
**Business Process Reengineering:
Role of Information Technology in the Implementation of Business Process
Reengineering**

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1. Abstract

Business process reengineering (reengineering) is a pervasive but challenging tool for transforming organizations for radical improvement in all aspects of its performance. Information technology (IT) plays an important role by either enabling or constraining successful implementation of Reengineering. This paper explores the role of IT in reengineering. The role of IT in reengineering is not automating the business process. Companies that think of IT as the tool for automating its business process cannot reengineer. IT can be an enabler for reengineering by enabling the organization to reengineer. IT allows the organization to do business process more efficiently. IT can also become an inhibitor of reengineering if the organization's IT Infrastructure is inadequate or inflexible. IT infrastructure capability includes both the technical and managerial expertise required to provide reliable physical services and extensive electronic connectivity within and outside the firm.

2. Introduction

In the post industrial age competition has intensified so much that if the organization can't keep pace with the other companies in the same competitive category it will fail. As a consequence of the above it has become necessary for the organizations to reinvent themselves, the methodology used being 'Business Process Reengineering'. Hammer and Champy (1993) says "Business Process Reengineering means starting all over, starting from scratch".

In 'Business Process Reengineering' all the ideas that were gained from several years of management is put aside and new ideas on how to do business today is found. Hammer and Champy (1993) says "At the heart of Business Process Reengineering lies the notion

of discontinuous thinking”. Organizations will have to identify and abandon old and obsolete rules and assumptions that underlie the current business practices.

This paper discusses the role of IT in implementing reengineering. How IT is going to affect the way in which an organization does business. IT has the ability to make or break the organization’s reengineering efforts. IT can also become an inhibitor of reengineering if the organization’s IT Infrastructure is inadequate or inflexible. The role played by IT in different stages of implementation of the reengineering project is also different, in some stages IT will have to play a supportive role to the reengineering team and in some others IT will have to take the leadership role. The paper also explores the future role of IT in business, reengineering in particular.

3. Business Process Reengineering Defined.

Several definitions of Business Process Reengineering can be found in the literature, but all of them capture the same theme of corporate renewal and rejuvenation by radical change in the business process.

The definition given by Hammer and Champy (1993) is “Business Process Reengineering is the fundamental rethinking and radical redesign of business process to achieve dramatic improvement in critical contemporary measures of performance such as cost, quality, service and speed”.

In the fundamental rethinking of business process people should ask the questions such as why do we do what we do. This will enable the organizations to rethink about the rules and assumptions that underlie the way they conduct business. This will help in identifying the rules and assumptions that are obsolete and inappropriate and eliminating them in the new design. During the redesign of business process radical steps have to be taken. Reengineering is about reinventing the organization and not improving or enhancing it. So old structures and procedures might have to be disregarded and new ways of accomplishing work has to be invented. If the company needs only small improvements then it needs to do only process improvement and not reengineering. Reengineering has to be employed for large-scale improvements. In reengineering the focus should be on the process and not on the tasks.

Hammer and Champy (1994) suggests seven 'Principles of reengineering'.

1. Organize around results and outcomes, not tasks.
2. Have those who use the output of the process perform the process.
3. Subsume information-processing work into the real work that produces the information.
4. Treat geographically dispersed resources as though they were centralized.
5. Link parallel activities instead of integrating their results.
6. Put the decision point where the work is performed, and build control into the process.
7. Capture information once and at the source

Carr (1995) define Business Process Reengineering as the technique that concentrates on the process to bring about radical change in the organization facilitating dramatic improvement in performance in core business processes critical for competitive advantage. This definition also captures the main idea of Business Process Reengineering, reinventing the organization for increasing performance.

4. Implementation of Business Process Reengineering

Business Process Reengineering is a discrete, one-time event and it needs to be treated as a project, which is critical to the future of the organization. So like any other project Reengineering will have an analysis phase, a design phase and an implementation phase. The complete process of reengineering can be captured as in the flow diagram given in figure 1.

The model of implementing reengineering in an organization given in figure 1.is built on the basic model for implementing reengineering in an organization given by Cross, Feather, and Lynch (1994). The development of various stages in the model from the basic model is explained in the following paragraphs.



Figure 1. Implementation of Business Process Reengineering in an Organization

In the analysis phase an in-depth understanding of markets and customer requirements is developed. Also an understanding about how work is being done today internally toward attaining the performance level needed to meet and beat competition is developed. In some cases benchmarking of best practices in the industry is also done. In the initial phase of analysis decisions are made about which process are candidates for reengineering and where decisions need to be focussed first.

Design specifications are developed from the customer requirement analysis, current process review and baseline analysis are done in the initial stages. Cross (1994, p32) says, “design specifications are the initial rough blueprint for reengineering design”.

In the design phase, the process of rethinking and designing the best way to serve the customer is developed. Cross (1994) says that there are six categories of key design principles that have to be applied for successful reengineering design. The six key design principles are as follows,

1. Service quality: Service quality provides guidance regarding the design of process as they relate to customer contacts.
2. Workflow: Workflow principles relate to the basic nature of managing the flow of work through a series of steps.
3. Workspace: Workspace principles address the ergonomic factors and layout options.
4. Continuous improvement: Continuous improvement principles help to ensure that a process can be self-sustaining by implementing continuous improvement and learning.

5. Workforce: Workforce principle is based on the premise that any workflow requires manpower as an integral part of it.
6. Information Technology: IT principles provide guidelines for ensuring that technology is viewed as an enabling option to improve the value added workflow.

Building upon the above design principles, specifications and options developed in the analysis phase an outline of the process to be reengineered is developed. Detailed business maps, procedures and operating policies and the design supporting infrastructure is developed. The design is validated through business modeling and interviews. Key performance measures have to be determined during the design phase. The design phase is concluded with testing the new process with a pilot.

The basic model doesn't elaborate on the implementation phase of reengineering, the proposed method of implementation is described herein. In implementation phase the entire organization has to apply and institutionalize the new design into its daily operation. Implementation phase has two components, (1) Planning and executing the logistics of converting on a large scale to the new mode of operation and (2) managing the transition. Caldwell, Bruce, Missteps, Miscues (1994) say "once reengineering plan is in place, you have got to pull all the stops and execute it. You cannot live in the limbo between what you used to do and what you are going to do. Otherwise dramatic improvements are sacrificed, people lose focus and reengineering slips into process improvement." The reengineering project does not end with initial change, the change has to be institutionalized into the daily operations of the organization. The transitional

period is more crucial as the organizational inertia may cause the company to slip back into the old state.

The implementation of reengineering needs people who have different roles in the reengineering horizon. The selection of people who will reengineer is a critical success factor in reengineering. The roles played by people in reengineering are

- 1) Leader: The leader is a senior executive who authorizes and motivates the overall reengineering effort.
- 2) Process owner: The process owner is a manager with responsibility of the process that is reengineered. It is his process that is reengineered.
- 3) Reengineering team: The reengineering team is a group of individuals who are dedicated to reengineering of the particular process.
- 4) Steering committee: The steering committee is a strategy team consisting of senior managers, who will make the strategy for reengineering in the company and monitors the reengineering effort.
- 5) Reengineering 'Czar': The reengineering czar is the individual responsible for developing reengineering techniques and tools within the company and achieving synergy across various reengineering efforts that are going on in the organization. Czar has two important functions, (a) Enabling and supporting the process owners and reengineering teams and (b) Coordinating all the ongoing reengineering activities in the organization.

To sum it up Hammer and Champy (1993) says that basically three types of companies should reengineer to improve their performance, they are as follows.

1. Companies that are facing a crisis
2. Companies that foresee a crisis approaching and
3. Market leaders that want to get ahead of other companies.

A lot of companies that belong to the above three categories are implementing reengineering to radically improve their performance to gain competitive advantage, an example being Hallmark, Inc, which was a market leader and wanted to get ahead of the other companies. Hammer and Champy (1993, p 166-167) says that using reengineering, Hallmark, redesigned the process they used to bring new card concepts to market. Their product cycle time was approximately three years. The growing trend of more and more niche markets convinced Hallmark executives that the product development process needed change. The company's goal was to get new products to market within one year. Hallmark has always assumed that the product development was comprised mostly of printing and production rework time. Much to their surprise two-thirds of the time was spent in developing the plan and concept for the card. They also found that from the time a concept was given to the creative staff, numerous hand-offs were completed. The concept spent 90% of the time within the creative staff's in and out slot. In developing a new line of cards in 1991 Hallmark used BPR to create a cross-functional team approach to product development bring the new card to market 8 months ahead of schedule. This resulted in a radical improvement in the business and performance for Hallmark, Inc, which resulted in Hallmark increasing its market share and thereby profits.

5. Role of Information technology in Reengineering

Whisler (1970) defines information technology as the technology of sensing, coding, transmitting, translating and transforming information. Hammer and Champy (1993) says that **information technology is an integral part of reengineering as an enabler** since it permits companies to reengineer business process. Davenport & Short (1990) say that Information technology and BPR have a recursive relationship. IT capabilities should support business processes, and business processes should be in terms of the capabilities IT can provide. The capability of IT in reengineering is listed in Table 1.

Broadbent, Weill, and St Clair (1999) say that IT plays an important role by either enabling or constraining successful BPR. **IT can also become an inhibitor of Reengineering if the organization's IT Infrastructure is inadequate or inflexible.** The role of IT is to make a new process design possible. If nothing changes about the way work is done and the role of IT is simply to automate an existing process, then economic benefits are likely to be minimal. **The role of IT in Reengineering is not to automate the business process.**

The application of IT to reengineering requires inductive thinking, which is the ability to first recognize a powerful solution and then seek the problems that it might solve. Hammer and Champy (1993) says that a company that looks at problems first and then seeks technology solutions cannot reengineer. This is where inductive thinking helps. A fundamental error that most companies commit when they look at technology is to see

how a new technology will help in solving problems in their existing process. The companies have to think how a technology can help them to do things that they are not doing in the current process. Hammer and Champy (1993) say, “reengineering is about innovation. It is about exploiting the latest capabilities of technology to achieve entirely new objectives”.

Haapaniemi (1996) evaluates the same idea of **utilizing** latest capabilities **of IT to achieve entirely new objectives** by giving the example of Alcoa, Inc. Alcoa announced the largest IT project in its history, an overhaul of its basic computer infrastructure. The \$150 million effort spanned 26 countries and took several years to complete. The effort is ambitious and complicated, but the goal is elegantly simple and clear, “Let employees around the globe communicate quickly and easily”. Alcoa's initiative reflects a basic fact of life in the use of strategic IT (IT). Today, IT is focused increasingly on creating connections between employees, across functions, with customers, and between data and decision-makers. In the above the company didn't think of the problems that IT will solve for them but it thought of the things that it could do with the new technology.

The major advantage of IT in reengineering lies in its disruptive power. **IT has the power to break the rules and make people think inductively and give the company a competitive advantage.** The company that used the disruptive power of IT to break all rules and gain competitive advantage was Amazon.com. Amazon.com broke the existing rules and sold books without a physical presence for its customers, through Internet.

Amazon.com in doing so has completely changed the book store business and broke all the rules.

The key to the effective use of IT lies not in moving the information faster but in doing right things with it. **IT has to be used to make proactive decisions to improve business performance** rather than report on it after the fact. In the design phase of implementation of reengineering the capabilities of IT can be used to simulate a model of the design and there by validate the new design.

Supermarkets like Wall-Mart have used IT to drive their business. The scanners that are used to check out commodities provide a huge benefit by making it possible to track sales in real time. A strong IT solution was developed and then problems that it will solve was found. The use of IT reduced the customer check out times and reduced the cashier labor in addition to tracking sales. IT enables the supermarket to keep products available to the customer at all times and minimize costs related to inventory, obsolescence and spoilage. IT is also used to make decisions as when to order.

The capability of IT in reengineering and its impact on the organization can be summarized as in Table1:

Table 1. Capabilities of IT in Reengineering (Thomas H. Davenport and James E. Short, 1990, Sloan Management Review)

Capability of IT	Organizational Impact of the Capability
Transactional	IT can transform unstructured business process into standardized transactions
Geographical	IT can transfer information with rapidity and ease across large distances, making business process independent of locations
Automation	IT can reduce human labor in certain process
Informational	IT can bring vast volumes of detailed information into a business process
Analytical	IT can bring complex analytical methods to bear on a process.
Sequential	IT enables changes in the sequence of tasks in a process, often allowing multiple tasks to be worked on simultaneously
Knowledge management	IT allows the capture and dissemination of knowledge and expertise to improve the process
Tracking	IT allows detailed tracking of status, inputs and outputs
Reduction of intermediaries	IT can be used to connect two parties within a process that would otherwise communicate through intermediaries

IT provides project management skills and experience, which is a key ingredient in successfully implementing reengineering. The IT group of the company has experience in large-scale project management as they are exposed to the structured demand of large-scale projects. Reengineering in a company is and should be undertaken as a project, this is the time when the project management expertise of the IT group becomes a key ingredient in the success of reengineering.

Martinez (1995) says that for the success of reengineering IT has to be implemented as a partner in reengineering and when appropriate allow it to assume leadership also.

Table 2 gives a summary of the roles that IT plays in the reengineering effort of an organization.

Table 2 Role of IT in Reengineering

Reengineering Area	Role of IT
Analysis phase	Partnership with the Process owner, and team who are responsible for implementing reengineering
Design phase	Partnership with the Process owner, leader, and team who are responsible for implementing reengineering
Implementation phase	Partnership with the process owner, steering committee, leader, and team who are responsible for implementing reengineering
Overall accountability and leadership	Support; project management expertise, design principles, key ingredient in the reengineered process
Reengineering plan and implementation	Partnership with the leader, and team who are responsible for implementing reengineering
Project management expertise	Leadership; IT group should provide their project management expertise in the implementation of reengineering
Technology expertise	Leadership; The technological capabilities should be evaluated before implementing reengineering
Identifying the process to be reengineered	Partnership with the leader, and team who are responsible for implementing reengineering
Business vision	Support; While defining new goals and vision the capability of IT has to be taken into account

Even after all this the role performed by IT is not to the mark due to variety of reasons. In a benchmarking study conducted by Prosci Research and Publishing Company among CEOs of 205 companies the performance of IT in reengineering found that IT group had conflicts with the reengineering team. The results of the case study can be summarized as in the chart given in figure 2.

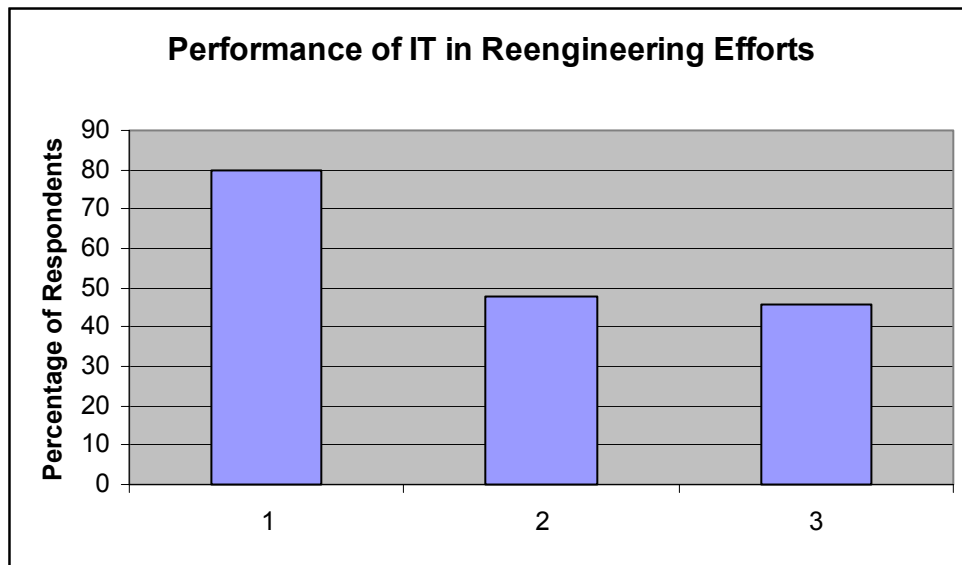


Figure 2. Performance of IT in reengineering efforts

Legend:

- 1: Performance of IT was poor
- 2: Operational groups had conflicts with IT group
- 3: IT and Operations had a strained relationship

80 % of the CEOs said that the performance of IT in the reengineering efforts of their company was poor. 48 % confirmed that the operational teams had conflicts with the IT group. 46 % confirmed that IT and operational group had a strained relationship.

6. Criticality of IT in Business Process

The criticality of IT in business process should be analyzed before embarking on the reengineering project; otherwise there will be a tendency to use IT for automating the business process, which is not reengineering. IT is the enabler, which will streamline business processes, reduce cycle times and validate the performance improvements. IT will help standardize and simplify business processes across the various dimensions of a business thereby bringing in efficiency gains in terms of time and money. More importantly, IT through the use of a databases can help in the vital area of knowledge management by converting data from a common format, manipulate it and present it as information that is useful in decision making. It can also consolidate and enrich data to create information that is not available from a single source and can therefore act as a vital source of competitive intelligence

There is a flip side of this wherein due to proliferation of IT, in many companies there is mismanagement. The dividing line between safe, traditional information processing approaches and the fast approach of strategic opportunity is fine and narrow. Braithwaite (1996) says, “Be too conservative and opportunities may be missed; be too aggressive and the project becomes too risky”.

The figure 3 captures the critical relationship between a business, IT and implementation of IT.

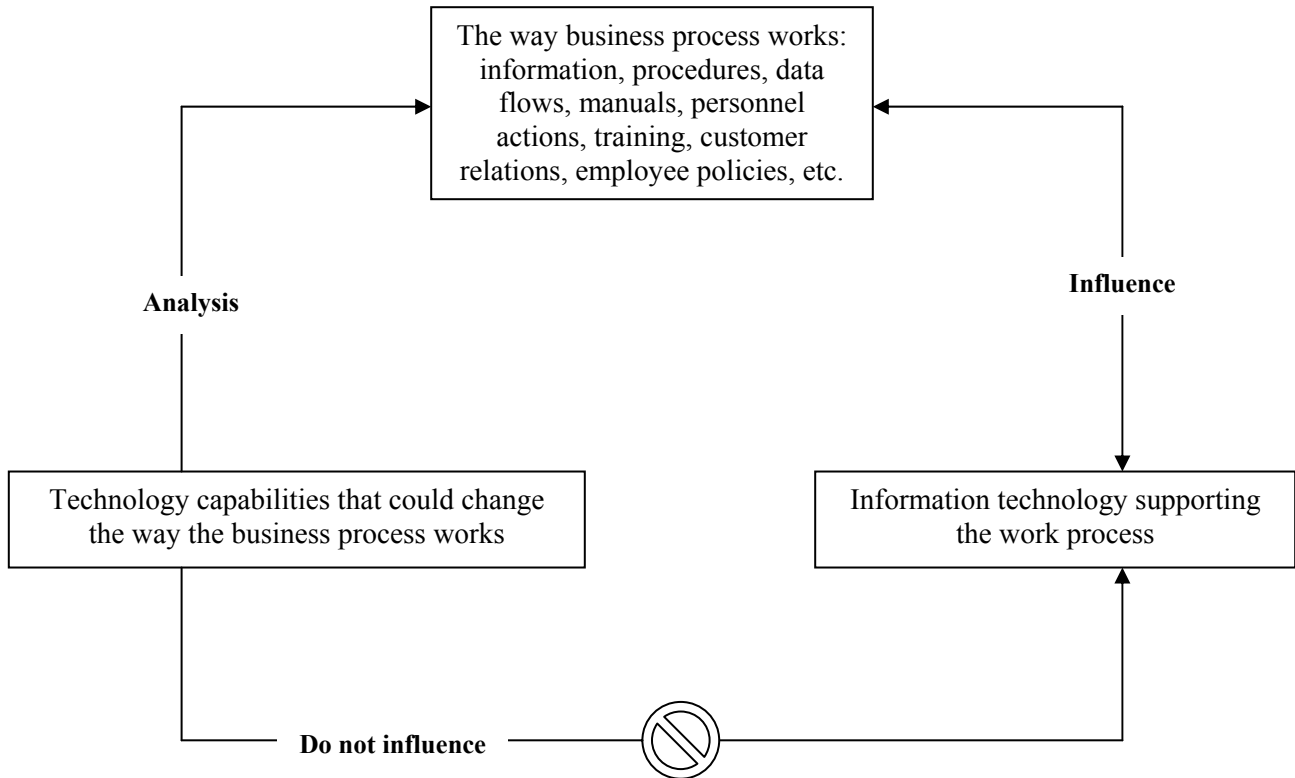


Figure 3. Critical relationship between a business, information technology and implementation of information technology

In the figure the three boxes must be balanced to get the greatest value from the use of IT.

IT should be subordinate to a business process. Technology capabilities are constantly changing and some of these may profoundly affect the future ways in which business process is conducted. Allowances for technological capability should be made when analyzing the way the current work process is executed. To put it differently solution-driven analysis of how technology could be used should always take into account the IT capabilities of the company. What must not be allowed is the technology capabilities in the industry influencing the IT system that is going to support the business process without analyzing the potential impact of that technology on the business process of the

company. This is shown with a stop in the flow diagram in figure 3. When technological capability influences the IT system directly then IT no longer plays a supporting role in the reengineering process, it becomes the driver. As such the business process may not smoothly integrate with work force capabilities and customer needs. Adherence to the above model in which IT capabilities do not directly influence the IT system in the company will increase the likelihood of the successful implementation of reengineering. Investment will provide the desired improvements without being disruptive since IT has been kept in its appropriate supportive role.

The greatest utility of IT in business process is not the solutions it provides but the questions that it provokes. These questions help the organization to better understand its strength and achieve competitive advantage. IT helps an organization to achieve its strategic goals and corporate objectives and bring about significant improvements in productivity

7. Future role of IT in Reengineering

With IT advancing at a rapid pace every day the future role of IT in reengineering becomes more critical. In the survey conducted by Prosci Research and Publishing Company among CEOs of 205 companies across the globe the future role of IT have been identified into three main categories.

1. Participate as a member of the reengineering team, but do not take control of the project.

2. Define technology solutions to enable new business processes and take time to educate operational managers about new technology.
3. Implement technology needed to support the new business processes. Be sure to set expectations and define deliverables clearly.

IT managers and staff have to become business analysts, knowledgeable of business needs and able to combine a business orientation with technical expertise. This will help in integrating business knowledge with technical skills.

With the advent of Internet and e-commerce, businesses are getting closer to the customers. In future Internet will change the way business is carried out. E-commerce will affect reengineering more than present day IT. E-commerce initiatives will be business led activities with an implicit acceptance of process change and often involving the use of high-energy change initiatives like reengineering.

8. Conclusion

It is not possible to reengineer without IT support. IT is not only an enabler for reengineering it has also become an essential and integral part of all reengineering efforts. In the implementation of reengineering IT is crucial and it provides the skills and tools that are needed to effectively reengineer.

1. IT provides project management skills that are important in the successful implementation of reengineering as a project.

2. In the design phase of implementation of reengineering the capabilities of IT can be used to simulate a model of the design and there by validate the new design.
3. The disruptive power of IT helps in the design phase of implementation of reengineering. The disruptive power helps organizations to break all the rules and think inductively about the business that they are in to gain competitive advantage.
4. If not used properly IT can become an inhibitor of reengineering if the organization's IT Infrastructure capabilities are inadequate or inflexible.
5. IT capabilities of the organization should not directly influence the IT solutions that are needed for the company.
6. IT is an indispensable tool in implementation of reengineering in the way that IT supports redesigned business process and facilitates cross-functional workflow.

Companies have to understand that the role of IT in reengineering is not to automate the business process.

In future companies will not be able to reengineer without involving IT department of the company. The staff of the IT department will become the members of the reengineering team.

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