new owners have invested capital in the group allowing for the migration to new technology, creation of new titles and various management and editorial changes.

The South African operation comprises three companies Cape Newspapers, Gauteng Newspapers and Natal Newspapers with the Independent Newspaper Company acting as national marketing and sales, and all under the umbrella of Independent Newspaper Holdings.

There are 12 newspapers: The Star, Cape Times, Daily News, Mercury, the Argus, Pretoria News, Saturday Star, Saturday Weekend Argus, the Saturday Paper, Sunday Independent, Sunday Weekend Argus and Sunday Tribune. In addition there are four national supplements: Personal Finance, Higher Education Review, Sunday Life and Business Report and a host of community newspapers and regional titles.

Each title has strong branding and dedicated editorial staff with advertising and marketing support both locally and nationally.

The *independent online* brings material from a number of these publications together under its own branding, with individual titles identifying specific content. Daily and weekly material is delivered in a variety of ways according to the editorial wishes.

The project works across the three companies reporting through the managing director's office of Cape Newspapers.

Speed wobbles

As a national project, the *independent online* depends upon the support of a variety of players, and in the early stages of development met with considerable resistance and was on the verge of closure.

The infrastructure has been contained, and it became an urgent requirement to seek additional equipment, and staff in order to reposition the service and alter the negative perceptions.

Problems are still being experienced in creating a truly national service, and as the Internet becomes a more widely used tool, there is a level of criticism about the service when compared to other titles.

Since the service resides in Cape Town this has been a source of criticism and has made close contact with other centres a difficult and complex task.

The visibility of the project within the group has been a focus of attention lately with 'house ads' appearing daily in the newspapers, and more recently with editorial appearing in different publications and larger advertisements of a more eye-catching nature.

The current position

Infrastructure

The site now has office space in Newspaper House, Cape Town, and this is intended for use as a training facility and presentation area. The connections to the backbone network are the same, but the possibility of the Internet connection being moved to Cape Town are being investigated, alternatively for an additional connection direct to the servers.

Hardware and software have been totally redeveloped and the visual and user interface aspects of the service changed.

This has been effected over the past three months, and in essence is a complete rebuild of the service.

Addresses have changed and search engines and reference services informed of the changes.

The fact that the website now has a permanent home is an indication of the changed perception and positive commitment to the project, but without continuous change involvement and improvement this may just as easily change.

Hardware

The site now runs on an Apple Workgroup 9150/120 server which has proven to be extremely stable and high performance. The old server is now acting as a mail server, and this will soon be migrated onto a new machine.

A Sun SPARCStation 5 has also been acquired and this will initially manage the mail and list services. Once this has been completed the old server will be used as a dedicated mail server and the Sun freed for process intensive applications , database services and website development for customers.

The Apple server is extremely easy to setup and manage and is a cost effective solution. With little prior knowledge of the environment the machine was up and running within a matter of a few hours.

Software

The core engine has been written in AppleScript and this is proving to be robust.

Much of the surrounding software has been downloaded such as the counter scripts and search engines. Some additional software has been purchased for development of private areas, online forms and performance improvement. Altogether the software has cost less than R30,000 and gives us the potential to create a wide variety of additional services.

The machines for data capture and the servers together form a sub-network, and access to the servers is restricted to material and software dedicated to delivery.

Design

The graphics have been redeveloped by Francois Smit of the Star and have aimed to create strong branding and fast download.

Simple clean images were the brief and using graphics filters the images have been reduced in size for performance without losing quality.

Since we are delivering predominantly text we aimed for a look and feel which does not detract from the content.

Business issues

Perceptions

Convincing the management that in electronic publishing the inevitable next development is Internet delivery sounds easy. It is not semantics, but a change of focus. Imploding the business into a delivery centre with no tangible product to a largely unknown readership is not a comfortable suggestion. You only have to look at the number of magazines about the Internet to see the absurdity of suggesting that a massive profitable business should turn itself inside out on a turn of a card.

Revenue

The issue of revenue generation will always arise, particularly when there isn't any! We took the view that it was an essential first step to create a service that delivered content, with strong branding and a reasonable track record of growing readership.

This we have achieved to some degree, and have the confidence to promote the service to customers and agencies.

One of the problems is that the website must be seen by the advertising departments as a viable product either as a supplement to existing channels or in its own right.

Creating a new set of rules and systems outside the existing departments simply confuses customers and could have a negative impact all round.

Therefore the politics and positions of these departments can have an influence on the speed of acceptance.

Similarly, pricing such services is an unknown, because it is not based upon consistent figures of readership, profiles etc. There is a need for statistical analysis tools to establish figures upon which pricing can be fairly and accurately based. The nature of the readership being a combination of local and international may lead to diminished interest in using the medium.

We are now looking at some means of attracting advertisers and paying services, but simple 'strip ads' has been more of a short term sponsorship approach - and one that has done more to create uncertainty than anything else.

Promotion

It is no use promoting a concept, but once there is a product, the need to aggressively promote becomes an imperative. Promotion internally is a difficult issue, particularly in an organisation which is undergoing the types of changes that the newspaper companies are today.

However, it all begins with creating confidence that this is not a plaything and that the people involved are serious and professional - I am in no position to be the judge of the level of success in the case of *independent online*.

The other side of the coin is external promotion and again, this is nothing new- standing on platforms, delivering speeches and presentations and like the guitarist who asks 'how do I get to Carnegie Hall?' is told 'practice baby practice'.

Project management

If you have an infinite number of monkeys with typewriters eventually they will produce the works of Shakespeare. That may be true, but a website is no different to any other publication - you have limited resources and a quantifiable output. The rules of systems analysis and design apply equally to a website as to a debtors system.

The difference is that with good systems in place, a simple interface to access information and a structure, the volumes of information that can be processed and viewed can increase considerably with little increase in resources.

We are now on our first rebuild, having initially developed software which had flaws and omissions, the rebuild has taken into consideration a number of reader enhancements and fundamental mistakes.

It was also achieved without any break in service - a little like changing the wheel of your car while driving.

A website for an event has a limited life and once completed the effort and lessons learned are transferred to the next development.

For a long term site the initial processes will live with you, and the impact will be disastrous.

Quality assurance

Most websites do not have the luxury of redundant equipment solely for testing purposes, but there is a need to ensure that prior to material being made public, there is an element of quality control. That does not mean merely checking

consistency of links, but viewing the site on different platforms, across different connections and with different people in order to find out what does and does not work.

It may become necessary to engage a sample of readers as a test sample, in order to gain views on developments before they are releases. Using feedback forms and other enticements may solicit reasonable comment, but again this will be an unknown sample in terms of the connectivity routes and other variables

Readership

The myth of traffic

The issue of traffic on the Internet is one which confuses service providers, website managers and readers alike, and there will have to be a more formal approach to these issues if the Internet is going to be taken seriously as an advertising medium and revenue source.

We have always excluded internal traffic from our figures, and as a result have always appeared to be 'relatively unsuccessful'.

But what is successful, is it attracting 'tire kickers' or genuine interest.

Similarly, how do you measure traffic - is it every page, each individual visit or a comprehensive analysis of log files?

Questions are asked of website managers which would appear to be naive and foolish if asked of print experts. For example, just because an advertisement appears in a magazine and you can recite the AMPS and circulation figures does it mean that a particular reader read that advert or made a purchasing decision? And yet we expect that level of detail from a website.

Taking snap shots of 'hits' on particular pages, excluding all internal traffic and then comparing the log files statistics gives us a reasonably estimate of readership in terms of content and volumes. Additional facilities for mail-back allow readers to give us their comments while browsing and often provide insights into how the service is actually used as opposed to how we think it is used.

We have found that feedback everywhere is the best method of soliciting comments.

Our recent addition of a simple search facility has borne out the idea that news material has an uncharacteristic value curve. On the day the news breaks it has immense value, within hours it has little if any value, and over time the value increases as it becomes background information on more recent developments.

This is one area that a printed newspaper cannot compete, and one which we feel will create the *independent online* as a complimentary product.

In essence our 'hit parade' is for our own use, but as audited services emerge we will subscribe in order to ensure the same degree of confidence that readers and advertisers alike attach to authoritative analysis.

It may all be smoke and mirrors, but in the same way that commerce on the Internet has always been secure (compared to credit cards transaction in stores) but is only gaining public confidence then if that is what it takes we will certainly offer our figures for scrutiny.

Requirements

Online readers are a fickle crowd, but after all they are the reason we are doing this in the first place, so it is important to take cognizance of their views.

We have continued to add according to the readers comments, such as stronger title branding, search facilities, access to archives, more specialist columns and special events.

The budget speech, the Argus Pick n Pay Cycle Tour results etc. are all examples of things we tried and found to be highly successful.

What this suggests is that readers want variety, interaction and fun. How do you make newspapers entertaining for the youth? Maybe the simple act of making it available on line is a starting point.

Lessons

Content is king

The *independent online* is updated daily and the general response has been very positive. While graphics and interaction are important we have aimed to achieve strong branding with minimal and consistent graphics. We are beginning to develop more processor intensive applications such as interactive word games and competitions, but always with the reader in mind. Download time must be kept to a minimum and every page must tell a story.

It's true that most websites are a 'triumph of presentation over content' a label we are trying to avoid.

The problem with constant updating of content is that unless the underlying systems and processes are robust the manual labour involved outweighs any benefits.

We estimate that by the end of the year we will be adding close to 1,000 items per day and the archive will be in the region of 250,000 items and the reader will have immediate access through the news tree to some 3-4,000 items. This can only be achieved through sound project management, attention to detail and constant monitoring of performance.

Influence not authority

Depending upon how the *independent online* and other Internet development is positioned will determine the level of support and resources available. Since it has yet to gain a critical mass, it is not likely to expand without careful consideration. Revenue generation will most certainly change the situation, but will have to come first. Promising that substantial investment will deliver is not going to be well received! Making things work and demonstrating success is more likely to receive favourable support.

In our case the resources are tightly constrained and there are numerous individuals whose support is required for long term success.

The website has to become an immediate consideration as an additional avenue for promotions, competitions, events, advertising and internal use.

To achieve this means working closely all across the organisation and paying attention to existing systems and looking for opportunities to simplify them. It is no use offering the websites an alternative if it disrupts existing processes - it has to fit.

Marketing and promotion

Simply having a website is fine if its main function is as an internal communications vehicle. Once it is available to the public, it needs to become visible through all other avenues of advertising and promotion. Making the URL visible in advertising, email and contact information on business cards and letterheads are just starting points.

Making sure that the website contains information that could not be used in print is one way of attracting visitors. For example, a new soft drink could use a website to include nutritional information; a new vehicle could display comparative performance information.

Again it has to be a long term campaign, which constantly points to the website as a place to go for more information and once there visitors should be enticed to return.

While a website may be cheap to run, the costs of promoting it could be substantial and can only be justified if promoting the content. In other words it must ride on all other marketing activities.

The elusive buck

The only people making money on the Internet are the service providers and page designers. The information providers have yet to see the Internet as a genuine sustainable revenue stream, and this must change. Having an Internet presence must represent a value added service to staff, customers and passing trade.

Linking to high volume sites is one way of attracting visitors, but more importantly becoming a high volume site will attract others, and your site will become a hub around which satellite sites orbit.

Savings are as important as revenue, and the recent emergence of the Intranet is an important lesson. Make internal use a valuable service and you may not care about the outside world.

One thing for sure is that anyone parting with money for an Internet presence is soon going to be asking the same questions they ask for all other services - what are we getting out of it?

Maintaining momentum

You can take months to plan and build your website but once it is up you are running and you have to constantly monitor.

Every time the website is ignored, you have to deal with the issue.

For example when we displayed the Budget Speech our own newspapers promoted a competitive site. Our own Internet directory ignored our presence, and there are numerous items which could be housed on the site which are currently outsourced such as telephone lists and marketing material.

There has to be a game plan and effort expended towards watching developments on the Internet, becoming involved in every facet of the business and applying this intelligence to the website and promoting it vigorously.

Problems

The Internet phenomena - death by media

Working in the newspaper business, it is particularly frustrating to see the negative side of the Internet receive the lion's share of coverage. It is almost a case of' not letting the facts stand in the way of a good story', and combating it takes vigilance.

If we looked at road traffic in the same way we look at computer hackers no one would drive a car - we balance the risk against our own experience, and I feel that the media position today is one which will change as the Internet matures.

We can all make predictions, and few will be correct, but damning the technology is relatively easy.

What has been heartening recently is the increasing request for response to wire stories regarding the Internet - my chance to counteract the negative views presented. Becoming a spokesman within your organisation is important, because there is a lot of fear and uncertainty. If you can ease the concerns then the Internet will not be seen as a threat.

The quality of service

It doesn't matter how good your site is if the road to it is under construction or full of potholes. Particularly in this country we need to pay more attention to the quality of service we receive from service providers.

The recent public debate between Telkom and ISP's is just one example. The trading for bandwidth and the difference between virtual and real bandwidth is another.

As information providers we are as guilty as most in not ensuring a level of service that is compatible with our plans and traffic.

They say you can't manage what you can't measure, and one of the most difficult tasks is to grasp the interaction between service providers, extract statistics in some meaningful way and be able to make an informed decision.

The more points between you and the eventual visitor the more chances of failure, and the visitor will consider you to be the problem despite everything.

The ease of attack

By its very nature the Internet offers immediate satisfaction - good or bad. If you do something wrong you will know very quickly.

If you do have a thin skin, a fragile ego or a need for constant positive feedback then don't become the website manager - leave it to someone more resilient.

Mistakes are immediately global, so be prepared for criticism of content, service and every aspect of your service from everyone from the novice to the expert from friends and colleagues to distant strangers.

Conclusions

Creating a presence

"Any fool can create a website, and many do".

This is not meant to be unkind, but a realistic view that there is a lot of vanity press and noise on the Internet. In the same way that duplicators, laser printers and photocopiers were used (and still are used) to distribute masses of junk mail, in-house newsletters and leaflets, so there will always be a component of this in any media.

Just dumping material onto a server is NOT creating a website, nor is developing material and leaving it to luck that someone will stumble across it.

In our experience, 'content isn't everything, it's the only thing', and we have aimed to deliver a service for the average user. This means taking into account the average connection speed, the average hardware configuration and the level of skill. A tall order, but one we are striving to achieve. After all newspapers use the 'average man' or the 'girl on the Woodstock bus' as a measure of the target reader, a pragmatic measure and one which ensures the widest potential readership.

That is not to say that we are not aiming to create a world standard site, but that we depend upon the news delivery service of the group to provide the substance.

The *independent online* is a low-cost, low-maintenance, high-volume website and the efforts have been directed towards ensuring that as the volumes of material increase the manual effort required is kept to a minimum.

Good project management, careful planning and sound systems development principles are essential in order to avoid the backlog and maintenance overhead.

Many websites are not intended to be long-term presence and for these the rules still apply, except that the window is much smaller and therefore all of the actions need to be more carefully managed.

While the 'vanilla news service' is and will continue to be aimed at the average reader, there will be developments which take advantage of additional features. For example database applications, interactive scripts and identification systems. Inevitably these will become mainstream, and while we are not aiming to be a leading edge site, we do intend to provide a constantly improved system.

Maintaining a presence

Simply being there is not enough, there has to be a plan of action to constantly monitor feedback and to promote the website.

Contacting search services, adding URLs to letterheads and business cards, distributing press releases, placing advertisements and 'being out there' are no different than for any other product.

A website for an event has a limited life, and it is generally intended to act as a 'shop window' for future contracts to build more sites - a good advert begets more business.

A website that intends to have a long life has to deal with continuous promotion and that includes regular postings to searches etc.

As we found, changing the design can have a mixed reaction from readers. Some will be annoyed, and quite rightly since their bookmarks become invalidated and they now have to 'relearn' the site. It just goes to show that change is something that one doesn't have to enjoy!

Securing one's position

After the initial euphoria has died away, there will be the inevitable questions about 'where is the revenue', 'why can't we include this...' and 'it's not as good as site X'.

To many of these questions there are no adequate answers, but that doesn't mean that they can be ignored.

In our experience, the initial reaction is one of apathy and disinterest since the Internet may be an unknown even feared phenomena.

As the take-on gathers momentum, 'experts' appear all over the organisation and the comments become critical.

Beyond this, the views become more constructive, and the site has to take cognizance because, in our case, the information delivered belong to the editors and the company management.

Once the site is firmly bedded down and the process of daily updating and site management is routinised then the harder task of internal promotion must begin in earnest.

Justifying existence will depend upon the nature of the business, the politics of the management and the position of technology.

The easy part is dumping information on a server, the hard part is getting people to read it over and over again; and making the website another arrow in the quiver for

promotions, competitions, added value services for customers and really a valued extension to existing communications.

The future

We predict that the next 12 months will see a reduction in the number of websites and an increase in the number of reference services to allow visitors to assess the quality of sites. Such services will be the equivalent of AMPS and ABC figures for circulation and readership profiles, while other services will look at the networking of sites to determine quality and relevance.

The readership will inevitably increase and since these individuals vote with their feet so the concentration of traffic will be to quality sites.

This means motivating for long-term development and where there is no demonstrable revenue stream or cost savings this will also contribute to the declining numbers of 'vanity sites'.

The shake-down is going to be another example of the process of market forces and the secret will be in justifying existence in terms that are consistent with other projects and products.

If there was an easy solution I would keep it secret, but hard work and continuous support and focus on content will prevail.

What we are currently developing are tailored products such as content driven advertising, customised news, interactive discussions, youth targeted competitions and involvement.

Each will be closely monitored to ensure that they comply with our vision of low-cost high-content low-maintenance and growth.

The Role of IT in Business Process Reengineering

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Abstract

South African organisations are facing increasing demands stemming from growing competition, fast changing technologies and global trends and pressures. The methods and management structures enabled these organisations to make effective use of information technology (IT) during the 70s and 80s, are currently proving to be inadequate. IT has extended into the organisation and beyond the IS department's control, and is accordingly expected to support entire business processes.

As such an increasing number of organisations have decided to use Business Process Reengineering (BPR) as the primary vehicle for organisational transformation. Because of the complexity of the BPR process, a failure can be very costly in terms of time and money. BPR literature is full of success and failure stories that identify various critical success factors. However most studies do not identify the correct use of IT as a critical success factor.

In this paper, we present our research findings on the identified critical success factors and the important role of IT, within BPR. Next we present the key critical success factors as identified by current BPR literature. We then present the results of our survey of South African businesses and their evaluation of the identified critical success factors, and especially the role IT should play in the BPR process. Finally we present a framework which focuses on the role of IT in BPR.

1.0 Introduction

Business Process Reengineering (BPR) is a radical Information Technology (IT) based redesign of work flows and processes within and between organisations [Shabana, 1996]. In many organisations BPR has not only been a success but also a failure, according to the CSC Index in 1992 up to 70% of all BPR projects fail. The rate of failures is a growing concern and as such it has become necessary to develop a framework for BPR projects in order to ensure the effective application of BPR.

Several frameworks have been developed which highlight a strategic path and specific role for IT to play in BPR. Although the research differs on the actual role of IT and IT's impact on BPR, each framework recognises IT's facilitating role in some reengineering areas and its leading role in other areas.

In this paper we firstly define what BPR is, and what it is not. Having established this we then set out to discuss the role that Information Technology plays in BPR. We then discuss the results of our questionnaire. The aim of the questionnaire being to determine the opinions of South African (SA) managers on the identified critical success factors of BPR projects from management literature. Based on the results of the questionnaire and based on other researchers frameworks we then develop a revised framework for BPR. The aim of this framework is to provide a guide to implementing BPR and to highlight the critical success factors in BPR which enable managers to facilitate a successful project. The framework provides steps to follow during BPR and highlights the specific role of IT in each step.

The role of IT in BPR has been clearly highlighted in the research done by Hall, Rosenthal and Wade[Hall *et al*, 1996]. Hall et al based research on more than 100 companies and found that BPR projects must impact on six crucial organisational levers: roles and responsibilities, measurements and incentives, organisational structure, information technology, shared values, and skills [Hall *et al*, 1996]. The redesign must penetrate to these core fundamental organisational elements in order to ensure a successful BPR project. Their framework however emphasizes that IT is not the only facilitator for process improvement and reengineering. Successful BPR projects therefore do not treat IT as either the sole driver or the magic bullet for providing the distinctive strategic advantage. Successful BPR leverages IT to create an appropriate organisational arrangement to support the new redesigned processes [Venkatraman, 1994].

However, BPR will not reach its full potential if IT is not being used for the right reasons. If it is deployed just because it exists and not for its specific capabilities, BPR will fail [Dixon *et al*, 1994]. In many cases IT has been used to hasten office work by automating it, rather than transforming the processes [Davenport, 1990]. IT's potential to fundamentally reshape the way business is done must be recognised and used in BPR to transform processes. The role of IT within a BPR framework therefore needs to be developed in order to ensure its correct use and thus ensure the success of the BPR project.

2.0 What is Business Process Reengineering ?

In this section we will set out to define what BPR is, and the aim that BPR is trying to achieve.

Business Process Reengineering is the critical analysis and radical redesign of existing business processes to achieve breakthrough improvements in performance measures [Teng, Grover and Fiedler, 1994]. This improvement is not just concerned with efficiency, it is also concerned with speed, quality, competitive advantage, value to the organisation and flexibility. BPR focuses on the details of the process, such as why the work is done, who does it, where it is done and when. By focusing on examining the process of producing the output, it is an examination of the processes ability to add value to the business [Davenport, 1990].

BPR radically departs from other popular business practices like total quality management, continuos improvement or downsizing [Dixon *et al*, 1994]. It involves a complete change of direction which therefore involves changing the organisations goals. True BPR will achieve dramatic improvements and in the process greater profitability and most importantly improved, faster and more efficient customer service [Martinez, 1995]. BPR is therefore characterized by a change of the organisation's goals in order to seek major improvement. Improving existing processes is far less dramatic than creating new ones. To achieve these dramatic improvements it is necessary to leverage IT to destroy what exists and rebuild by starting from scratch. There is a need for an IT partnership in BPR in order to ensure the success of the project. IT consists of hardware, software, telecommunications and data management and also includes the IS organisation. The IS organisation has the skills to identify applicable technologies, design, implement and manage technology-based solutions [Martinez, 1995].

Davenport describes the relationship between BPR and IT as recursive [Davenport, 1994]. IT should be considered in terms of how it can support business processes and business processes should be considered in terms how they can be transformed using IT. Each is the key to thinking about the other [Davenport, 1994]. A process can be defined as a set of logically related tasks performed to achieve a defined business outcome. A set of processes forms a business system which carries out its business. Processes have two important characteristics: they have defined business outcomes and there are recipients of the outcomes. Secondly processes cross organizational boundaries. That is they occur across or between organisational sub units [Davenport, 1994].

Typically, maximum performance gains are achieved with the reorganizing of a process where these related tasks are performed by personnel from several different functional units [Teng *et al* 1994]. In the past the majority of computer systems merely automated or supported existing business procedures. Efficiency improved but within each functional unit in the organisation`but the lack of coperation between different functions remained. The 1990's are characterized by unprecedented uncertainty which is forcing organisations to reconsider the lack of co-operation between functional units. Internal integration should not be the result of automating inefficient processes [Venkatraman, 1994]. The power of BPR lies in its ability to increase value across the entire organsisation. Many organisations are now attempting to leverage IT to facilitate co-operation and thus increase the organisations flexibility and responsiveness. Although some processes may operate within one functional unit, most important business processes cross departmental boundaries [Teng *et al,* 1994].

Common examples of processes meeting these criteria include developing a new product, ordering goods from a supplier, creating a marketing plan, processing and paying an insurance claim and writing a proposal for a government contract. Other examples are accounts payable changes, reorganization focusing on the customer and organisational transformation [Dixon *et al*, 1994]. BPR therefore involves the reorganization of an organisations existing processes and the development of new processes. The aim being to dramatically improve critical measures of performance, such as quality, service and speed.

3.0 What BPR is not

Having defined what BPR is and its aim, this next section deals with what BPR is not and what BPR should not be confused with.

BPR can and has often been confused with other improvement projects because it is not a fundamentally new approach to performance improvement. It has been confused with Total Quality Management (TQM) which involves the incremental change to an existing process. Reengineering, however, involves the radical change of existing processes. It focuses on the desired results from a process and aims to create value. BPR in some cases requires starting with a "clean sheet of paper" [Dixon *et al*, 1994].

BPR is not reengineering software, unless it is done in support of a radical change in the way a business process is conducted. It is not the reorganization of people in charge of departments or a reduction in their headcount. BPR does not involve the reengineering of the IS department or any other department. Often these factors will be a result of BPR but they are not part of BPR activities [The Butler Group, 1996]. It is important to distinguish BPR from those activities and from the array of other improvement alternatives available to managers.

BPR offers a combination of emerging technological capabilities and management approaches to cope with the demands of the changing South African market place. As such it offers dramatic improvements and many organisations are taking advantage of BPR to enable them for the changing market place. Successful BPR therefore depends on a working definition to guide organisations and therefore enable them to gain the full advantage of BPR.

4.0 The Role of Information Technology in Business Process Reengineering

Having concluded what BPR is and what it is not, the following section now deals with the role that IT should play in BPR.

In the past the productivity gains from IT have been disappointing and as such a new role for IT in business needs to be developed. BPR provides the mechanism for IT to be deployed successfully. Through BPR an organisation's structure can be redesigned and by deploying IT, the full advantages can be realised [Venkatraman, 1994]. IT provides BPR with two primary methods for managing the implementation of BPR. It firstly provides project management discipline and experience and secondly it provides the technological vision and expertise which BPR demands [Venkatraman, 1995]. These two factors were found to be crucial to the success of a BPR project conducted at Breezy Services Company in 1992. The role of IT needs throughout the process needs to be delineated before the BPR project gets under way.

5.0 The Questionnaire

In order to determine SA managers opinions we developed a questionnaire to determine what SA managers thought were the critical success factors in a BPR project, and if in fact they perceived IT as having a critical role to play in BPR.

The questionnaire consisted of 13 questions which aimed at obtaining a ranking of critical success factors. The factors were ranked by respondents as highly critical to not important to the BPR process. Each factor was ranked from 1 to 5, 1 being the least important and 5 being the most important. The results were then added to obtain a overall ranking of the respondents opinions.

The questionnaire was mailed via e-mail to South African Computer Society members, selected members of the Durban Chamber of Commerce and other addresses of people involved in BPR.

6.0 Results of South African Survey

This research study sought to rank the 13 identified critical success factors in BPR. The study involved e-mailing a questionnaire to 30 managers in a varied section of industries. The study was based in part on the identified critical success factors in the literature. An additional section was included to rank the role of IT in BPR. The intention was to obtain a wide cross section of managers' opinions on the factors which are the critical enablers of BPR and especially to highlight the role of IT in BPR.

6.1 Analysis of the Data

The demographic questions were based on a financial mail survey and aimed to classify respondents fields of work, size of organisation and when and if BPR had been attempted. The following table indicates the fields of work of the respondents.

Table 1: Demographics of Respondents

Information Technology	26%
Finance	16,6%
Manufacturing	13%
Services	13%
Academic	13%
Education	10%
Accounting/Auditing	3%
Retail	3%

Over 80% of the respondents were from organisations with over 100 people. This indicates BPR's applicability in mainly large organisations rather than in smaller organisations. Fifty seven percent of the sample had attempted BPR with 75% having attempted BPR in the last 2 years. This indicates BPR's increase in popularity and the possible need of organisations to change to keep up with the changes occurring in South Africa.

The following table indicates the view of IT and non-IT respondents on the success rate of BPR. The number of percieved failures were the same in both groups. The non-IT group percieve BPR to be more of a success than the IT group.

Table 2: Respondents in fields of work who have attempted BPR

Type of Job	Failure	Moderate Success	Success
Non-IT	11,76%	41%	17,64%
IT	11,76%	17,64%	

The majority of respondents were from middle management. Overall 75% felt BPR was a success and 24% considered BPR a failure. However the results also indicate that the majority of respondents, 81%, considered BPR to be a moderate success to complete failure. This shows that most respondents are not completly satisfied with the results of BPR.

Respondents were asked to rank BPR in terms of their perception of it's success and failure. The following table indicates the perceived success rate of BPR by those respondents who have attempted BPR. The majority of respondents saw BPR as more of a complete failure than a complete success.

Table 3: The perceived success rate of BPR

Total Failure	6%
Failure	24%
Moderate Success	53%
Success	18%
Total Success	0%

The following table indicates the opinions of mangers on the identified critical success factors. The ranking of the critical success factors were from highly critical to of no importance to the BPR process. The more critical factor scored 5 points and the least critical 1 point.

Table 4: The percieved ranking of BPR critical success factors

1	The support of top management	93%
2	The strategic alignment of reengineering project goals to the organisations goals	87%
3	The support of the people directly involved in the process being reengineered	87%
4	Organisational and political commitment for the BPR process	86%
5	The development of a formal human resources strategy	83%
6	A plan to measure and track performance of the BPR project	83%
7	The use of teams in the BPR process	80%
8	The identification and prioritization of processes to be reengineered	82%
9	Highlighting an area for IT within each business vision and process objectives	77%
10	Consider IT early on in BPR and contemplate IT's capabilities during redesign	78%
11	The length of time taken to complete BPR	70%
12	The allocation of an entire step to IT during process redesign	67%
13	The use of IT as a redesign tool as in CASE tools	59%

6.2 Discussion of results

Table 4 indicates that the questionnaire revealed that the most critical aspect of BPR to South African managers were the management of the human side of BPR rather than the technical side of BPR. However despite this view most projects were not a complete success. This could be attributed to the fact that not enough emphasis is being placed on IT and therefore the projects are failing. "Without the constructive partnership, technical leadership, and focused endeavours of the IS organisation, a reengineering effort is doomed to fail" [Martinez, 1995]. The top 3 factors indicate that support from all those involved in BPR is the most critical aspect. Other research conducted came to similar conclusions. "In any redesign project, senior executives must overcome resistance and convince employees of the need for change. Ignored or ill-handled, the politics of redesign can doom an otherwise successful project" [Hall, Rosenthal and Wade, 1993]. Another possible reason for the emphasis on the people side of BPR in South Africa is because of the strong influence and power of trade unions. A radical reengineering of processes will almost always involve the loss of jobs and with South Africa's current rate of unemployment this would not be welcomed. Dixon et al in 1994 undertook an analysis of 23 reengineering projects and found that the major concern from project mangers was continued top management support and commitment.

In our survey a large utilities organisation undertook BPR and found that the human resource aspect of change management was of critical importance when implementing BPR. A BPR project leader from a software development company felt that BPR is merely about politics and without support from the organisations top management, the project will fail.

Table 4 indicates that the IT critical success factors scored the lowest in terms of their criticality to BPR. The conclusion from this is that while IT is an identified critical success factor it is not perceived as the key role in every BPR exercise. The same conclusion was reached by Coulson-Thomas in the COBRA(Constraints and Opportunities in Business Restructuring- an Analysis) in 1993. The project involved a pan-European study of BPR experience and practice. "The critical implementation issues tend to concern attitudes, beliefs and behaviour. Inter-personal communication and involvement are usually the limiting factors rather than the capability of technology"[Coulson-Thomas,1993].

It therefore seems that we can deduce from the questionnaire that BPR is a multifaceted exercise which impacts on many different aspects of an organisation. As such it is necessary to focus on each of the identified critical success factors with differing intensity, depending on which step or part of BPR is being implemented. BPR will fail if even one of the factors is either ignored or not implemented correctly.

Although the human side of BPR was perceived to be critical to BPR, the overall results still lead to the fact that most BPR projects fail. The results also indicated that IT's involvement in BPR is perceived as the least important factor in the process. This could be attributed to the fact that IT is not being used properly in the BPR process and therefore because people percieve it as being unimportant the process fails. "We believe that there is a potential for greater IT influence in BPR but only when the organisations adopt a change in mind set concerning the role of the IT function" [Dixon et al, 1994]. Thus IT needs to play a greater role in BPR before the success rate will improve. In order to ensure this we have developed a framework which highlights the role of IT in BPR and provides a practical guideline to ensuring BPR success.

7.0 A Framework for IT in BPR

The results of the questionnaire support the literature [CSC Index, 1992] which indicates that the majority of BPR projects fail. Combined with this is a poor perception of the role IT should be playing in BPR. In the light of this we present a revised framework for BPR which highlights the important role of IT. The framework will be based on Davenport and Short's initial industrial engineering framework which focused largely on IT as a critical enabler of BPR [Davenport, 1990]. The objective of the framework is to provide a general guide to the facilitators of the BPR process and to ensure the emphasis of critical success factors.

7.1 Developing a business vision and process objectives.

The first step in the framework is to develop a business vision and process objectives. BPR is often initiated because management develops a vision for the organisation which cannot be supported by the current operating capabilities [Dixon *et al*, 1994]. Management may be reacting to a crisis imposed by outside competitive forces or may be taking a pro-active step in order to be prepared for future competition. Many organisations who attempt business process reengineering are leaders in their field and are looking to improve their current position [Dixon *et al*, 1994]. Whatever the reasons for attempting BPR, a business vision for BPR and for the organisation must be developed. A business vision can be defined as a broad strategic vision into which the process redesign activity fits [Davenport, 1990]. Davenport identifies this as a critical success factor. At Xerox for example this vision involved taking the perspective of the customer. At Westinghouse, the vision consisted largely of improving product quality [Davenport, 1990]. Each vision implied a specific objective for the process redesign. Likely objectives are cost reduction, time reduction, output quality and quality of work life. These objectives should be specific to the point of quantification. The setting of goals encourages the organisation to aspire to a set and known objective[Davenport, 1990].

According to the questionnaire the development of a business vision for BPR which is strategically aligned was the second most critical success factor. The development of a business vision should be developed by the business management during this phase and IS should play a support role [Martinez, 1995]. The SA questionnaire indicated that the consistent support of top management throughout the BPR process was the most critical out of the 13 critical success factors. Top management can therefore become involved by firstly assisting in developing a business vision and process objectives for the project.

When Banca di America e di Italia (BIA) reengineered its banking system it was driven by the CEO's goal of creating a paperless bank [Hall *et al*, 1993]. Their business vision was to improve customer service levels whilst reducing cost per branch as well as improving front-office efficiency. The process objectives were to decrease cost per branch and to increase efficiency [Hall *et al*, 1993].

Thus the organisation needs to determine the needed organisational changes and then identify the level of transformation or reengineering necessary to enable the organisation to change. Venkatraman suggests a five level model where organisations must firstly determine which level of transformation is necessary to achieve the specific business vision. The organisations business vision will depend on whether the organisation is trying to rectify current deficiencies which is defined as "seeking efficiency" or the organisation is attempting to create capabilities for the future which is defined as enhancing capabilities. Most business visions in BPR are concerned with the first option, which involves a redesign effort only within the organisations boundaries. Once this has been determined managers can choose an appropriate degree of business transformation. Organisations attempting to enhance their capabilities will enter the level of transformation at business network redesign. This level represents the redesign of the organisation and all of the organisations interconnections with external business, such as suppliers and buyers.[Venkatraman, 1994] Once a business vision has been formulated this needs to be translated into technical reality. Venkatraman suggests IT provide a support role whilst BPR leaders develop the business vision. Once the new business vision has been developed, IS should lead by analysing the vision and then determining the technical implications for the new processes.

7.2 Identify processes to be redesigned

Once a clear business vision and the scope of the project has been determined, the candidate processes can be identified. This phase is known as the diagnostic phase of BPR and can be described as one of the most critical stages in BPR [Hall, Rosenthal and Wade, 1993]. This is because it is possible to reengineer the wrong processes and thus not meet the business vision which was developed in the first phase of BPR. The questionnaire revealed that the identification of processes is the eighth most important critical success factor in BPR, out of 13 factors.

This phase involves the BPR team surveying the businesses process steps from initial customer contact through to the collection of funds [Hall *et al*, 1993]. Different frameworks each have specific methods to identify and prioritize processes which need to be redesigned. Davenport [1990] found the means by which the processes are identified to be a key issue during this phase.

Every process in a business should not however be reengineered. The importance of this phase is to understand the rationale of the current business processes and thus determine their strengths and limatations [Venkatraman, 1994]. The scope of the project, which was defined during the planning phase of BPR, should be used to limit the magnitude of the processes to be reegineered. Hall, Rosenthal and Wade found that for all organisations in their sample, expanding the dimensions of the redesign project was critical to success [Hall *et al*, 1993]. BPR projects which are too narrow and change only one or two aspects of the organisations depth levels are more likely to fail. Whilst reengineering single processes can be important for organisations with limited problems, this approach will not achieve the kind of widespread results managers are aiming for.

7.3 Understanding and measuring existing processes

Subsequent to the selection of candidate processes each of the processes needs to be understood and measured. This is firstly to gain an understanding of the problems with the existing process so they are not repeated. Secondly it is to serve as a baseline, so when new processes are measured they can be compared and thus the projects success measured and monitored. [Davenport, 1990]

Hall, Rosenthal and Wade found in their detailed study of 20 BPR projects that firstly the BPR team diagnosed by documenting all existing processes [Hall *et al*, 1993]. This was achieved by surveying all the process steps from initial customer contact to collection of funds. Interviews were conducted and all the relevant forms used in the process and all the controls were revealed. Each process was divided up into the number of existing activities and paperwork required to complete the process. Once a detailed picture of the process was gained it could be redesigned from scratch. The processes were then measured in terms of number of customers and the amount of support it provided. Examples are customer responsiveness and service efficiency. These would serve as benchmarks for the new process to be compared against.

These methods serve as rough guidelines to understand the existing processes, however other methods provide a more technical and specific method for measurement. Teng et al [1994], developed a functional coupling framework of business processes so processes could be plotted on a two dimensional space according to their current levels of mediation and collaboration. The degree of collaboration is the frequency and intensity of information exchange and mutual adjustment when functions are participating in the same process. Once the processes have been plotted, a strategic path for reengineering can be selected from the various paths available.

However it is important not to over emphasize this step. Designers should consider past process problems and errors but work from a clean slate. This means that not all processes should be measured ,only those with specific objectives which have been set should be measured. Simply fine tuning the existing outmoded processes through current technological capabilities does not create the desired BPR results [Venkatraman, 1994].