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**BUSINESS PROCESS REENGINEERING:
A PRIMER FOR THE MARINE CORPS'
PROCESS OWNER**

by

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As the defense establishment downsizes, it has turned to the private sector to model its methods for improved productivity. Business Process Reengineering (BPR) is a technique used by the private sector to achieve order of magnitude improvements in organizational performance by leveraging information technology to enable the holistic redesign of business processes. This thesis provides a guide to the methods and tools used during BPR, and presents a practical way for Marine Corps' leaders to establish and direct a reengineering effort. Instruction is provided on the basics of how to establish a strategic direction, organize the reengineering team, and analyze business processes through the use of process-maps, flowcharts, Integrated Definition for Function (IDEF0) models, Activity-Based Costing (ABC), and value-added assessment. Approaches and principles useful during the development of the new process are discussed, as well as benchmarking and the factors leading to process implementation and organizational change. Recommendations are made for further reading.

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I. INTRODUCTION

A. BACKGROUND

> Over the past decade, the American commercial sector has reorganized, restructured, and adopted revolutionary new business and management practices in order to assure its competitive edge in the rapidly changing global marketplace. Now the (Defense) Department must adopt and adapt the lessons of the private sector so our armed forces can maintain their competitive edge in the rapidly changing global security market -- Secretary of Defense William Cohen, 14 May 1997.

Throughout the past two decades the private sector has experienced a change in its external environment due to increasing competition and the globalization of the market place. In response to the changing environment, private sector organizations have adapted their processes and structures in order to remain competitive. Likewise, the Defense Department is also experiencing external mandates for change in the form of programs and legislation like Corporate Information Management (CIM), the Chief Financial Officer's (CFO) Act, the National Performance Review, the Government Performance and Results Act (GPRA), and the Clinger-Cohen Act. The Quadrennial Defense Review (QDR) reiterated the fact that the Department of Defense (DOD) is downsizing in response to a reduced Cold-War threat and increasing pressures on discretionary federal spending. Since 1985 America has reduced its defense budget by 38 percent, its force structure by 33 percent, and its procurement programs by 63 percent (Quadrennial Defense Review, 1997). As the defense establishment downsizes it has turned to the private sector to model its methods for improved productivity.

> We must fundamentally reengineer our infrastructure and streamline our support structures by taking advantage of the Revolution in Business Affairs that has occurred in the commercial world. We must focus on the future and not the past. Only through such efforts can we realize the cost efficiencies necessary to recapitalize the force. (Quadrennial Defense Review, 1997)

Business Process Reengineering (BPR) is one of the strategies being used by the Defense Department to mitigate the effects of smaller budgets. A defense reform task-force has been formed by Secretary of Defense Cohen to improve the organization and procedures in the Department. This group of military and civilian executives is expected to make recommendations to the Secretary to streamline DOD's organizational structures and business practices (Department of Defense Press Release, 239-97).

Within the Marine Corps, BPR and process improvement techniques are being used by Headquarters Marine Corps (HQMC) to streamline their business processes with the hopes of increased capacity, greater service to customers, financial savings and better decision making. In April 1995 a team of Active Duty and Reserve Marines and Marine Corps' civilians was formed for the express purpose of documenting and improving the Marine Corps' business processes within the beltway. Their activity became known as the Marine Corps Continuous Process Improvement Program (MCCPIP). This group has identified the key processes at work within the "Business Enterprise" of the Marine Corps that directly deliver the end products and services that the operating forces need to maintain readiness and ultimately make Marines and win battles. (Neal, 1997)

As the DOD and HQMC continue their change efforts, the Operating Forces and the Supporting Establishment will need to adapt their processes to work in congruence with higher headquarters. These smaller organizations interact with fewer external agencies and consequently their processes are by some measures less complex than those employed by HQMC. However, the need for these organizations to evaluate and improve their processes will surface as the Department and other smaller intra-service organizations continue their quest for greater efficiency.

B. SCOPE OF THESIS

This thesis is a management guide to the methods and tools required for successful reengineering. The objective of the thesis is to provide the Marine Corps' process owners with a process improvement method and tools that have demonstrated their usefulness

within the public sector and DOD. Research included an examination of the different strategies and methods behind BPR, and the environmental enablers that together lead to successful reengineering. This document seeks to: 1) outline the steps necessary to ensure a successful BPR effort; 2) describe some of the most pertinent tools that are being used within the DOD and the private sector; 3) identify the characteristics of a work environment that supports and enables reengineering; and 4) provide references for further reading in each area. If the BPR effort is limited then it may be done without the need for costly consulting fees. If the process is complex, then readers of the thesis will have the requisite knowledge to talk intelligently with consultants and recognize appropriate actions.

It is my intent that this thesis will be used by military leaders at the middle levels of the organization (within departments at HQMC, the operating forces, and the supporting establishment) as a primer for BPR and a source book for additional readings. It is not written with the intent to fully educate the reader on all of the aspects of BPR, but as a introduction to the methods and tools used during reengineering so the reader may make an informed decision on how to proceed. At the end of each chapter recommendations for further reading are presented to direct the reader to information the author found interesting and relevant for reengineering.

II. BACKGROUND OF PROCESS IMPROVEMENT TECHNIQUES

A. BACKGROUND

Michael Hammer, who popularized the term "business process reengineering," reasons that the industrial age is over and that a new postindustrial era is on the rise. As a result, many of the hallmarks of the industrial age are no longer relevant to today's business environment (Hammer and Champy, 1993). When Adam Smith wrote "The Wealth of Nations" in 1776 he classified the industrial paradigm as the division of labor and economies of scale (Smith, 1956). This set of assumptions was used as building blocks for industrial era corporations. These corporations broke down processes into highly simplified tasks that could be performed efficiently by poorly educated workers. As Adam Smith and Henry Ford discovered, workers that specialized in performing one simple task could perform that task very efficiently. (Hammer and Champy, 1993) In the parable of the pin makers Smith demonstrated how dividing the process of making straight pins into specialized tasks for the workers could increase productivity. By dividing the process into 18 tasks, he found that 10 employees could increase their productivity from less than 100 pins a day to 48,000. These separate tasks were coordinated and integrated by layers of management. These layers of management were the formation of the bureaucracy. (Smith, 1956) Just as the production process was separated, likewise the management of organizations was simplified and separated into manageable tasks (Hammer and Champy, 1993).

Ironically, according to Hammer and Champy (1993), the same set of management principles that enabled the industrial revolution and success during World Wars I and II, now hinder organizations from competing in this post-industrial age. They see reengineering as the vehicle of change to incorporate new ways of doing business into organizations.

If the industrial era paradigm worked for over 200 years why change now? In the private sector, global competition places additional demands on businesses for effectiveness and efficiency. In the public sector, change is required because funding authority is no longer plentiful. Also, Congress, the media, and the American people see the efficiencies at work in the private sector and ask why their tax dollars can not be used more efficiently? The pressure of public scrutiny in the form of nightly reports on waste, fraud, and abuse in the news, and Congressional mandates in the form of the QDR, the Clinger-Cohen Act, GPRA and CIM initiatives now require change.

> We have to have a revolution in our business practices, and we will do that.
> - Secretary of Defense William Cohen, 14 May 1997.

BPR is seen by many to be one method to make this change happen (GAO/AMID-10.1.15, Department of Defense Press Release No. 238-97).

B. WHAT IS A PROCESS?

Before continuing, it is important to define what a process is in order to grasp the entirety of the BPR effort. A business process is the series of steps and procedures that govern how resources are used with the intent to create products and services that meet the needs of particular customers or markets (GAO/AIMD-10.1.15). This is shown pictorially in Figure 2-1.

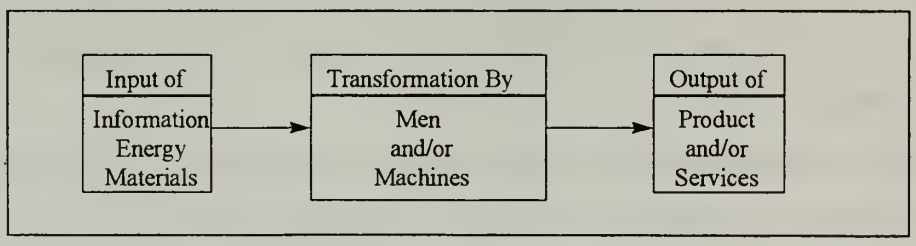

Figure 2-1. A process or system.
From Johnson, Kast, and Rosenweig, 1963.

The main processes may be divided into sub-processes or tasks, where the output from one sub-process becomes the input for another. Together these processes and sub-

processes form a chain that ideally creates value for the customer. Similar definitions of processes include the following:

> a group of logically related tasks that use the resources of the organization to provide defined results in support of the organization's objectives. (Harrington, 1991, pp. 9)
>
> a series of steps designed to produce a product or service. Most processes are cross-functional, spanning the 'white space' between the boxes on the organizational chart. (Rummler, 1995, pp. 45)
>
> a collection of related, structured activities – a chain of events – that produces a specific service or product for a particular customer or customers...regardless of the hierarchy and vertical structural designs. For most mangers, accustomed to functional units and activities which can virtually stand alone, this is a much different view. (Caudle, 1995, pp. 7-9)

In short, processes are what the organization does. Developing products, procuring materials, compensating employees, and financial planning are all examples of processes. Who works in the process is a function of structure. Examining an organization through its processes, rather than its structure, is a process orientation.

A process orientation is an alternative way of looking at an organization. That is, looking at the organization horizontally as a collection of processes rather than vertically as a collection of functions. Figure 2-2 shows the relationship between a vertical/functional view of an organization and the horizontal/process view of an organization. Business processes are generally cross-functional; the hand-offs from one activity or function to the next are points where the greatest opportunities lie for performance improvement (Hammer 1995, Rummler 1995). Process improvement seeks to achieve performance gains in the organization by looking at the entire process and bringing the pieces back together (Hammer, 1995). If the individuals who perform a function in Figure 2-2 improve how they perform a piece of the process, modest gains (cycle time, cost) may result in the entire process.

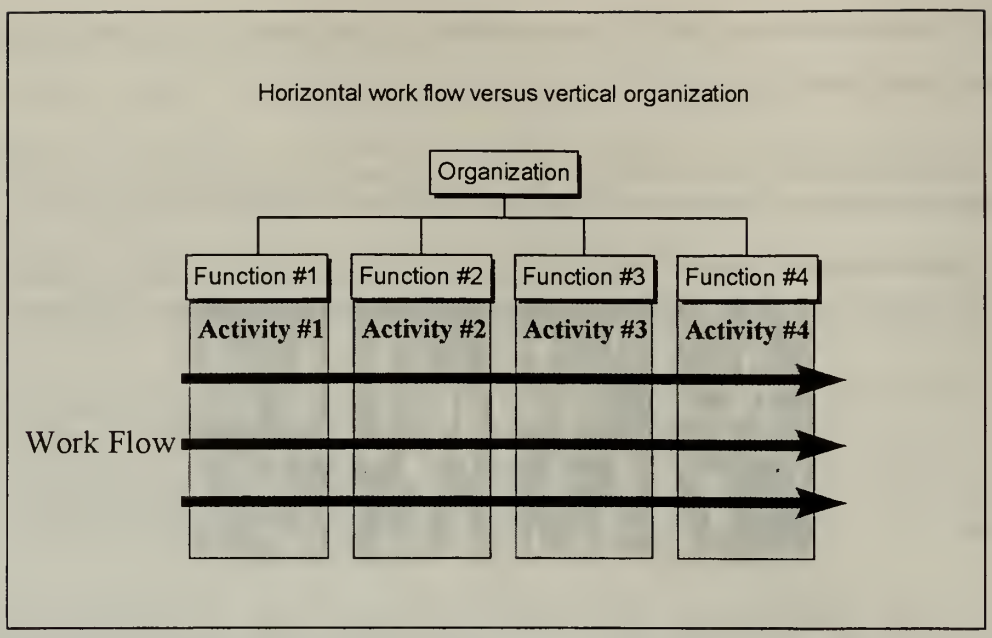

Figure 2-2. Contrasting the process orientation vs. a functional orientation. Adapted from Rummler, 1995.

However, order-of-magnitude gains are possible if *all* functions improve their performance, smooth the *interfaces* between functions, and arrange the entire process in a logical streamlined path. (Rummler 1995, Hammer 1993) The focus on process is a fundamental element of BPR. Whether one is interested in improving the process of acquisition or providing combat-ready forces, the entire process must be examined to attempt to optimize the system.

C. THREE STRATEGIES TO PROCESS IMPROVEMENT

There are many ways to attack any problem and process improvement is no different. Some authors, like Harrington (1991), proclaim the need for continuously improving current processes to achieve gains in efficiency and effectiveness. Others, like Hammer and Champy (1993), exhort that radical changes are necessary to achieve breakthrough order-of-magnitude increases in efficiency and effectiveness.

Three strategies for process improvement have surfaced in the research conducted for this thesis. These strategies differ in their approach and the rate of change prescribed

for process improvement. This section describes the three strategies for process improvement: Continuous Process Improvement (CPI), Business Process Redesign, and Business Process Reengineering.

1. Continuous Process Improvement

CPI grew out of the Total Quality Management (TQM) movement. It seeks to uncover and fix problems occurring in the current process. Self-managed teams are empowered to make task-level improvements in quality, cycle-time, and cost. CPI is usually done within a particular function but may involve cross-functional teams. CPI is continuous; it becomes a philosophy and a way of life, finding problems, identifying the causes, and incrementally modifying the process to fix the problems. A number of well-defined techniques and tools are available for use by practitioners that require a moderate amount of training (e.g., control charts, Pareto diagrams, flow charts, cause and effect diagrams, histograms). Performance gains are incremental, usually 5-10 percent improvements in cost, time, or customer satisfaction. Costs are low because the level of organizational change and level of effort required is low. Risks are avoided because little money is invested in the change effort and the scope of the change is incremental. (Davis 1994, Caudle 1995)

2. Business Process Redesign

Business Process Redesign is usually a project that aims to streamline processes by removing non-value added activities and attempting to integrate tasks in a process. Direction setting and strategic planning focus cross-functional teams on specific improvement objectives. Processes generally remain intact with moderate increases in performance and little to moderate changes in information systems and organizational structures. Additional resources are used and risk is increased, as compared to CPI, due to the level of organizational change involved (e.g., culture, tasks, structure, and roles). (Davis 1994, Caudle 1995)

3. Business Process Reengineering

BPR seeks to radically change processes to dramatically increase performance. Radical is derived from the Latin word "radix" meaning root. Reengineering is about getting to the root of things, not only fixing what is already in place, but also inventing completely new ways of accomplishing work (Hammer & Champy, 1993). Dramatic because BPR is not about 10 percent improvements, but stretching for order-of-magnitude increases in performance. BPR rejects the notion that significant gains in performance and efficiency may be achieved through incremental improvements. Hammer and Champy (1993) define BPR as:

> the fundamental rethinking and radical redesign of business processes to achieve dramatic improvements in critical, contemporary measures of performance, such as cost, quality, service and speed. (Hammer and Champy, 1993, pp.32)

Cross-functional teams, including outsiders (facilitators, customers, consultants), rebuild the entire end-to-end process. The scope of the change effort, the entire process, usually results in a high level of organizational change. Existing organizational technical infrastructures and culture are apt to change as the result of a successful reengineering effort. The project is driven from the top-down using executive leadership and strategic planning to lead the effort. Information technologies are used to enable reengineered processes rather than support existing processes. Simply described, BPR is starting over and rebuilding the process from the ground up. (Davis 1994, Hammer 1993)

Table 2-1 below, compares and contrasts the features of each of the process improvement strategies:

Features	Continuous Process Improvement	Business Process Redesign	Business Process Reengineering
Philosophy	Improve what you do in functional or sub-activity; Accepts status quo -- current processes are what customers need	Accepts current process: Remove "hand off" activities of little value in an end-to-end examination	Focus on critical broken processes: Alter or replace basic approach to doing business in jobs, skills, structures, systems, culture
Timing	Part of a way of life to continuously improve; project results in short time frames	Done on a periodic basis; improvement may take a few months for simple efforts; 1 to 2 years if efforts are more complex	Used selectively; sub-process deployment may take several months; full deployment across an entire complex process may take 2 to 5 years
Scope	Little emphasis on interrelationship of business processes in a business system; internal focus	Coverage of many sub-processes and "turf"; internal focus	Scope is entire process or major sub-processes that cover broad cross-functional areas; includes interfacing outside the organization
Leadership	Broad-based, bottom-up	Both bottom-up and top-down, more senior leadership needed	Management focused, top-down; significant senior management attention and time
Means	Generally, improvement work done by work unit part-time teams; use of quality tools	Improvement work often done by diversified task forces or teams that cross functions	Improvement generally done by dedicated teams representing end-to-end activities; work facilitated by process sponsors and owners
Performance Gains	Incremental: Slightly increases (5-10%) performance	Moderately increases performance	Revolutionary: Greatly increases performance
Costs, Risks, Pain	Low: Resources generally easily handled within existing budgets and personnel allocations; small iterative investments; low-level effort offers few risks; pain of implementation is minimal	Low to moderate: Resources may require shifting funds and personnel or adding more funds and personnel; risks increase somewhat as more activities are involved; implementation pain covers more activities	High: Resources require significant funding and dedicated personnel allocations; large, upfront investments; risks greatly increase given extensive process coverage; implementation pain is high

Table 2-1. Process Improvement Approaches. From Caudle, 1995.

Hammer originally thought that the key word in his definition of BPR was "radical." Meaning that significant improvements in performance were only achieved by

radically changing the process, or starting from scratch (a blank piece of paper). However, he recently recanted (1996) and stated the key word is "process."

Whatever the approach the improvement team intends to take, the key to business improvement is the focus on processes. The distinctions between the three improvement strategies are only a matter of scope and level of organizational change. In practice the distinctions between CPI, redesign, and BPR are blurred. All share the common themes of a process orientation and customer focus. Therefore, it may be best to view process improvement techniques, as presented in Figure 2-3, on a continuum with CPI at one end, BPR on the opposite end, and redesign somewhere in the middle.

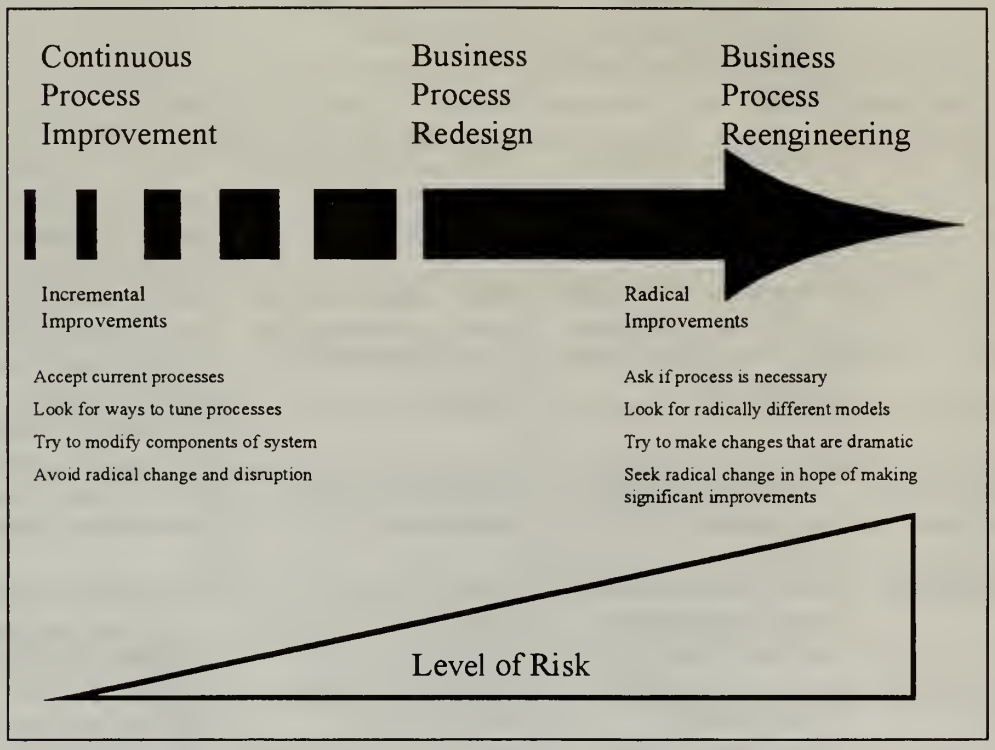

Figure 2-3. The Process Improvement Continuum.
Adapted from Lucus, 1996.

Additionally, the three strategies are not mutually exclusive. It is the combination of BPR and CPI that allows organizations to truly become world class performers. In a process-centered organization, CPI/TQM is not an additional duty, but is the essence of management. Hammer describes TQM and BPR as different pews in the church of

process improvement (Hammer, 1996). TQM assumes the current process is sound and traces the symptoms of problems (broken processes) back to the "root cause" so the underlying cause can addressed. If the environment has significantly changed since the process was put into place, large improvements may be required. This is where BPR is needed. Figure 2-4 shows how TQM and BPR, when used together, allow for continuous and breakthrough improvements.

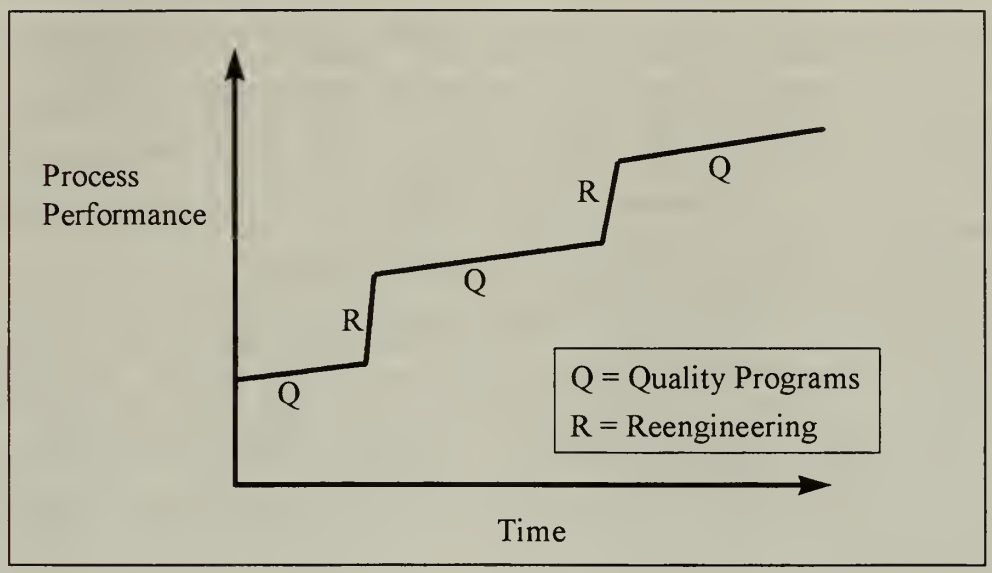

Figure 2-4. CPI and BPR working together. From Hammer, 1996.

D. WHAT BPR IS NOT

Some managers, when introduced to BPR, see it as another business improvement flavor-of-the-month, the management buzzword that will claim to cure all ills and quietly fade away as the next buzzword stakes its claim. In some respects, they are correct and in other ways they are wrong. The term Business Process Reengineering is new, the concepts are not.

The concept behind BPR is an extension of the systems theory, looking at organizations as a system of systems. Systems theorists (Kast and Rosenweig 1972, Optner 1960) and quality consultants (Juran 1974, Deming 1986) have proposed a process view of organizations for years. British and American system theorists, during World War

II, used these same concepts to analyze the complexities of war production and logistics (Hellriegel and Slocum, 1993). In the early 1960's systems theory was applied to organizational management (Optner 1960, Johnson, Kast, and Rosenweig, 1963). Many of the same ideas put forth over 35 years ago sound like the reengineering rhetoric heard today.

What makes BPR new is using the combination of systems theory and modern information technologies to radically change a process. Modern information technologies (e.g., networks, intranets, electronic data interchange, shared relational databases) allow organizations to perform processes in ways that were unthinkable 20 years ago. Hammer and Champy (1993) and Davenport (1993) highlighted and championed the need to change the way business is done in light of emerging technologies.

Some of the confusion that surrounds reengineering might stem from the term reengineering seeming to have become a part of the national lexicon. From satire in Dilbert comic strips, to car commercials that ask potential customers to "reengineer your life" the phase is heard often. The diverse use of the term obfuscates the technical meaning of the term.

BPR is not downsizing or rightsizing. These are actions taken by organizations to adjust to changes in demand (Hammer, 1993). Reengineering addresses the process and asks, "how can we do more, with less?"

BPR is not reorganizing, delayering, or restructuring. These techniques focus primarily on structure, looking to do the same processes, with a smaller structure. This in effect puts the cart before the horse, asking if one needs to alter a process to fit it to the new structure. Or as Hammer and Champy (1993) put it "Overlaying a new organization on top of an old process is pouring sour wine into new bottles." Might the effects of BPR change an organization's structure? Of course, but by designing the new process, before realigning the structure, the horse leads the cart.

BPR is not about eliminating all controls from a process or removing structure and hierarchy from an organization. Bureaucracy busting, as it as sometimes called, also

attacks the problem from the wrong angle. If you do not like bureaucracy try getting along without it. As was mentioned earlier in this chapter, it is the bureaucracy that holds the fragmented process together. BPR pulls the pieces of the process together, thereby allowing for a smaller bureaucracy and a flatter organization. (Hammer & Champy, 1993)

E. HOW IS REENGINEERING DIFFERENT FOR GOVERMENT/DOD?

All organizations are public. Their degree of publicness arises from the extent to which they are governed by public authority whether that be labor laws, environmental laws, anti-trust laws and the like (Bozeman, 1993). No pure "clean slate" approach exists for reengineering in any organization, certainly not within DOD. Reengineering in DOD occurs in a political environment where a clean-sheet approach is seldom available or practical. In addition to the usual notion of customers (i.e., the operating forces) reengineering must also take into account the effects of change on a larger set of customers, commonly called stakeholders. Bryson (1995) defines stakeholders as "any person, group, or organization that can place a claim on an organization's attention, resources, or output or is affected by that output." These stakeholders include legislative and executive interests, the taxpayers, the media, special interest groups, unions, and a host of agencies (within and outside the DOD) that in some way provide resources for, or receive services from the DOD. These stakeholders have the power to influence political support, policy determinations, and funding (Caudle, 1995). Caudle defines reengineering in government:

> Government business process reengineering is a radical improvement approach that critically examines, rethinks, and redesigns mission-delivery processes and sub-processes. In a political environment, it achieves dramatic mission performance gain from multiple customer and stakeholder perspectives. It is a key part of a process management approach that continually evaluates, adjusts, or removes processes or sub-process for optimal performance. (Caudle, 1995, pp. 10)

While BPR in government is similar to the private sector it differs to the extent of autonomy the reengineering team has to change the process while fulfilling stakeholders

interests and mandates. The reengineering team is normally more constrained in executing BPR is the government (Caudle, 1995). The next chapter will take a closer look at direction setting in the public sector and its relation to BPR.

F. INFORMATION TECHNOLOGY AND BPR

Information systems (e.g., hardware, software, telecommunications, and data management) are fundamental elements of most reengineering projects, serving as an essential enabler that allows organizations to do work in radically different ways. However reengineering is not synonymous with automation. Automating outdated processes is analogous to paving cow paths, it further reinforces the "old" way of doing business by embedding processes in silicone. System developers have too often simply automated existing processes without thinking about the need for radical change (Hammer, 1990). "Automation simply provides more efficient ways of doing the wrong kinds of things" (Hammer & Champy, 1993).

> Firms that do develop new applications must do so in a new way. Organizations commonly tailor application packages to fit existing business practice, with the result that most business applications are functionally orientated; marketing systems solve marketing problems, sales systems solve sales problems, manufacturing systems solve manufacturing problems. Such "stovepiped" systems cannot support a process view of the organization; they imprison data within functions, so that new product designs cannot be released to engineering, sales data cannot be transferred to manufacturing, and customers for one product who might be customers for another product cannot be identified. (Davenport, 1993, pp. 44)

Likewise, not all processes require or need automation, the human factor is a consideration in any process. How do you feel when you call a company for customer service and end up moving through a maze of touch-tone options on a Interactive Voice Response (IVR) system? How would you feel if you called that same company and a human voice answered "goodafternoonXYZcompanypleasehold"? Neither of the above examples may be acceptable customer service but serve to demonstrate a point, the lesson being that automation should not be randomly thrown at a process.

1. Information Technology as an Enabler of BPR

Many processes were never designed at all, they just happened. As organizations grew ad hoc processes formed to handle a certain situation. Each exception and abnormality necessitated some sort of Band-Aid® fix to be incorporated into the process. Technology was first seen as a way to support the process, automating tasks and speeding the accomplishment of activities. But as Davenport stated this only served to reinforce the functional stovepipes. Technology is used during reengineering to allow process activities and information flow to happen in ways that have never been possible. After reengineering, new processes are not just automated, but enabled by information technologies. (Hammer, 1990)

Reengineering leverages information technology (IT) to allow organizations to rethink fragmented processes and glue the pieces back together. Instead of asking, "How can we use technology to enhance what we are already doing?" the question is "How can we use technology to do things we are not already doing?" (Hammer and Champy, 1993) Reengineering is about innovation, seeking new ways to accomplish the mission, exploiting the opportunities IT provides. This allows organizations to be innovative and break the rules that limit how they conduct their work.

How does IT enable reengineering? Davenport (1993) declares that IT can aid reengineering in the following ways:

- IT's automation capability can reduce or replace human labor in a process. Within service processes it can automatically route images and text from person to person.
- IT's information capability can be used to capture information about process performance and allows the detailed tracking of tasks, inputs and outputs.
- IT has a sequential capability and can enable changes in the sequence of tasks in a process, often allowing multiple tasks to be worked on simultaneously, reducing cycle times.

- Because of its monitoring and tracking capability, IT can trace outputs to customers or inputs from suppliers, like those used in the transportation and logistic industries.
- IT can bring complex analytical methods and decision-making capabilities to bear in a process.
- IT can make processes independent of geography.
- Through IT, information may be accessed and used remotely by many users, thus integrating split tasks and processes.
- IT can provide an intellectual capability by allowing the capture and dissemination of knowledge and expertise to improve the process.
- IT's disintermediation capabilities can pass information between two parties within a process that would otherwise communicate through an intermediary.

The tools that technology "brings to the table" helps to alter fragmented processes and bring them together, thereby enabling reengineering. Technology is an enabler, not a driver, of reengineering.

2. BPR and the Role of the Information Systems Staff

Successful reengineering projects must strike a balance between reliance on Information Systems (IS) personnel and general management. IS staff have the skills to identify the applicable technologies, design, implement, and manage the technical areas of reengineering. Because of the important role of IS in reengineering, the IS staff must be considered partners in the reengineering effort. Their involvement on the cross-functional teams, early in the effort, highlights the importance of IT and allows the IS staff to preview the proposals (i.e., a sanity check) for implementation hazards. The IS role must move from "order taker" and "system mechanics" to one of a partner in leadership (Martinez, 1995).

Hammer admits that 50 to 70 percent of reengineering efforts fail to deliver the intended dramatic results (Hammer, 1993). Martinez (1995) states that more often than not this failure "can be attributed to the companies failure to engage IS as a true partner in

reengineering." However, IS should not take the lead for the overall effort, the obvious benefits of managers leading reengineering initiatives are that responsibility and accountability for the new process are placed "on those most knowledgeable about operations and most affected by the impending change" (Martinez, 1995).

Throughout the effort, IS should be assessing current capabilities, redefining its role and mission, developing strategies and architectures, developing a master plan, and taking leadership roles where applicable (e.g., application of technology to the process). Project managers must pay careful attention to ensure that IS is involved and has developed plans harmoniously with the rest of the effort for smooth integration during project implementation.

G. TAILORING YOUR APPROACH TO PROCESS IMPROVEMENT

The appendix presents three methods, or specific step-by-step procedures, for conducting process improvement. What is the "best" way? Unfortunately, there is no approach that may be used by all organizations, public or private. The development of a model is situationally dependent. Successful organizations will tailor their improvement models to the breath and depth of the change needed within sub-processes and across a process (Caudle, 1995). Successful managers continue to use multiple improvement techniques (quality teams, unit costing, technology-based methods, etc.) to leverage those tools and techniques in order to afford different insights to organizational improvement (Euske and Player, 1996). The inclusion of parts of the models presented in the appendix along with the generic model proposed within this thesis should allow process managers to sufficiently tailor their approach.

H. HOW THIS DOCUMENT WILL APPROACH PROCESS IMPROVEMENT

There is a commonality between all the process improvement methods researched. All methods include project definition and planning, an examination of the old process, the modification or reengineering of the process, and project implementation that takes the

strains of organizational change into account. These commonalties are addressed in this thesis:

> The details of a specific method or approach to process innovation may vary, but the inclusion of several key activities is critical to the success of any initiative. These include selecting processes for redesign, giving structured consideration to enablers of innovation, creating a vision, understanding the existing process, and designing the new process and organization in detail. (Davenport, 1993, pp. 300)

This document provides instruction into each of these phases in order to act as primer for your improvement efforts. The remainder of this document will follow a rather generic process improvement model shown below:

The phases addressed in this model are:

Phase I: Direction Setting - Ensuring the improvement effort is properly aligned with the organization's vision and goals.

Phase II: Development of the BPR plan/timelines and team - Setting up the team and planning for BPR.

Phase III: Analyzing the existing process - Ways to view and examine the current process for improvement opportunities.

Phase IV: Designing the new process - How to simulate creativity and rules-of-thumb for designing the new process.

Phase V: Implementation - Ensuring the project is properly implemented into the organization.

Phase VI: Environmental Enablers and Inhibitors - This is not so much a phase, as it is the considerations of how people affect the reengineering process and what must be done to take account of the impact.

This model provides the barebones of any improvement process. It is readily applicable to smaller organizations and may be tailored to their specific application.

I. RECOMMENDED READINGS

The following readings provide greater detail into topics covered in this chapter:

The Electronic College of Process Innovation (ECPI): Achieving Breakthrough Improvement is a CD-ROM available through Defense Technical Information Center (DTIC). The ECPI is a knowledge-warehouse about BPR covering numerous topics related to BPR, total quality management, acquisition reform, and change management. It contains textbooks, guidebooks, and training course materials. It is a handy reference for anyone considering BPR within the DOD. Copies may be ordered by calling DTIC at DSN: 427-8274 or 1-800-225-3842.

Framework for Managing Process Improvement by Robert J. Davis is the authoritative reference guide for DOD process improvement. It is available in electronic form on the ECPI CD-ROM or hard copy through DTIC.

Reengineering the Corporation by Michael Hammer is recommended for learning the core of reengineering from an executive standpoint, without being cluttered with a methodology.

III. ORGANIZING FOR BPR

Before rolling up the sleeves and reengineering the organization's business processes, some key decisions need to be made.

- Do you require the help of consultants? What can they do for you?
- Will the reengineered process contribute to the organization's goals and objectives? Why is the process done at all? Is it congruent with the organization's strategic direction?
- Who is needed for a successful reengineering project? What will they do?
- Which processes should be reengineered? Is the process really broken?

This chapter provides guidance to help the reader work through these questions and properly prepare for a successful reengineering project. The first section discusses the benefits and problems of using outside consultants to aid the organization throughout reengineering. Next, direction setting is introduced, ensuring reengineering is aligned with the organization's vision and goals. Lastly, the composition and roles of the team that will lead and do the work of reengineering are considered.

A. CONSULTANTS

Consulting is big business, and due to the recent interest in reengineering it is getting bigger. By some estimates consulting for reengineering projects now provides approximately 20 percent of the revenue for the consulting industry, or anywhere from $1.4 to $2.6 billion a year. Why do organizations feel the need to hire consultants for the reengineering project? Reengineering is not something that organizations do on a routine basis, or have ever done for that matter. The idea of taking on such a risky undertaking can be daunting. It is because of these reasons that organizations have sought help with their efforts, namely in the form of consultants. (Hammer, 1995)

1. What Can Consultants Do?

According to Hammer (1995) consultants can aid in the reengineering effort in three ways: head, heart and hands.

a. The Head

Consultants can bring experience and knowledge to the project (the head). Many of the tools used during reengineering are complex and require training for the application of these techniques. For example, Benchmarking, IDEF0, and Activity Based Costing (ABC) are all disciplines in their own right. The use of either external or internal consultants can aid the reengineering team in the application of these tools. This allows the team to focus on their primary goal of redesigning the process and not on learning the intricacies of the tools.

Consultants bring specialized skills, experience, and know-how that the organization may need but cannot afford the cost or time to develop internally (Shabana, 1995). Some consultants have the ability to transfer their knowledge from reengineering other organizations. Using the lessons learned at other organizations they may know how to steer efforts around expensive or time-consuming pitfalls.

b. The Heart

Consultants can also provide the "heart." In the tough times throughout the project the consultant may be able to motivate and enthuse the team. By acting as facilitators they are in a position to mediate the conflicts that are likely to occur during reengineering. Their dedication to the effort may be contagious as they counsel leaders, participate in communication efforts, support the teams, and help "navigate the rapids of transition." (Hammer, 1995)

c. The Hands

Consultants may lend extra sets of hands to the project. What if the organization does not have the available manpower to devote to the effort? Reengineering

is time consuming work, even the simple projects may take months, and larger projects may involve years. If the organization does not have slack resources (man-hours) who will do the detailed work of reengineering? Consultants can lend a hand to help develop the models, run the numbers, and complete the documentation.

2. The Pro's and Con's of Consultants

Outsiders provide a fresh set of eyes, unbiased by the present organizational culture. They sometimes provide another perspective in the analysis of the old process and in the design of new or reengineered process. Organizational insiders may have turf to protect, or may believe the present process works fine the way it is (Interview, Haga). Outsiders, or consultants, may find it easier to say the emperor has no clothes. Larger consulting firms can provide assistance by helping to develop the software and databases that might be required to implement the project. Few organizations have the skills and experience to implement change throughout the organization, a good consulting firm brings this kind of experience with them. (Hammer, 1995)

Consultants however, can be a double-edged sword. Depending entirely on consultants to lead the effort is dangerous. It is your organization that will live with the results of the effort long after the consultants have collected their fees and gone home. By not actively involving the organization's own personnel, a golden opportunity to develop the necessary talent in-house is missed. Additionally, by not involving the organization's personnel in conjunction with the consultants' work little monitoring may be done to ensure the consultants are doing a proper job. For instance, one Chicago bank hired a firm and allowed the consultants to position themselves as the leaders and owners of the entire project. When the bank discovered the consulting firm was using its control over the information to hide problems, it was too late, six months of plans had to be scrapped, and the bank was forced to start over. The use of consultants will depend on the organization's experience with process improvement and the amount of time available to devote to the effort. Summarized below are the pros and cons of using consultants (adapted from Hammer, 1995):.

- Pro-The ability to leverage other companies' experiences
- Pro-Getting access to essential skills
- Pro-Third-party objectivity
- Con-The risk of outsourcing an important capability
- Con-Incurring significant expense
- Con-Diffuse accountability
- Con-Risk of expecting the consultants to have all the answers
- Con-Risk of having the consultants' biases influencing organizational decisions

Not all companies use consultants. Texas Instruments and Harley Davidson both have chosen not to use consultants during reengineering (Barrett, 1996). Instead teams at the corporate level are available for use by the divisions during process innovation. The advantages of internalizing the change function is the clout associated with recommendations generated from within the organization, thereby avoiding the "not-invented-here" syndrome (Barrett, 1996). Also while it is certainly possible for consultants to diagram processes and functions, their diagrams may ignore the political and organizational forces that have shaped existing processes (Shabana, 1995). These forces are a necessary consideration throughout the project and may not be recognized by the consultants.

Furthermore, at least one study (Shabana, 1995) shows that the "level of consultant's interventions had little influence over the success of the BPR project in both the outcomes and implementation dimensions." He credits this to the "wide fluctuation in the quality of services currently offered by consulting firms" and the trap that some organizations fall into "expecting consulting firms to reengineer their processes with little or no contribution on their part" (Bashein, 1994). As is further explained in Chapter 6,

the outcome of the project is ultimately dependent on the organization's commitment to the project (Shabana, 1995).

B. PHASE I: DIRECTION SETTING

This section is titled direction setting rather than the broader term strategic planning in order to properly place this exercise in the context of a small organization operating in a much larger bureaucracy, the primary audience of this report. Additionally, the term strategic planning seems to downplay the significance of action. Plans never executed, or executed poorly, are useless. For these reasons the author has elected to use the phrase "direction setting."

Direction stetting connotes an azimuth for action, the direction to which the organization will strive for throughout the reengineering effort. If one is in charge of an organization fulfilling a particular need of a much larger organization (DOD) the specific overarching strategies may not be relevant or applicable to the tactical level execution of the organization. Below the business unit or functional area strategic planning is generally not required (Davis, 1994). This, however, does not eliminate the need for these smaller organizations to think through why they exist, and whom they exist for.

Every organization is created for a purpose. In the early years the mission and the specific goals and objectives are likely to be clear. As the organization matures, becomes more complex, and routine sets in, the specific mission and the communication of changes in direction grows increasingly complex and difficult (Simons, 1995). Only after identifying its reason for being can an organization begin the reengineering process. What good is reengineering a process, and making it more efficient, if it is not properly aligned with the vision and objectives of the larger organization? Until the organization asks what it should be doing, the question of how best to do it is moot. The time and resources spent on reengineering may be wasted if leadership has not defined the strategic direction. (GAO/AIMD-10.1.15, Davenport 1993) Figure 3-2 shows how mission is a critical

consideration in defining work processes, and it is from the mission that all other elements in the process flow.

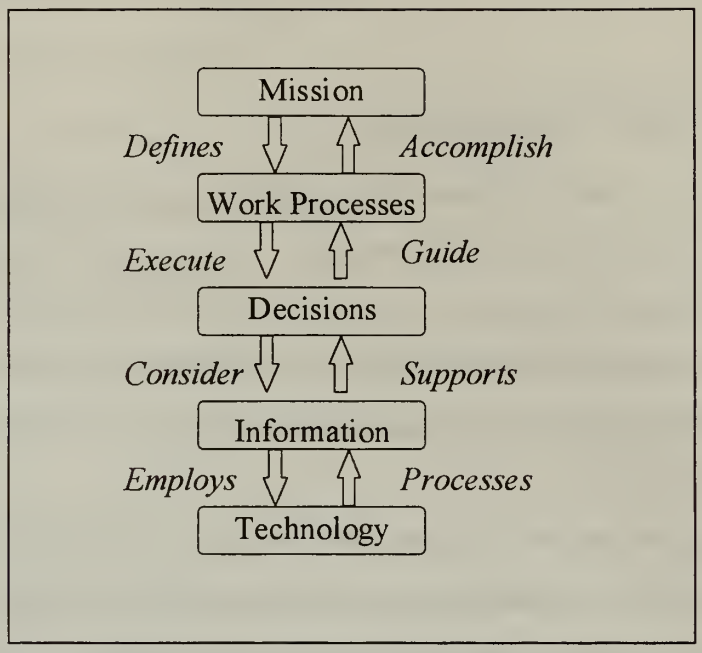

Figure 3-1. Relationship between Mission and Work Processes to Information Technology. From GAO/AMID-10.1.15.

Direction setting is looking back to the organization's mission, seeing if the mission is still applicable and relevant, to ensure the reengineered process is properly aligned with the organization's mandates and mission.

> Measuring how well the agency's core business processes perform in terms of cost, quality, and timeliness in serving customers helps the agency prioritize areas for improvement, decide whether reengineering is in order, and make a compelling argument for investing time and resources in redesigning a process to achieve better results. (GAO/AMID-10.1.15, 1997, pp. 14)

The results of the this phase are a clear organization mission, an appreciation of who the key customers or stakeholders are, how to meet their expectations, and metrics to define success. With this information the reengineering team can set out with specific goals and not waste time determining what their objectives should be. (Davis, 1994)

1. Identifying Organizational Mandates

Before reengineering any applicable mission statements, legislation, and policy documents should be reviewed by leadership to ascertain what, in fact, the organization must do. In this context, mandates are the requirements of the organization as a whole. The military is full of mandates in the form of Standard Operating Procedures (SOPs) but the idea here is to review the relevant policy documents that lay out why the organization exists, its mission, and what it is required to do. Bryson (1995) has found that unless organizational mandates are clear and well known, organizations will likely make one or all of the following mistakes:

- By not knowing what they are supposed to do, they are not likely to do it.
- They may believe they are more constrained in their actions then they actually are.
- They may believe that unless specifically ordered to do something, they are not allowed to do it.

The outcomes of this review are the identification of formal and informal mandates, the requirements of these mandates (possibly leading to goals and/or performance indicators), and an understanding of what actions are specifically off-limits. By reviewing the mandates the organization revisits the sphere of the organization's possible actions and may continue with the direction setting process having a better understanding of what it is "formally and informally *required* to do (and not do) by external authorities". (Bryson, 1995)

2. Customer and Stakeholder Analysis

Reengineering should be focused on the customer. Before reengineering, the organization should have an understanding of who its customers are, and their needs and expectations. This information will be used to guide the reengineering effort and set goals for cost, quality, and cycle-time for the organization's outputs (products, information).

In addition to customers, there exists another set of people/organizations who have the ability to influence the organization or that are affected by the actions and strategies the organization pursues. These other groups, outside the immediate boundaries of the organization, are known as stakeholders. Stakeholders may include, suppliers, regulatory groups, inspectors, higher headquarters, and subordinate units. Stakeholders can play an important role in reengineering through their ability to influence the process. What are their expectations? What is the gap between current performance and their expectations? This defines the measures the reengineering team will consider in order to bridge that gap.

> If an organization does not know who its stakeholders are, what criteria they [stakeholders] use to judge the organization, and how the organization is performing against those criteria, there is little likelihood that the organization will know what it should do to satisfy its key stakeholders. (Bryson, 1995, pp. 70)

Stakeholder and customer input, gathered throughout reengineering, or even their involvement on the reengineering team are keys to success and will help to shape the mission and guide the reengineering effort.

3. Clarifying Mission

> If you do not know where you're heading, you're likely to end up somewhere else.
> --Yogi Berra

Typically missions for organizations operating within the DOD are subsets of the larger mission. DOD's largest mission, "provide for the common defense," is not likely to provide much guidance in terms of direction for process innovation. Reviewing the mission defines why the organization exists, its organizational purpose, and how this contributes to the larger organization's purpose. Mission development is a leadership issue, it sets the course and direction of the entire organization and the reengineering initiative.

Clarifying mission involves looking at the critical factors that define success for the organization, reaching a consensus on what it is to accomplish for whom, and by when

(GAO/AMID-10.1.15). Bryson (1995) presents six questions that serve to help organizations clarify their mission:

- *Who are we?* Separate what the organization is, from what it does. Organizations are a means to an end, not an end in themselves. What is the identity of the organization? What does it mean to say you are who you are? For instance, in the early parts of the 20th century the railroad companies saw themselves as railroad companies and not as transportation companies that happened to be in the railroad business. The result of this definition of themselves was an inability to recognize the rise of new competitors like the automobile and trucking industries.

- *In general, what are the basic needs we exist to meet, or what are the basic social or political problems we exist to address?*

- *In general, what do we do to recognize, anticipate, and respond to these needs or problems?* The more that the people in the organization as a whole attend to external needs and problems, the more likely it will be that a climate conducive to innovation will prevail, and the easier it will be to justify desirable innovations to internal audiences.

- *How should we respond to our key stakeholders?*

- *What are our philosophy, values, and culture?* Only strategies that are congruent with the philosophy, core values, and culture are likely to succeed.

- *What makes us distinctive or unique?*

By clarifying mission, process improvement is given meaning and direction in the context of the entire organization.

4. Vision of Success

The vision of success, or vision statement, is the vision of what the organization wants to be, the end-state, the commander's intent. It is the picture of what the organization should strive for, the vision of success. Vision helps to inspire the reengineering effort by describing the organization's future when innovation plans are successfully implemented and adopted by the organization. Vision provides a basis for policy and decision making. It lays out the values, ethics, and morals that describe how

the organization will move towards the vision. It defines the boundaries that will not be crossed in pursuit of its mission.

5. Goals, Objectives and Performance Criteria

> Without measurement, you cannot control it. If you cannot control it, you cannot manage it. If you cannot manage it, you cannot improve it. - H. J. Harrington.

Goals are refinements to the vision. They identify how well the organization will strive to perform. Goals support and quantify the mission and vision. Clausewitz stressed the importance of goals and objectives for military operations, and goals are no less important for reengineering military organizations.

Goals for reengineering should be ambitious stretch goals, for instance, over 50 percent improvement (Davenport 1993, Hammer 1993). Reengineering is not about improvements of five or ten percent, it is about breakthroughs and quantum leaps in performance (Caudle, 1995). Stretch goals motivate reengineering, set the goals small and the reengineering team will likely deliver small results, incremental improvements. Set aggressive, bold goals and the reengineering team will be forced to think creatively and strive to develop new ways to conquer the problems.

How should the process performance goals be established and measured? Two ways: customer involvement and benchmarking. Successful reengineering projects identify their stakeholders, internal and external customers, and what their performance expectations are. Goals are established that direct the organization to meet or exceed these expectations.

> Successful organizations communicate extensively with their customers and stakeholders. They ask what the performance problems are and how well the organization is doing to meet their performance expectations. They ask what business processes should deliver as final products and services, what performance levels should be, and what suggestions customers and stakeholders have about factors that might enable improvement (Caudle, 1995, pp. 22)

Another way to determine process goals is through benchmarking. Benchmarking involves comparing the process being reengineered with a similar process within the organization, or a similar process in an outside organization that does a first-class job. The purpose is to find out who does this particular job the best. Benchmarking is discussed in detail in Chapter IV.

Each goal should contain as least three elements: what, by how much, and by when. For instance:

- Reduce development cycle time by 50 percent in three years
- Double customer service satisfaction levels in two years
- Reduce processing costs for customer orders by 60 percent over three years

Measures must be developed that are affordable to collect, readily available or easy to determine. They should be understandable and relevant to the workers performing the process, and measure what the organization desires to achieve (mission and vision). For instance, in the former Soviet Union, management at sheet glass manufacturing facilities was rewarded on the basis of tons of glass produced. The result was poor quality glass that was thick and heavy. The measures were then changed to square-foot of glass produced, and the predictable results were thin glass that was no more usable than before (Euske, 1984). An effective performance measurement system should fulfill the following criteria (From Defense Enterprise Planning and Management, 1996):

- **Validity**: It must measure what it sets out to measure.
- **Reliability**: On re-assessment of the same things, under the same/similar conditions, it must produce the same/similar data or information.
- **Utility**: The performance measure captures the kind of information needed.
- **Strategic Focus**: It is aligned with the higher organization's vision and goals.

- **Systematically Optimized**: To improve performance and horizontal, as well as vertical reporting. Measure quality of output (effectiveness) as opposed to focusing only on efficiency (cost of production).

- **Integrated**: Evaluates cost, quality, etc.

- **Understandable and Useful**: Easy to use (so it gets used) and has an assigned owner.

- **Selective**: Includes a reasonable number of measures critical to success. Provides assessment of things that provide a balanced perspective of performance. It is easy to get "data/information overload", which hinders effective analysis and use of performance measurement results. Use common sense.

- **Relevant and Appropriate**: For the intended audience and organizational setting.

- **Cost-effective**: Available at a reasonable cost. The cost of data collection and analysis must not be excessive. Purchasing expensive hardware (e.g., computers) to gather data that is of marginal use is not cost-effective. Even if the data is very useful, the cost may still be excessive.

Performance targets define and measure progress toward meeting goals and objectives. They provide gates and check-marks to meet during an improvement effort, a way to monitor and measure the success of process improvements. For instance, if an organizational goal is to double customer service satisfaction levels in three years, a performance target might be to improve customer service levels by 50 percent in the first six months, another 30 percent by the end of the first year. Performance targets provide a linkage between mission and action.[1]

At least four categories of measures can be developed for each goal or performance target. Consider developing process measures that describe fitness for

[1] The Defense Technical Information Center (DTIC) can provide software support for tracking goals and performance targets. TurboBPR uses graphical and spreadsheet formats for periodically tracking process performance targets and actual performance.

purpose, conformance to standard, process time, and process costs as described below (Davis, 1994):

- Fitness-for-purpose provides a means of measuring the effectiveness of a process or product with respect to stakeholder interests.
- Conformance-to-standard provides a means of measuring the quality aspects of a process or product.
- Process time measures quantify the response and cycle time characteristics of a process.
- Process cost measures weigh the efficiency and productivity characteristics of a process.

These measures may be developed for any of the stakeholders identified during the customer/stakeholder analysis. How and for whom, they are identified for is dependent on the needs of leadership with respect to the particular organization, process, or product.

6. Strategies

Strategies are the plans, policies, programs, and decisions that will enable the organization to meet performance targets, goals and objectives, and ultimately the organization's vision (Bryson, 1995). Strategies are the bridge between specific actions, the vision, and process reengineering.

Bryson (1995) presents a five-step process for strategy development:

1. What are the practical alternatives, dreams, or visions we might pursue to achieve this goal, address this strategic issue, or realize this scenario?

2. What are the barriers to the realization of these alternatives, dreams, or visions?

3. What major proposals might we pursue to achieve these alternatives, dreams, or visions directly or to overcome the barriers to their realization?

4. What major actions must be taken within the next year (or two) to implement the major proposals?

5. What specific steps must be taken within the next six months to implement the major proposals, and who is responsible?

Strategies take into account the opportunities and threats of the external environment, the strengths and weaknesses of the organization, and the mission to develop plans that will allow the achievement of the organization's performance targets and goals.

C. PHASE II: DEVELOP THE REENGINEERING PLAN

Reengineering is often underestimated in the amount of time and people required to pull off such an enormous task (Hammer, 1995). Embarking on an improvement process will ultimately involve most, if not all, of the organization (Hammer, 1995). This section first presents the duties of key people throughout the organization that will have an important role throughout reengineering. Next, the symptoms of broken processes and the selection of which processes to reengineer first are offered.

1. The Roles in BPR

Reengineering is not a one person show. As the process owner you might already be familiar with some of the many roles of people engaged in the process. This section will discuss the roles of the people that should be involved in the process. Figure 3-2 graphically illustrates the members discussed in the following sections. The names change between different authors but the overall structure remains much the same.

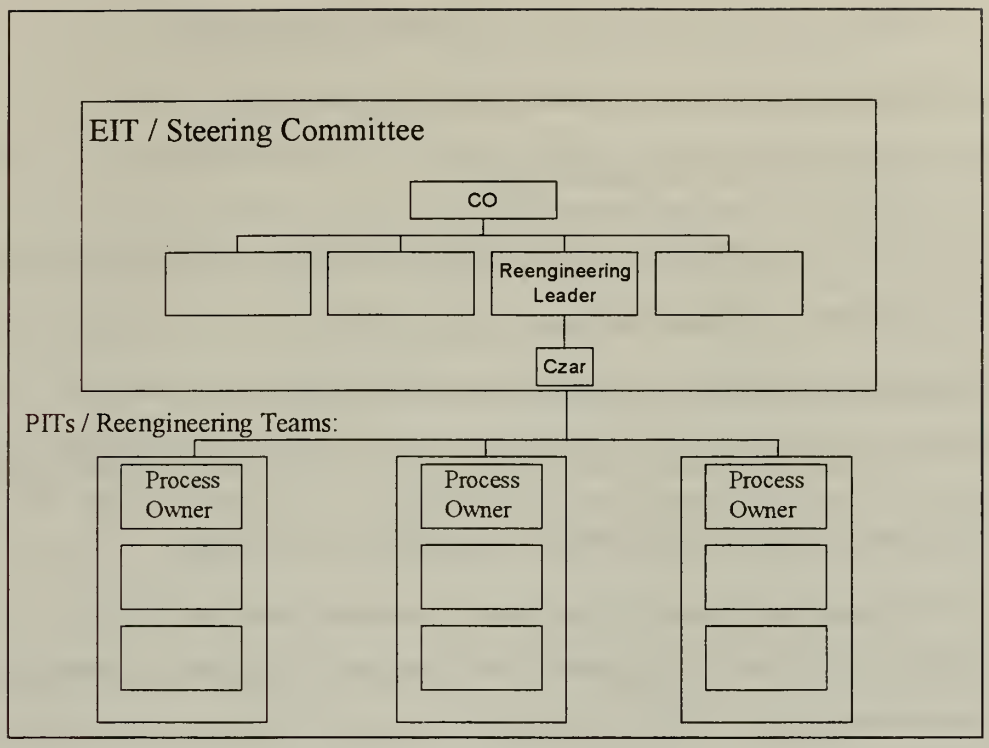

Figure 3-2. The Roles in BPR.
Adapted from Harrington, 1991.

a. Executive Improvement Team (EIT)

Also called the steering committee, this is the group of senior executives that provide overall guidance to reengineering efforts. The EIT is usually comprised of the leader/Commanding Officer and the heads of the functional departments within the organization. The EIT does not do the work of reengineering but should lead, support, decide priorities, and approve new processes and organizations as they are formed (Currid, 1994).

These members must be willing to shed their traditional roles, have a desire to positively change their organizations, and avoid falling into a "protecting their turf" mentality. The EIT is normally organized and coordinated by the reengineering leader. The primary duties of the EIT are (Adapted from Harrington 1991 and Hammer & Champy 1993):

- Communicating the need for change to the entire organization

- Releasing required supporting documentation (i.e., directives)
- Identifying problem processes in need of improvement
- Assigning business process owners
- Identifying resources for the reengineering effort (i.e., manpower, money)
- Registering process improvement teams (PITs)
- Defining business strategy and customer requirements
- Following up to ensure that process improvement is an organizational priority
- Resolving conflicts that cannot be handled at lower levels
- Providing rewards and recognition to members of successful PITs

Within the EIT some roles of key players usually emerge, namely the reengineering leader and the reengineering czar. They may be either appointed as such or may naturally be self appointed.

b. Reengineering Leader

Sometimes called the reengineering champion, the reengineering leader is the most important job for successful reengineering. This is the executive whose leadership and enthusiasm keeps the effort moving. The leader's job is to develop and customize the entire effort (Harrington, 1991). He acts as a visionary and motivator. He must have the clout to cause an organization to not just accept the changes reengineering brings, but to relish it. The leader understands that if the organization is not changing in response to the external environment or its own internal capabilities, it is not as effective as it should be. He must be "seized by a passion to reinvent" the organization. Absent a strong leader, the effort will likely fizzle. Some studies may get done, but the organization will probably not be able to implement the changes (Hammer & Champy, 1993).

The leader helps process owners by breaking through obstacles and ensuring an environment of change is felt throughout the organization.

c. Reengineering Czar

Since the leader of the reengineering project is usually one of the senior members of the organization he may be tied up with the day-to-day tasks of running the organization. When this happens another role sometimes appears, the reengineering czar or champion. The czar is the leader's chief-of-staff for the reengineering project and is the first person the process owner calls for guidance and direction. She has two main functions: "one, enabling and supporting each individual process owner and reengineering team; and, two, coordinating all ongoing reengineering activities" (Hammer and Champy, 1993). She must be trained in, or familiar with, reengineering concepts and tools, and able to focus her energies on reengineering. This may be a full-time job for larger activities, or a part-time job for smaller activities so long as her other duties are retailored accordingly. The czar's job is to (Adapted from Harrington 1991 and Hammer & Champy 1993):

- Customize the process improvement effort to the business and sell the approach throughout the organization
- Develop, in conjunction with the EIT, procedures that define how reengineering will be implemented within the organization
- Serve as the EIT's eyes and ears
- Prepare the job descriptions for the process owners and the PITs
- Review and monitor the progress of the PITs
- Provide guidance and direction to the PITs
- Aid in the selection of process owners and reengineering team, and selection of processes to reengineer
- Ensure the coordination between reengineering teams, mediate and resolve disputes between reengineering teams
- Developing lesson's learned and other documentation for use during future reengineering efforts

d. The Process Owner

The process owner is the person who is responsible for the operating efficiency and effectiveness of the entire process. During reengineering there may be one or many processes being reengineered. Within each process a process owner is identified for advocacy and oversight of the process. He is familiar with the entire process. The success and failure of the reengineered process is on the shoulders of the process owner and the reengineering team. He is expected to take actions to ensure the entire process, from start to finish, is improved. By ensuring the proper resources (manpower and money) are available to the process owners they may focus entirely on the improvement of that process.

The process owner is given the perspective of looking through the whole process, not just a slice of it. He must focus his efforts and resources where the greatest need for improvement lies, whether that is within a certain function, or the hand-offs between functions (the white space on the organizational chart). His job

> is comparable to a program manager. A program manager usually has very specific goals (i.e., to deliver a new product by a certain date, in conformance with customer requirements). The business process owner's goal is to improve the assigned process to the point at which it reaches best-of-breed status and to keep it at that level. (Harrington, 1991)

Appointed by the EIT or management, the process owner's responsibilities during reengineering are to (Adapted from Harrington, 1991):

- Act as the representative for all functional managers
- Ensure that the overall goals of the process are met and that the improvements made within the process do not negatively affect other processes or other parts of the organization (sub-optimization)
- Define the preliminary boundaries and scope of the process
- Form a Process Improvement Team (PIT)
- Ensure the PIT is educated or trained in the tools of reengineering and its principles

- Organize the PITs activities by: planning, preparing, and conducting meetings, following up on PIT activities, and resolving or escalating differences between PIT members
- Safeguard the integrity of measurement data
- Identify critical success factors and key dependencies of the process
- Define sub-processes and their owners (usually line managers)
- Identify and implement process changes required to meet business and customer needs
- Maintain contact with the czar and EIT regarding: the PITs progress, resource requirements, automation and mechanization issues
- Establish the appropriate mechanisms for continuously updating procedures and improving the effectiveness and efficiency of the overall process
- Maintain contact with the customers of the process to ensure that their expectations are understood and met
- Keep the PIT informed about changes that may effect the process

Who should be the process owner? The process owner selected should be a person who is concerned and involved in the present process, has the power and clout to influence changes in policies and procedures affecting the process, has developed strong leadership and group skills, is confident and persistent, and is familiar with the workings of the entire process. It is up to the process owner to organize and facilitate the reengineering team throughout the process, a challenging and daunting task, but one that might be very satisfying to the right individual.

e. The Process Improvement Team

The Process Improvement Team or reengineering team is where the actual work of reengineering gets done. This group, along with the process owner, will take action on a specific process, analyze the old system, redesign or reengineer the new system, and plan out the details of implementation. The PIT is a small group (about 5 to

10 people) of insiders who represent the various functions being reengineered and outsiders of the current process.

Insiders know the existing process well, or at least their functional part of it. They have worked within the process and understand the process "flow." Their intimate knowledge of the process is both an asset and a liability of the team. They are quickly able to point out deficiencies and the causes of the problems in the current system. However, because of the time they have spent with the old system they may find it harder to design new ways of performing the process.

> Insiders...are incapable of reengineering a process. Their individual perspectives may be too narrow, confined to just one part of the process. Further, insiders can hold a vested interest in the existing process and the organization designed to support it. It would be asking too much to expect them, unaided, to overcome their cognitive and institutional biases and to envision radically new ways of working. (Hammer and Champy, 1993).

Therefore the best insiders to have on the PIT are the "mavericks" that are smart enough to understand the old system, open enough to critique and support the reengineered process, and credible enough to muster the support of their functional counterparts. Ideally, the persons assigned from the functional areas are the "best and brightest" (Hammer and Champy, 1993).

Due to the aforementioned reasons, insiders alone may have a tough time reengineering the process alone. This is where the fresh blood of the outsiders is so valuable. Outsiders objectivity and naiveté may be little use during the analysis phase, but will stimulate new ways of approaching the problem when it comes time to redesign or reengineer the new process (Hammer and Champy, 1993).

A ratio of two or three insiders to each outsider seems to be the rule (Hammer and Champy, 1993). The outsiders may come from outside the organization (consultants), or from within the organization but outside the process. Representatives from the suppliers, customers, or stakeholders of the process can bring their priorities and recommendations to bear on the new process and are therefore important members of the

team. Outsiders must be big-picture thinkers, who can quickly get up-to-speed about the process, and bold enough to voice their opinions. The mixture of insiders and outsiders, and the contention that may result, must be carefully managed by the process owner.

Outsiders in the form of personnel from IS should be engaged in the PIT from the beginning. As discussed in the last chapter they have the capability to introduce applications for IT in the new process.

The team members' responsibilities are to (Adapted from Harrington, 1991):

- Participate in all PIT activities (e.g., train in BPR techniques, attend meetings)
- Conduct BPR activities in his or her department as required by the PIT (e.g., obtain "local" documentation, develop a flowchart of the department's participation in the process, verify application of the participation in the process, verify application of the process, measure efficiency, and help implement department changes)
- Participate in the design of the new process
- Implement changes in the process as they apply to his or her department (e.g., supervise production of new documentation, organize training, and perform follow-up work)
- Chair sub-process teams as appropriate
- Support change (e.g., inform, encourage, provide feedback, and listen to complaints)
- Train and involve other department members as appropriate
- Solve process-related problems
- Provide his or her department with a better understanding of how it fits in the total process.

2. Finding the Processes to Fix

Processes, not functions or organizations, are reengineered. The process owner has likely been assigned a specific process to examine. However, the EIT should have used some sort of method to choose which processes require attention. This section briefly describes how a process should be chosen for reengineering. More importantly, the section illustrates some of the attributes of broken processes. This is useful for the process owner to gauge the extent to which his/her process requires improvement.

a. Identify the Major Business Processes

All businesses use processes, these are how the work gets done. The identification of macro-level processes is not always easy or intuitive. However, leadership will need to conclude what the organization's processes are in order to facilitate communication during the reengineering effort and to provide a context for understanding sub-processes.

Texas Instrument's (TI) semiconductor division does about $4 billion of business annually. When TI embarked on reengineering they were surprised at how few macro-level processes operate within their organization. TI identified six processes: strategy development, product development, customer design and support, manufacturing capability, customer communications, and order fulfillment. Few organizations operate more than ten principle processes. (Hammer & Champy, 1993)

Within the Marine Corps, the MCCPIP identified five principle processes at work: command, acquire assets, provide capabilities, sustain readiness, and provide for force operations (MCPIP Force Structure Process Reference Book, 1995). Each of these processes could be broken down into multiple levels of sub-processes. However, the identification of these macro-processes allows for a common vocabulary and perspective during reengineering. The process assigned to the process owner is likely a sub-process of some larger macro-process. In these cases the process must be taken in context of the larger goals of organization.

b. Selection of Processes for Improvement

Once the organization's processes have been identified the question then becomes which processes to reengineer first. If reengineering is new to the organization, the processes that have a strong impact on the organization, that are truly broken, and that have the greatest potential for successful change should be tackled first. Reach for the low hanging fruit first. Part D of this section may help in the identification of broken processes.

The GAO (GAO/AMID-10.1.15) provides the following guidelines to help organization determine which processes to reengineer first:

- Processes with the strongest link to organizational mandate and mission, and the highest impact on customers
- Processes with the biggest potential return on the resources invested in improving them (e.g., processes that cut across several functional units where opportunities to reduce hand-offs, reviews, cycle time, and costs may be greatest)
- Processes where change management issues can be more easily resolved because there is strong consensus among the organization, stakeholders, and customers on the need for change
- Processes that can be redesigned with currently available resources and infrastructure
- Less complex processes where improvement goals can be achieved within a short period of time and experience can be gained in reengineering

c. Identify Process Boundaries

Before the Process Owner can begin to reengineer, the process boundaries must be established. These boundaries will identify where the process begins, ends, and the level of detail included in the process. Identifying the boundaries includes determining the potential involvement of functional units in the improvement process. Davenport (1993) presents five questions to help define the process boundaries:

- When should the process owner's concern with the process begin and end?

- When should process customers' involvement begin and end?
- Where do sub-processes begin and end?
- Is the process fully embedded within another process?
- Are performance benefits likely to result from combining the process with other processes or sub-processes?

The process owner does not make these decisions alone. In addition to the input from the PIT, the Czar or EIT will want to ensure that the process boundaries do not overlap with another PIT's responsibility or leave a gap between processes.

d. Symptoms and Diseases of Broken Processes

Looking at how workers within a process operate may give the process owner and PIT some insights into the problems that effect the performance of the system. The following symptoms and diseases are presented by Hammer & Champy (1993) to aid in the identification of broken processes.

Symptom: Extensive information exchange, data redundancy, and rekeying.

Disease: Arbitrary fragmentation of a natural process.

If information is being transferred from one computer printout into another computer, or requires computers to electronically move the data from one database to another, or requires extensive communication between participants in the process, it suggests that a natural activity has been fragmented (Hammer and Champy, 1993). These activities are reactions by employees in an attempt to pull the process back together and smooth the interface between activities. Faster, more robust interfaces will treat the symptoms of the problem and not the disease.

Symptom: Inventory, buffers, and other assets

Disease: System slack to cope with uncertainty

This goes beyond inventory assets to include information, money, and extra workers. Why do workers and management generate and keep additional reports, inventory, and workers? Is it to ensure the resources are there just-in-case demand

surges and additional items or information are required? Reducing all the slack in a system requires certainty, which may not be possible, but by reducing the uncertainty in a system, one may be able to reduce the slack materials and manpower built into the system. One way to reduce the uncertainty in a system is to structure the processes so that customers and suppliers can work together to plan and schedule the demand (Hammer and Champy, 1993).

Symptom: High ratio of checking and control to value adding.

Disease: Fragmentation

Do customers care about the audits, internal controls and quality checks of the organization? Probably not. The customer values quality results, produced at a reasonable cost, delivered where and when they need them. From the perspective of the customer, they do not care if it is done right the first time or the fourth time. Like TQM, reengineering attacks the root cause of discrepancies, and focuses on eliminating the causes of non-conformance.

Symptom: Complexity, exceptions, and special cases.

Disease: Using one process to fulfill all needs.

When most processes were first designed they were created to handle a specific problem. As special cases arose, the original process was modified to handle that situation. With each new exception another twist or task was incorporated into the process and subsequently the process grew more complex. However, most of the inputs into a process may continue to be that original simple case, yet it must proceed through the more complex process created for the special cases. The solution may lie in the creation of two processes, one for the simple case, and another for the more complex cases.

D. RECOMMENDED READINGS

The following readings provide additional information on the topics covered in this chapter:

Michael Hammer's book *The Reengineering Revolution* (1995), provides a balanced perspective on using consultants during reengineering. As a consultant he does not pull many punches in critiquing his colleagues.

For information on strategic planning or direction setting look for John Bryson's book *Strategic Planning for Public and Non-Profit Organizations: A Guide to Strengthening and Sustaining Organizational Achievement*, (1995).

For a more in depth discussion of goals and performance measures consider the *Service Process Guidebook* (1998) published by CAM-I. This guidebook not only provides instruction on the unique characteristics of service processes, but also includes a case study of the reengineering of the Marine Corps' Resource Allocation Process. Copies are available from CAM-I at (817) 860-1654. Alternatively, refer to Chapter 12 of *Improving Performance: How to Manage the White Space on the Organization Chart* (1995), by Geary Rummler and Alan Brache.

H.J. Harrington's book, *Business Process Improvement*(1991), will furnish some additional information about the roles and responsibilities of the actors in reengineering.

IV. PHASE III - UNDERSTANDING THE OLD PROCESS

The purpose of this Chapter is to present a variety of methods to gauge the effectiveness and efficiency of processes. Some methods are direct descendants from TQM, while others rely on software-based modeling. The tools provide a variety of perspectives to view the old process. For this reason the application of one tool may provide insights that another tool failed to expose. By leveraging the strengths of the different tools, ideally the user will identify opportunities for improvement for use in the next phase, redesign.

A. WHY ANALYZE THE OLD PROCESS

The literature surveyed recommended that a study of the present system be conducted before attempting to redesign the process (Harrington, 1991; Hammer and Champy, 1993; Davenport, 1993; Davis, 1994; Currid, 1994; Hammer, 1995). Hammer cautions readers from spending too much time on analysis:

> Understanding your process is an essential first step in reengineering, but an analysis of those processes is a destructive waste of time. You must place strict limits, both on the time you take to develop this understanding and on the length of description you create. (Hammer, 1995, pp. 22)

Hammer reasons that it is a waste of time to fill up binders with information on a process that will shortly be thrown away. Secondly, too much analysis might inhibit change by crippling the imagination, whereby the reengineering team may become convinced that the process actually works. He recommends devoting about 4 to 6 weeks on studying the current process focusing on what the process does, how well or poorly it performs, and why it does not perform better. (Hammer, 1995)

Other authors are not as pessimistic on the value of analyzing the current process (Davis 1994, Harrington 1991, Davenport 1993). They see the old process as a handy

example of how things have been done and the mistakes previously made. Davenport (1993) presents four reasons for analyzing and documenting the current process:

1. Facilitates communication among participants. Creates a common understanding of the existing structure.

2. Documentation is an essential input to migration and implementation planning. It allows for an understanding of the magnitude of anticipated change and the tasks required to move from the current to a new process.

3. Highlights problems in an existing process, thereby helping to ensure they are not repeated in the new process.

4. Provides a baseline to measure the value of the proposed innovation. Given a process objective of reducing cycle time, for example, baselined data collection would need to include measurement of elapsed time for the current process.

The reengineering team should take the time to document the old process before redesign. For reengineering projects within the DOD, especially projects whose scope requires changes in information systems, documentation is a prerequisite for process implementation (Davis, 1994).

B. TOOLS FOR ANALYZING THE OLD PROCESS

This section presents six tools, or methods, to view the current process: process maps, flowcharts, Integration Definition for Function Modeling (IDEF0), Activity Based Costing (ABC), time-based measurement, and value-added assessment. The material is presented in a natural order with each tool building on the results of the previous ones. Each tool is discussed in sufficient depth for understanding the purpose for its use. However, due to the complexity of some of the tools (e.g., IDEF0, ABC) additional instruction will be required before application. At the end of the chapter recommended readings are listed for further explanation of each tool.

1. Process Maps

The process map documents the sequence of events and steps in converting inputs to outputs for a specific process (Rummler, 1995). It is a representation of the major

activities and decision points in a process (Davis, 1994). The reengineering team's efforts in producing a process map will highlight areas of the process where fuzzy procedures are being used and introduce all team members to the process being examined (Harrington, 1991). Once completed the process maps are usually used as wall charts for reference, to facilitate communication, and to aid in more robust modeling efforts. The object is to draw a picture of how the process is currently operating, including inputs, customers, activities, and the sequence of the process. (Rummler, 1994)

The simplest kind of process map pictorially displays the events in the process without regard to the department or function performing the action. Take for example Figure 4-1, a simplified order fulfillment process at a fictional company XYZ.

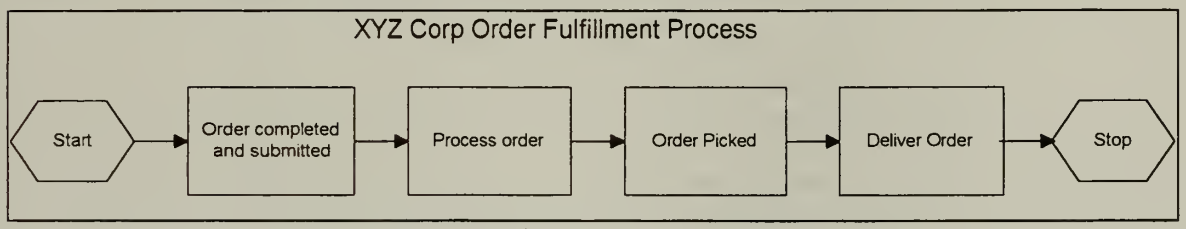

Figure 4-1. Simplified Order Fulfillment Process

Each rectangle represents a sub-process of the larger process. Initially the process map will contain only the broad-brush workings of the process, later the reengineering team will add detail as their work progresses. The process map pictorially describes "what" is done. Each rectangle can then be exploded to show the inner workings of that sub-process. Each sub-process may also be broken down into its sub-sub-processes showing additional levels of detail. Showing "how" something (a process) is done is best achieved using a flowchart.

2. Flowcharts

The flowchart is similar to a process map in that it pictorially represents a process or a sub-process. However, the flowchart describes "how" something is done, that is the decisions that are made by users of the process and the sequence of actions taken. (Harrington, 1991)

Flowcharts use standard geometric shapes for ease in communication. Figure 4-2 is the flowchart for XYZ Corporation's process order sub-process. It breaks down the Process Order sub-process into its tasks. The procedure of breaking processes down into sub-processes and sub-sub-processes is known as decomposition.

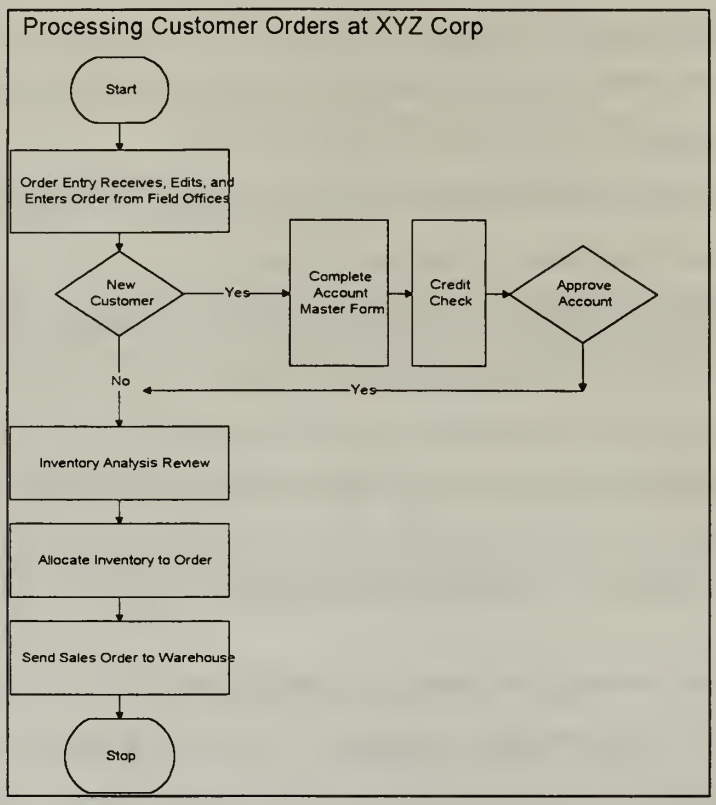

Figure 4-2. Flowchart for a sub-process.
From Euske and Player, 1996.

A more robust process diagram is known as a process deployment diagram or interfunctional process map. In this type of diagram the functions or workers who perform each part of the process is laid over the flowchart. In Figure 4-3 the workers who perform each step of the sub-process are indicated on the diagram. The same type of diagram could also show the different functional departments working on the process (Euske and Player, 1996).

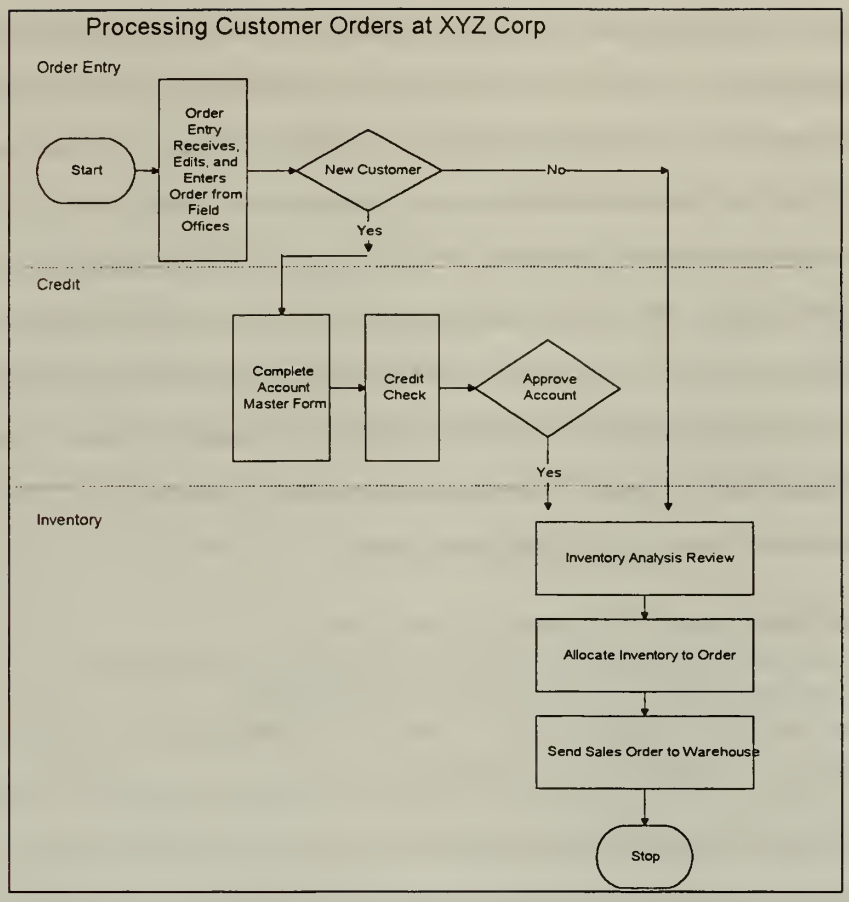

Figure 4-3. Interfunctional flowchart.
From Euske and Player, 1996.

Software packages are available that can aid the team in developing the process maps and flowcharts. These tools provide templates with the standard geometric shapes and lines to quickly produce high quality diagrams. One such tool is VISIO™ which comes with a number of templates and stencils that the user can use to drag-and-drop objects onto the screen. Flowcharts, process maps, and organizational charts are completed easily and with little training. Microsoft PowerPoint© and Lotus Freelance Graphics© provide some of the same capabilities and may be readily available on your desktops but lack the ease with which these types of diagrams can be produced with VISIO™.

Constructing process maps and flowcharts is best done utilizing the knowledge and experience of the entire team. If you will be acting as the facilitator, ask what happens in the beginning of the process, and what happens next. As the process is diagrammed you will likely find the need to erase or move objects, so be prepared. Ask questions, try not to answer the questions asked, team members may have very different ideas on how the process works. Alternatively, work backward from the customer to the supplier, if the process map is different from the one generated from beginning to end, something was likely overlooked. Consider physically walking through the process to reconcile the two versions and to ensure all key steps are included in the model. Some helpful questions to use as the team generates the diagrams (from Burr, 1993):

- Where does the material/information come from?
- How does the material/information get to the process?
- Who makes the decision (if one is needed)?
- What happens if the decision is "yes" or "no"?
- Is there anything else that has to be done at this point?
- Where does the product of this operation go?
- What tests are performed on the product at each part of the process?
- What tests are performed on the process?
- What happens if a test is out of tolerance?

Process maps and flowcharts are a simple and useful way to organize the process that will be evaluated. As with any technique, these do have limitations that restrict the extent which they may be used. Large processes that cover a broad range of activities and that must be diagrammed in detail may generate unruly process maps. Additionally, for large reengineering projects a data dictionary may be required to integrate the many reengineering teams working on the effort. (Hill, 1995)

A data dictionary is a collection of narratives that describe each step in the process. Each step is given a unique name to ensure that multiple reengineering teams use a common language as they define their specific process. If there exists any overlap between the processes, the data dictionary helps to ensure that both teams identify the activities in the same fashion. For instance, one improvement team may call a particular activity " accounts receivable" while others may refer to the same activity as " invoicing" or "billing." (Hill, 1995)

In a later section this chapter explains how other tools such as Activity Based Costing (ABC) and time-based measurement may be incorporated into the process maps and flowcharts to further describe the workings of the process.

3. Integration Definition for Function Modeling (IDEF0)

IDEF was developed in the late 1970s as a spin off of the Air Force's ICAM (Integrated Computer Aided Manufacturing) program. While originally designed to help improve manufacturing productivity, its applicability to modeling business processes was soon recognized. Two types of IDEF modeling techniques are commonly used in government and industry today, IDEF0 for modeling processes, and IDEF1X for data flow models (Hill, 1995). This thesis specifically addresses the use of IDEF0.

a. Why IDEF0?

IDEF0 provides a tool to define, analyze, and document business processes. Like the process flow diagrams, pictorial representations of the processes are produced. Unlike flowcharts, IDEF0 represents what is done, rather than how it is done. IDEF0's goal is effectiveness not efficiency; it works to help users define their business processes so they produce the desired, intended output. (Hill, 1995)

> An IDEF0 model represents activities of the business from the point of view of the business, how those business activities interrelate, resources used to conduct each activity, and the results or output of each activity. The model consists of graphics and associated text supporting the graphics. (Hill, 1995, pp.31)

For many projects within DOD the use of IDEF0 is mandatory. " IDEF0 is the standard activity modeling technique to be used in DOD and all other Federal agencies" (Davis, 1994). The National Institute of Standards and Technology specified the language and the diagram descriptions in the Federal Information Processing Standards (FIPS) publication 183. Standard means that IDEF0 diagrams follow a set of rules to guide its implementation in order to facilitate communication between users and promote reusability (Hill, 1995). IDEF0 was chosen because of the following characteristics (FIPS Pub 183, 1993):

- Generic: IDEF0 allows for analysis for systems of varying purposes, scope and complexity.
- Rigorous and precise: IDEF0 provides for the production of correct, useable models.
- Concise: IDEF0 facilitates understanding, communications, consensus and validation.
- Conceptual: IDEF0 represents functional requirements rather than physical or organizational implementations.
- Flexible: IDEF0 may support several phases of the life cycle of a project.

IDEF0 is a useful tool but not a " silver bullet." It simply provides another window through which to view the organization. Its focus on " what" is done, rather than " how" it is done, allows for additional details to be represented such as the controls for the process, what is consumed in the process (inputs), and the mechanisms that perform the process. Even the proponents of IDEF0 recognize that it does not fulfill all the needs of users. " The on-going task of process improvement (execute-measure-improve) may be better done using other techniques as well (Hill, 1995)." Some experts argue that IDEF0 unnecessarily introduces complexity in the process improvement life cycle through the modeling methods (Gregory and Reingruber, 1996) and " focuses improvement efforts

away from seeing the 'big picture' by involving members in detailed model creation" (Snider, 1994).

> The trouble with IDEF0 is the [rules with the] boxes and arrows. Out of the exhaustion and tedium of doing the AS-IS, the group will finally just decide to connect everything with everything...they give up on making distinctions, and finally you end up with a very complicated chart that means nothing. (Interview, Haga)

How then may IDEF0 be used during BPR? Supporters claim IDEF0 provides the reengineering team a disciplined way to pictorially view the process, and the capabilities to modify the diagrams to represent how the process should be. The diagrams of the present process are known as the " AS-IS," and the diagrams that present the future state of the process are known as the " TO-BE." Hill (1995) presents nine positive and painful ways that IDEF0 can help the BPR effort. IDEF0 can:

- Provide a sold baseline for applying metrics, thereby improving processes and output
- Provide documentation to business personnel
- Provide an architecture that can be studied, refined, and improved
- Provide sufficient understanding for attaching cost
- Expose processes that do not deliver needed outputs
- Expose overly complex processes that need improvement
- Expose "high-cost" processes
- Expose exorbitant process flow times and cycle times
- Target redundant processes for elimination

IDEF0 has proponents and critics. Some users find the discipline it forces on process analysis helpful and useful (Interview, Peters). Other users found IDEF0 to be overly complex and distracting from the improvement effort (Interview, Haga).

Ultimately, it is up to the reengineering team to determine the utility of IDEF0 and the level of detail examined in the models.

b. Constructing an IDEF0 Diagram

IDEF0 diagrams are composed of activities and arrows. An *activity* is a process or sub-process, a series of actions that produce an output. Activities represent "what" is being done. They do not describe "how" it is done, "who" does it, or "what" resources are used. An activity is represented by a rectangle with its description in the rectangle, independent of any functional area. The description is a verb phrase that describes the activity. These activities are the building blocks of the diagram. An activity example is depicted in Figure 4-4.

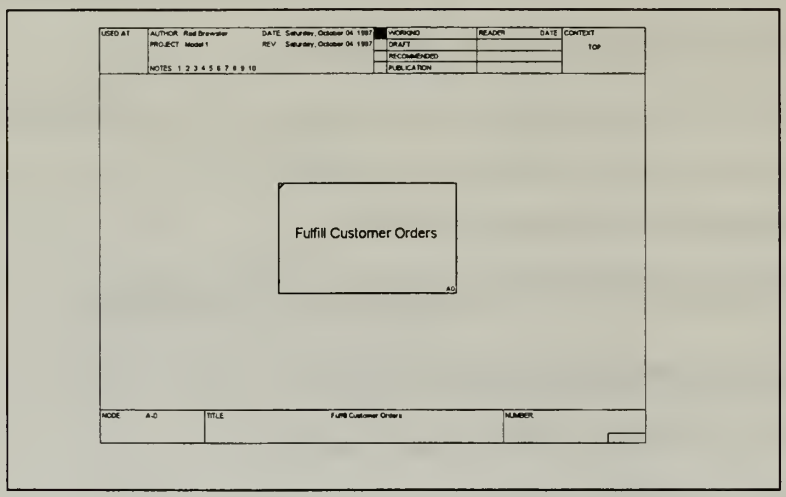

Figure 4-4. Activity example.

Arrows represent how information and materials flow between the activities. Arrows are at times referred to as ICOM's. ICOM is an acronym for the names of the arrows, Input, Controls, Outputs, and Mechanisms. What a particular arrow represents is identified by its placement in relation to the activity (Hill, 1995).

- *Inputs* are information or materials used to produce the output of the activity. Inputs connect to the left side of the activity box.
- *Controls* are information or material that constrains or controls an activity for successful operation. Controls connect to the top side of the activity box.

- *Outputs* are product/information produced by or resulting from an activity. Outputs connect to the right side of the activity box.

- *Mechanisms* are people, machines, or systems that perform the activity. Mechanisms connect to the bottom of the activity box.

The placements of the arrows are represented in Figure 4-5.

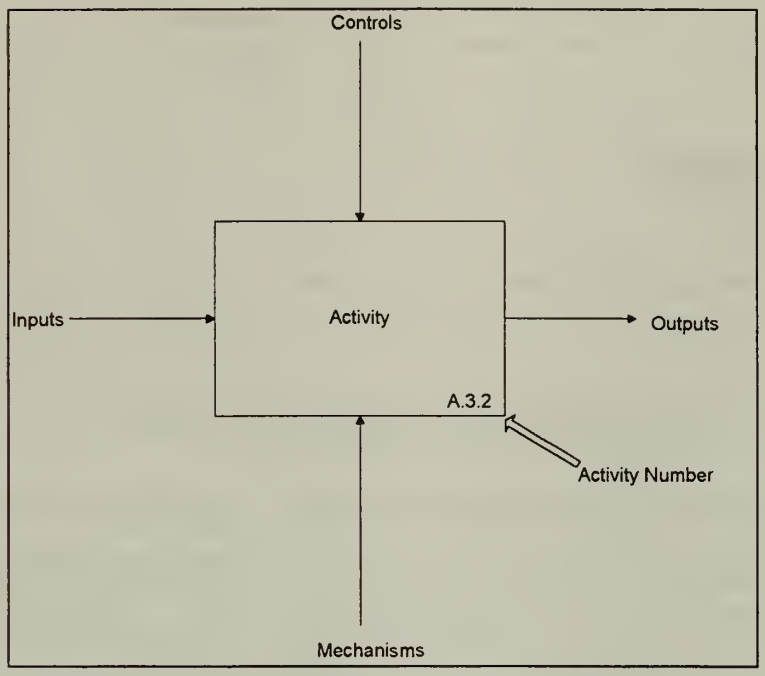

Figure 4-5. ICOM Placement

The first diagram generated when constructing an IDEF0 model is the *context diagram*. A context diagram is a single activity that illustrates the highest level activity and its information or materials. This represents the scope of the subject being modeled and includes the viewpoint (management, customer) and the purpose of the diagram. Figure 4-6 shows a context diagram for the example that this document will use for the remainder of the explanation. For this example the process for baking brownies will be diagrammed.[2]

[2] This example was adapted from Steven C. Hill and Lee A. Robinson (1995).

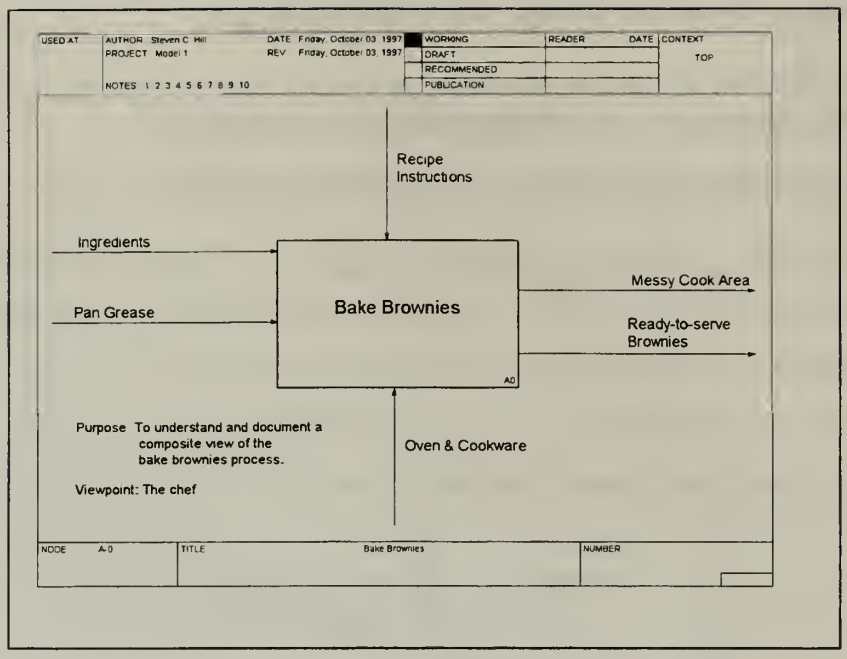

Figure 4-6. Context Diagram for the Bake Brownies process.

Once the context diagram portrays the scope of the process we may begin to decompose the process into the separate sub-processes. Using decomposition the larger process is broken down into more detailed sub-processes through a series of parent-child relationships (Hill, 1995). A parent is any activity that has been decomposed and a child is a series of activities that represents the details of a specific parent activity. The *node tree* is used to diagram the hierarchy between the context activity at the top and the decomposed activities. Each activity is represented by a solid dot, or a box, and is connected to its parent or children via a line. ICOMs are not represented on the node tree. Figure 4-7 depicts a node tree for our major activity "bake brownies."

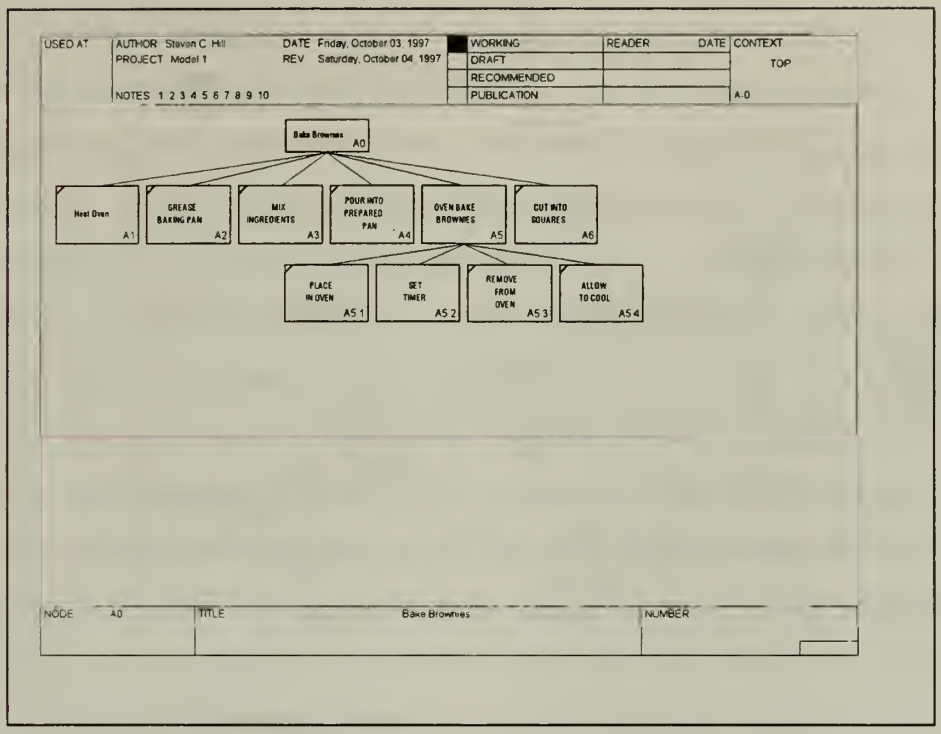

Figure 4-7. Node Tree Example.

Our context activity A0 " Bake Brownies" has been decomposed into 6 major sub-activities: heat oven, grease baking pan, mix ingredients, pour into prepared pan, oven bake brownies, and cut into squares. Each activity is identified with a number that indicates the level in the hierarchy and its relationship to the parent activity. For instance " pour into prepared pan" is labeled A4 indicating that is the fourth activity in the second level, likewise " set timer" is labeled A5.2 indicating that it is the second sub-activity of activity A5.

A *decomposition diagram* presents the relationships between the sub-activities. The arrows (ICOM) link the activities to each other and the outside world. Decomposition diagrams contain only one level of the activities in the hierarchy. In Figure 4-8 the bake brownies process is depicted along with the inputs and outputs from each activity. Notice how the outputs from some activities (heat oven) become the mechanisms for other activities (oven-bake brownies). How the arrows are depicted is governed by rules for the IDEF0 diagram thereby providing discipline and structure.

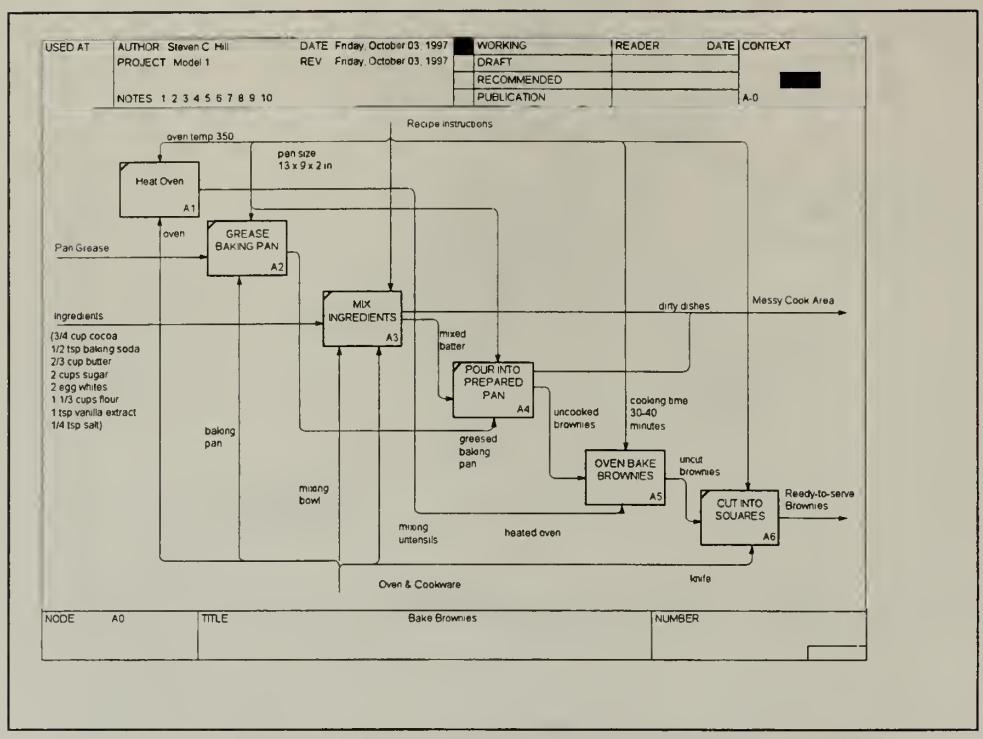

Figure 4-8. Decomposition diagram. (Hill, 1995)

Each activity in a decomposition diagram may be further decomposed on a separate, lower level diagram. Each activity on the node tree is represented as an activity on the decomposition diagram. Each resulting layer provides additional details into the process. For instance, a decomposition diagram may be created for activity five (A5) showing the relationships among its sub-activities.

In addition to the context diagram, node tree, and decomposition diagram an IDEF0 model includes glossaries to textually describe each of the activities, diagrams and ICOMs. These glossaries facilitate the use of common language and identifiers throughout the model.

c. Software Support for IDEF0

The IDEF0 technique for modeling processes has been highly simplified for this paper. IDEF0 models for business processes may contain hundreds of diagrams and activities. For instance, a recent reengineering effort at the Marine Corps Institute (MCI)

identified nearly five-hundred activities (nodes) for the process its Student Services Department operates (Baden and Peters, 1997). For this reason software that helps to develop and track the model is essential. A number of software modeling tools provide rule checking, import and export capabilities, object orientated design techniques, and point-and-click access between parent and child diagrams, the data repository, the node tree diagrams, and the decomposition diagrams (Baden and Peters, 1997). One such tool used to generate the diagrams presented above is BPwin® by Logicworks, Incorporated.[3] An on-line tutorial provides instructions to the user, however it is assumed that the user has a basic understanding of the rules and constructs of the IDEF0 technique. For this reason it is recommended that users attend one of the IDEF0 classes offered by DTIC, or consult one of the IDEF0 books listed at the end of this chapter before starting to model processes.

4. Activity Based Costing

Activity Based Costing (ABC) is another tool for use in a BPR effort. Not only does ABC provide a much needed quantitative insight into the current process, it also builds on tools discussed earlier (process mapping, IDEF0). ABC is a cost assignment method that links the cost of products and services with the consumption of resources. Don't stop reading here. ABC is more than accountant's magic for cost accounting. It is an intuitive way of organizing an organization's expenditures in order to provide the reengineering team with valuable information of how the process consumes resources.

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[3] A software library, operated by the DISA Operational Process Improvement Office, provides loaner software to organizations within DOD. Software tools are loaned to activities for 30 days for evaluation. BPwin®, System Architect and other software packages useful for Activity Based Costing (ABC), simulation, activity and data models, IDEF0 and IDEF1X are available for loan. Readers may call DISA at 1-703-681-2421 for more information.

a. What is ABC?

The concept of ABC is not new, it was introduced in accounting journals as far back as the 1800's (Cokins et al., 1992). Why then, did it take until the 1980's for it to gain acceptance? Two reasons begin to explain this phenomena:

Traditional cost accounting systems allocate overhead (administrative costs, maintenance, utilities, supervisory salaries) to products based on an arbitrary measure such as labor hours. Fifty years ago, or even 20 years ago, this was acceptable. The majority of a product's cost involved the manual labor to build / fix / operate it, so it was natural and rational to assume that the more labor a particular product used, the more overhead it consumed. However, the labor-capital mix has changed, today most manufacturing operations are automated, whether that means a desktop computer that acts as a word processor or an automated assembly line. This has caused the labor costs of products to drop dramatically while the overhead costs have grown. The result of this combination is that the traditional cost-allocation measure, labor hours, is increasingly becoming a poor indicator of the amount of overhead costs a particular product or service consumes. When labor hours are used as a allocation measure, we frequently find "gross misallocations" of overhead. (Cokins et al., 1992)

Secondly, tracing costs to activities was a time intensive way to collect and distribute costs. This however was before the computer hardware and software (relational databases and Fourth Generation Languages) were available to aid in the generation of the numbers. (Cokins et al., 1992)

Something else was noticed as ABC gained its relevance. Through the steps used in developing product cost, ABC provided something that decision-makers could use to look at business processes. This is the cost of the *activities* involved in a *process*. What seems like such an obvious need was not provided by functional accounting systems. Why? Because these systems collected and reported costs based on the functional organization, not on the activities in a process. ABC attempts to better

represent what products, services and products truly cost by assigning costs to the process (Cokins et al., 1992).

ABC:

- Is a method that measures the cost and performance of process-related activities and cost objects
- Assigns cost activities based on their use of resources, and assigns cost to cost objects, such as products or customers, based on their use of activities

While initially a costing system, ABC has become a tool to enable continuous improvement, decision support, and BPR more effective. ABC captures cost and time data and translates this into decision information. This expanded role for ABC has become known as Activity Based Management (ABM). Cokins *et al.* define ABM as:

- A discipline focused on the management of activities as the route to continuously improve both the value received by customers and the profit earned by providing this value
- Including cost-driver analysis, activity analysis, and performance analysis
- Drawing on activity-based costing as a major source for data and information

Figure 4-9 shows some of the many uses for ABC/ABM and the relationship between ABC and ABM. ABM gives the reengineering team the capability to quantify, and therefore improve, the activities in a process.

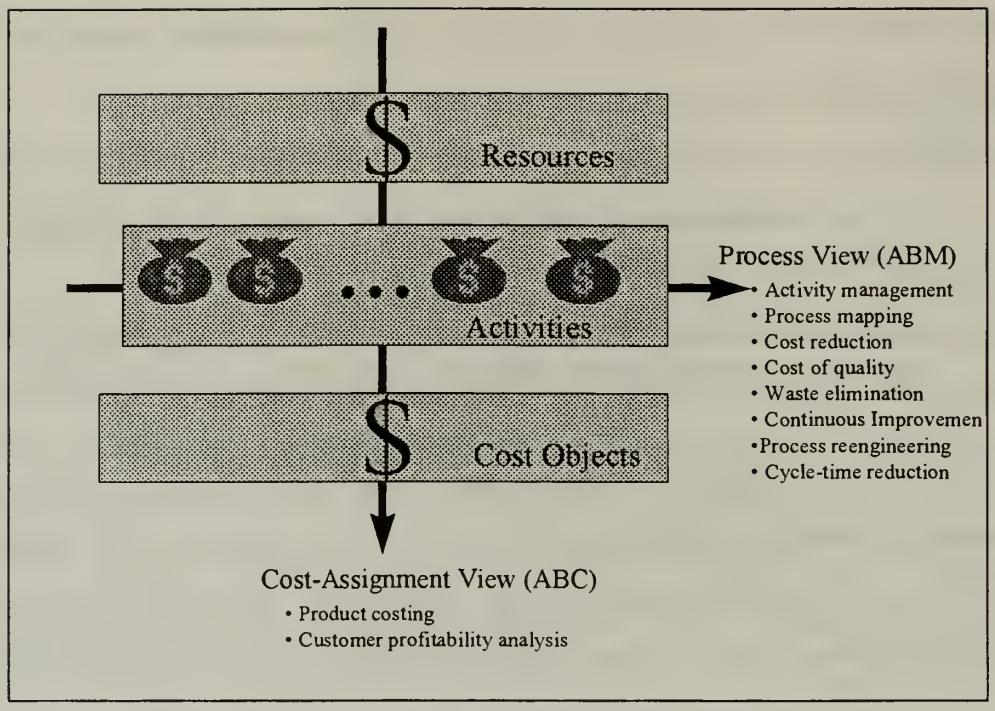

Figure 4-9. The Cost Assignment and Process Axes.
From Cokins, Stratton, and Helbling, 1992, pp. 25.

The use of the word *activities* is not by accident and is familiar after the previous two sections on process mapping and IDEF0. ABC is a method of assigning a quantitative measure (money, time) to the activities identified in the process models. This quantitative assessment is important to demonstrate the improvements proposed by the new process, and to measure the results of that improvement.

> An evaluation using purely qualitative judgment of possible alternatives and change opportunities is woefully inadequate to demonstrate the full potential of meaningful improvements, particularly in an environment where dollars and work hours are a major determinant of performance and efficiency. It is the quantitative characteristics of activity-based costing that make it a key component of the analysis and evaluation process and improves the quality of the final decisions. (DOD, ABC Guidebook, pp. iii)

With this data, reengineering teams "are empowered to reengineer business processes, to identify waste, to reduce cycle time, and to accomplish these tasks profitably" (Cokins et al., 1992).

The next section explains the basic concepts behind the generation of ABC data. It provides the reader enough information to understand how it is accomplished. This will not make the reader an accountant or even provide the knowledge to lead an ABC project from beginning to end. It will however, provide the reader with the information needed to participate on the ABC team. Nevertheless, it is recommended that the reader seek out one of the recommended readings listed in the end of this chapter.

b. How Does ABC work?

Some accounting systems capture costs by department or function and allocate costs by a measure such as labor hours. For instance, within the military, costs are captured by function, such as a fund administrator or cost center. Unless the organization is funded with a revolving fund (DBOF), it is unlikely that any attempt is made to cost out products. In contrast, ABC attempts to trace costs based on cause-and-effect relationships (Cokins et al., 1992). This section explains this causal relationship.

ABC's focus on activities is what makes ABC different from functionally orientated accounting systems. However, the functional accounting systems may contain the data necessary to begin ABC. Normally, it is not necessary to change over to a new accounting system in order to do an ABC project. ABC uses the basic data captured in the accounting system and additional data gathered throughout the project to convert the old accounts into information useful for BPR, that is the association of activities (a process) with their costs. Functional accounting systems (the General Ledger) focus on what is spent (salaries, equipment, ammunition) and who spent it (supply department, headquarters, Alpha company). ABC and activities describe "how" it was spent (recruiting, train people, sustain readiness). Figure 4-10 shows the relation between the general ledger and the ABC database. ABC reclassifies costs according to the way resources are used.

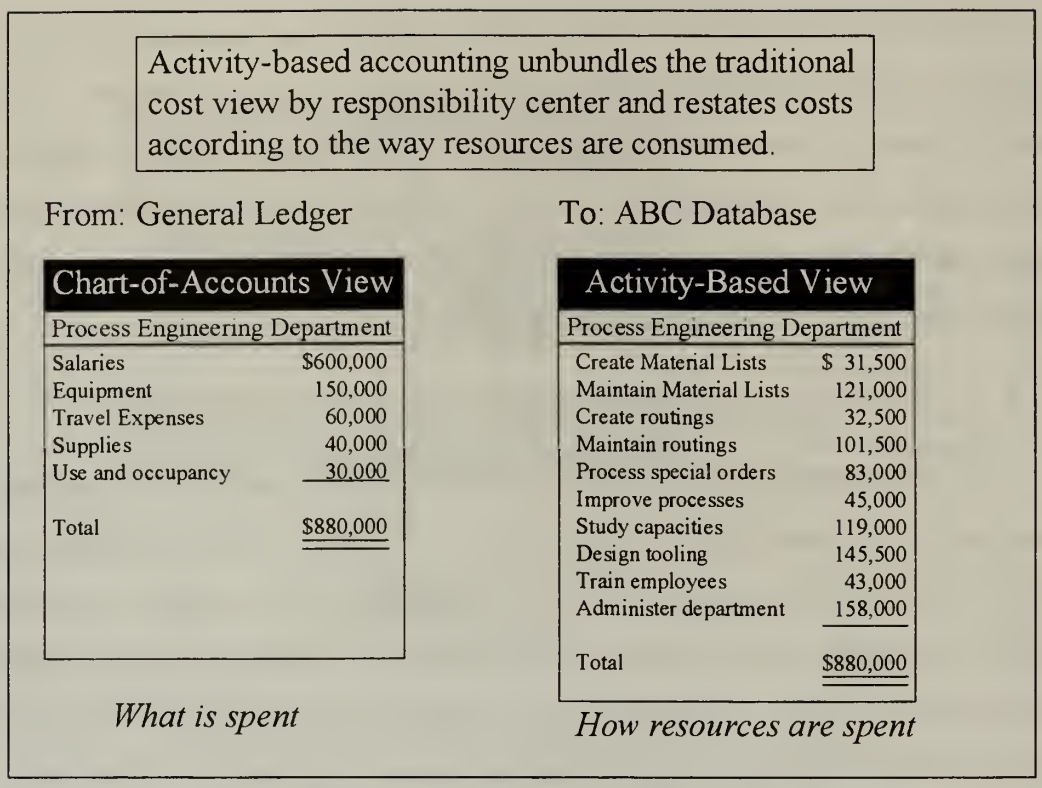

Figure 4-10. Comparison between the General Ledge and ABC. Adopted from Cokins, Stratton, and Helbling, 1992, pp. 9.

ABC is a two-stage process. First, costs are traced to activities then these activity costs are assigned to products based on consumption patterns.[4] Figure 4-11 demonstrates this two-stage process. Departmental costs are first traced to activities in a process, then activity costs are assigned to the output of the process, be that a product or information.

[4] When costs are *traced* to activities practitioners attempt to identify a cause-and-effect relationship between the occurrence of overhead costs and the actions that necessitated the cost. This is different from an allocation, which uses an arbitrary measure, such as labor hours, to spread out overhead costs by assuming that the relationship exists equally for all types of products produced.

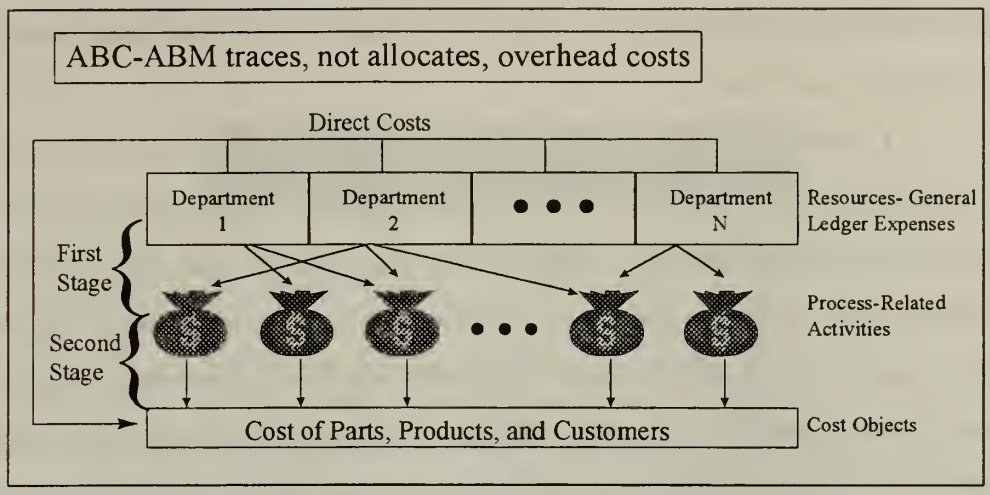

Figure 4-11. The ABC multi-stage process.
From Cokins, Stratton, and Helbling, 1992, pp. 8.

With these fundamentals in mind the next section will identify the steps taken during an ABC project.

c. How is ABC Done?

The process for performing ABC is briefly discussed in this section. ABC has a defined five-step process. This process is depicted in Figure 4-12 and involves determining the activities within an organization, gathering the costs of those activities, tracing the costs to specific activities, establishing output measures to assign costs to the output of the activities, and finally analyzing those costs to identify areas for improvement. This section will discuss each in turn.

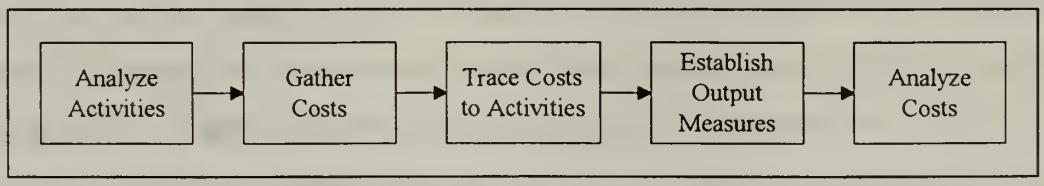

Figure 4-12. Steps for Activity-Based costing.
From DOD Guidebook for ABC, 1995.

Analyze Activities. This task involves decomposing a process into the activities that are performed in the process. A completed process map or a more complex

IDEF0 model fulfills this requirement. The process model will be used as the template to assign costs to the activities.

Gather Costs. During this task the accountant captures all the expenses that are relevant to the process. This is accomplished by examining the costs as they are reported in the accounting system at the lowest possible level, be that fund administrators or cost centers. If a particular entity is involved in two or more processes the accountant attempts to trace the costs to the separate processes based on a percentage level of effort determined through interviews, surveys, and time studies with managers and workers in the department. It is unlikely that it will be possible to trace all of the costs from the entity to the two processes, the accountant will then allocate these residual costs to the processes using a reasonable but arbitrary measure.[5]

Tracing Costs to Activities. This step combines the information gathered in the previous two steps " analyze activities" and " gather costs." This is accomplished in a number of ways, through a series of distributions, redistributions and allocations (DOD Guidebook for ABC, 1995). These distributions normally involve the tracing of managerial and support costs (ADP, accounting, payroll) to the functions (operational elements) they support. These fully burdened functional costs are then traced to the activities they perform.

The distributions are accomplished by first conducting interviews, surveys, and time studies with the personnel who work in the process. From this data, tables of percentages are developed based on the amount of time spent performing a certain activity.[6] For instance, if a certain department X uses its time as depicted in Table 4-1, and the department spends $10,000 a year, the costs would be traced to the activities as shown in the right-hand column. This would be accomplished for all the departments and

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[5] By definition, "allocation" is using an arbitrary measure to spread out costs. While the accountant would prefer a cause-and-effect relationship, this is not always available or practicable. In practice the accountant will attempt to minimize the use of allocations.

[6] These same time measurements will again be used in the next section on time-based measurement.

activities in the process for all direct and indirect costs. Conceptually this is shown in Figure 4-13.

Activity	Workload	Assigned Cost of Activity
A.1	30%	$3,000
A.1.1	15%	$1,500
A.1.2	5%	$500
A.1.3	10%	$1,000
A.2	20%	$2,000
A.2.1	4%	$400
A.2.2	16%	$1,600
A.3	50%	$5,000
A.3.1	25%	$2,500
A.3.2	15%	$1,500
A.3.3	10%	$1,000

Table 4-1. Determination of Activity Costs

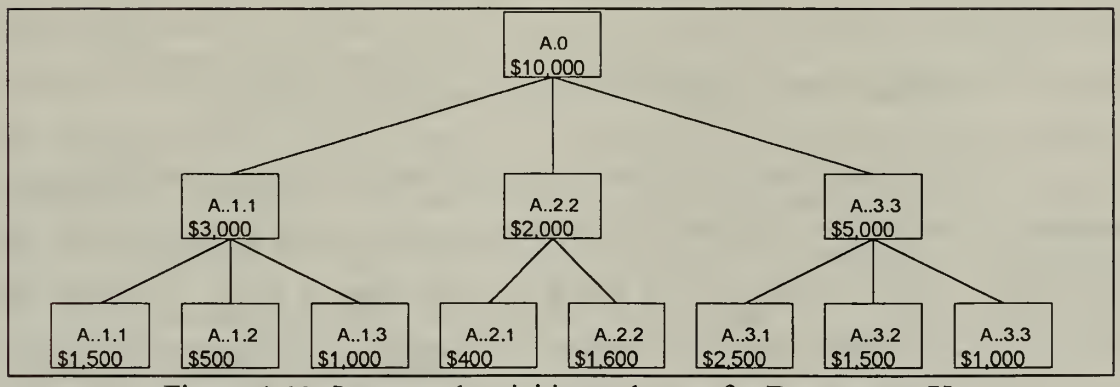

Figure 4-13. Integrated activities and costs for Department X.

As may be expected the amount of data gathered can be difficult to manage. To help aid ABC, numerous software tools are available to help automate the effort (e.g., EasyABC, COSMO, ERwin/BPwin, DesignIDEF, IDEFine)[7].

Establish Output Measures. This step accomplishes the second phase of ABC, assigning the activity's costs to outputs. Output measures act as the bridge that distributes activity dollars into cost objects (Cokins et al., 1992). Some texts call these

[7] All of these titles are available through DTIC's loan library.

output measures "cost-drivers" or "activity drivers" which is intuitively a factor that causes or "drives" an activities costs (Maher and Deakin, 1994). Figure 4-14 presents some examples for cost drivers.

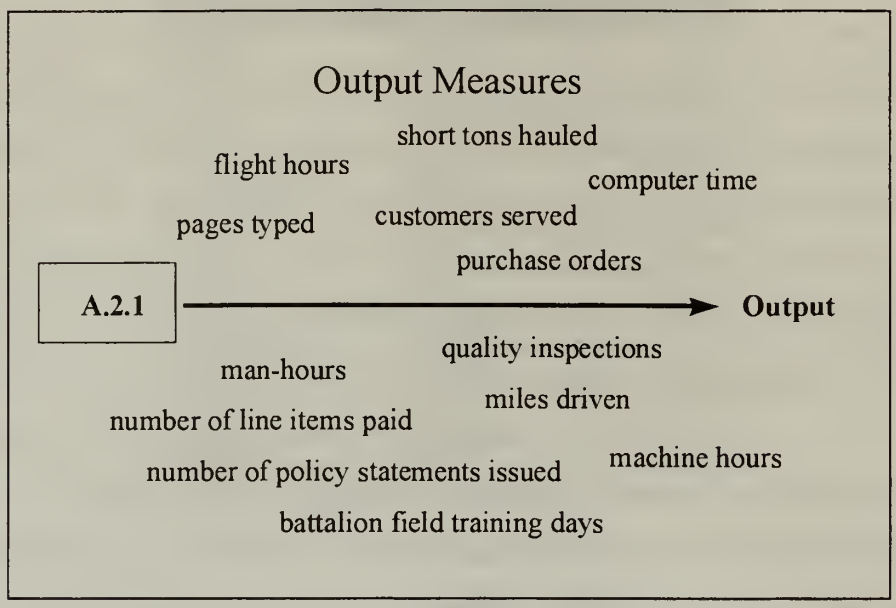

Figure 4-14. Examples of output measures (cost drivers).

The output measure chosen establishes how the costs will be distributed to the outputs of the process. For example, assume an activity chosen is "pay invoice" and that $50,000 is traced to that activity during the first stage of ABC. If during data gathering it was identified that the complexity of paying the invoices varies with the number of line items on the invoices, and that 100,000 line items were paid during that time period, the distribution of costs is purely mathematical as shown in Figure 4-15.

$$\textit{Cost Per Output Unit} = \frac{\textit{Total Activity Cost}}{\textit{Total Units of Output}}$$

$$\textit{Cost Per Output Unit} = \frac{\$50{,}000}{100{,}000 \text{ line items paid}}$$

$$\textit{Cost Per line item} = \$0.50$$

Figure 4-15. Costing the output measure.

This same reasoning is applied to all the activities in a process. Activity outputs are identified and the activity cost per unit of output is determined.

Analyze cost. After the completion of the previous four steps the reengineering team has the cost of each activity, the cost of the process, and the cost for the outputs of the process. At this point these measurements may be analyzed to identify areas for improvement, special cases and irregularities are documented, the model is scrutinized for " red-flags" that may indicate something is being performed which is unnecessary, and ideas are generated for the new process. This last step is a creative act that will be discussed in the next chapter under phase IV of the reengineering methodology "design the new process."

d. ABC and the Activity Accountant

ABC/ABM is a tool for BPR but using ABC/ABM is not necessarily an easy task. Accordingly, the comptroller or activity accountant should be a critical player throughout the entire process (DOD Guidebook for ABC, 1995). Consultants or outside help may be required to undertake such a project. The activity accountant will oversee the project but will require the help of the reengineering team in gathering data and identifying activity and cost drivers. The accountant will ensure professional reliability and proper documentation.

5. Time Based Measurement

Process costs help mangers analyze processes, and in a similar fashion time measurements can provide insights into where to focus efforts to reduce bottlenecks and improve the process. The process time may be an important consideration for the improvement effort if the goals and objectives focus on faster service or turnaround times. Within the data gathered for ABC a number of process attributes were captured, in addition to costs, the time required to perform each activity was recorded.

Using these process attributes a cost/cycle time chart can be constructed to visually represent the build up of costs and time as a product/information moves through the process. Each activity in the process is represented by an area on the graph corresponding to the cost of that activity and the time required to perform the activity. In Figure 4-16 the cumulative process cost is reflected on the Y-axis and the cumulative time to perform each activity on the X-axis. (Harrington, 1991)

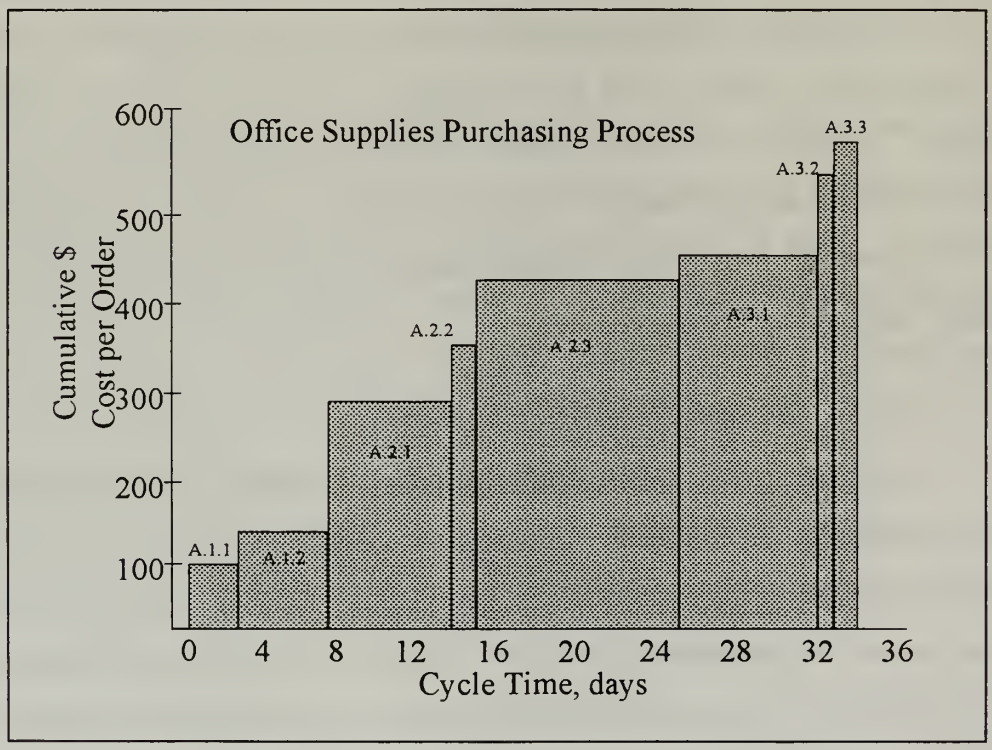

Figure 4-16. A cost/cycle time chart.
After Harrington, 1991, pp. 129.

In Figure 4-16 each activity can be identified with both a cost and a time. For instance, assume activity A.2.1 is "identify suppliers." Notice that about $150 of the total $600 cost for the process is consumed by activity A.2.1. This particular activity could be further decomposed to analyze and possibly reduce the costs of identifying suppliers. Or consider activity A.2.3. If this particular activity "place order" takes up about 10 days of the entire process, steps may be taken to reduce the time is required for this activity.

Time based measurement will help the reengineering team identify the activities in a process that consume the most resources (i.e., money, time). The next section demonstrates how this same information may be used to graphically display how important each of the activities are to the process through value-added assessment.

6. Value-added Assessment

Ideally each activity in a process provides some value to the organization or the customer. However, this is not always the case. For instance, reports produced but never read or used are of little value to anyone.

Value-added assessment is examining each activity in the process and determining if that activity provides value from the customer's point of view. Each activity in a process may be categorized in one of three ways: Real Value Added (RVA), Business Value Added (BVA), or No Value Added (NVA). RVA are those activities that must be performed to meet customer requirements. BVA are those activities that allow for the smooth functioning of the organization. Activities that could be eliminated and not effect the product or service provided are NVA. (Harrington, 1991)

The flowchart in Figure 4-17 may be used to evaluate the steps in the process. Each activity is characterized as RVA, BVA, or NVA by walking through the questions as described on the diagram.

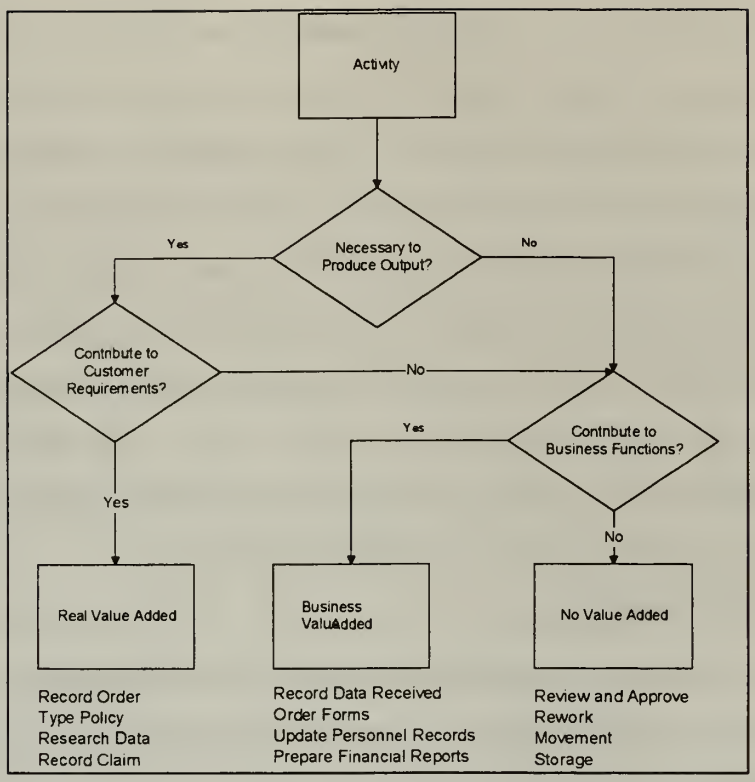

Figure 4-17. Value-added assessment.
From Harrington, 1991, pp. 141.

On the process map or IDEF0 model, consider coloring all BVA activities one color and all NVA activities another. Notice the cost and cycle-time involved in each of the NVA activities. Reengineering teams may be surprised at how many activities are NVA. In most business processes less than 30 percent of the cost is contained in RVA activities. The reengineering team may also apply these same colors to the cost/cycle time chart prepared earlier as shown in Figure 4-18. (Harrington, 1991)

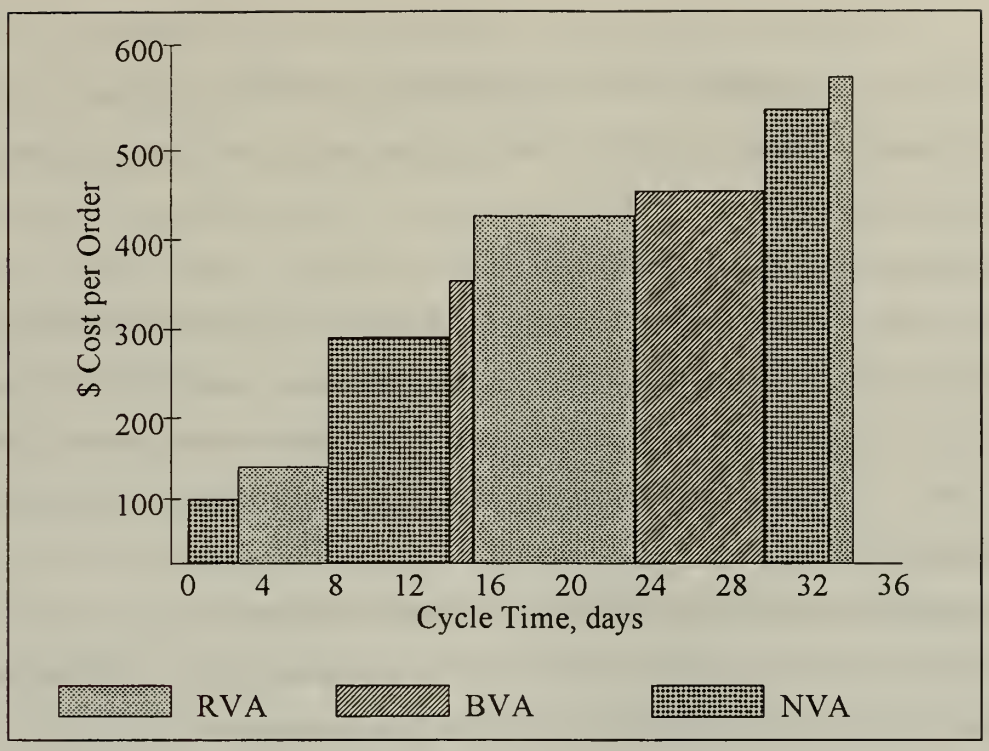

Figure 4-18. Value-added assessment on a cost/cycle time chart.
From Cokins et at., 1992; Harrington 1991.

How can the reengineering team reduce the number of NVA activities? By applying the reengineering principles discussed in the next chapter and removing the root causes of the errors that necessitate the rework and inspections.

C. RECOMMENDED READINGS

The following readings pertain to the material presented in this chapter:

Process maps & flowcharts:

A number of books cover process maps and flowcharts. Two books the author found helpful are Harrington, H.J., *Business Process Improvement* (1991), (Chapters 3 & 4) and Rummler and Brache's *Improving Performance: How to Mange the White Space on the Organization Chart* (1995).

Integration Definition for Function Modeling (IDEF0):

Concise is a relative term. However, given the complexity of the topic Steven Hill and Lee Robinson's book, *A Concise Guide to the IDEF0 Technique* (1995) is a 269 page ready reference for IDEF0. Users may also wish to enroll in one of the classes offered by DTIC for further instruction.

Activity-Based Costing (ABC):

An ABC Manager's Primer by Cokins, Stratton and Helbling (1992), is short booklet that describes the fundamentals of ABC. Copies are available from CAM-I at (817) 860-1654. An alternate is the " Guidebook for Using and Understanding Activity-Based Costing" distributed by DOD. Electronic copies are available from DTIC or on the ECPI CD-ROM.

Time-Based Measurement and Value-Added Assessment:

Both materials on ABC cover Time-Based measurement. Chapter six of Harrington's book provides a description of Value-Added Assessment.

V. PHASE IV: DESIGN THE NEW PROCESS

Designing the new process will probably be the hardest and certainly the most creative part of the BPR project. It is here, with the team gathered around the table looking at a blank sheet of paper or a computer screen that the redesign of the new process will occur. Analysis is comfortable, redesign (for most people) is terra incognita. However, BPR has been practiced for a number of years now and some tricks and principles have been discovered to make the task a bit easier. This chapter presents some ideas to help the reengineering team work through the redesign process.

The first section outlines principles, developed by Hammer (1993) and Davenport (1993), that are offered as a guide to action. The second section discusses brainstorming, a procedure to help stimulate creativity and discontinuous thinking in the reengineering team. Some process streamlining and simplification tools are introduced in section 3. Finally, section 4 discusses a procedure called benchmarking, which looks to similar processes in other organizations for ideas and performance measurements (i.e., benchmarks).

A. REENGINEERING PRINCIPLES

The consultants who have practiced reengineering for a number of years have proposed some "reengineering principles" to help the reengineering team think through the task of designing the new process. The principles of war (i.e., maneuver, objective, offensive, surprise, economy of force, mass, unity of command, simplicity, and security) do not explain how to fight a battle; they are merely guides to action, or items to consider. Likewise, the same can be said for the reengineering principles, they do not explain how to design the new process nor are they meant to be applied in every situation, but should be considered. Described below, they are offered as advice from those who have gone before and have seen it work in practice.

1. Organize Around Outcomes, Not Functions

Reengineered processes combine several jobs into one. Consider having one person, or a team, perform multiple, or even all, steps in a process. For instance, at Mutual Benefit Life, a case manager now performs the entire application approval process rather than the long multi-step process involving 5 departments and 19 people. The case manager is assisted by a PC-based workstation running an expert system. Turnaround time dropped from 5-25 days to 2-3 days. Errors and delays were reduced because integrated processes meant fewer hand-offs, and this lead to reduced administrative overhead. (Linden 1993, Hammer & Champy 1993)

2. Workers Make Decisions

This is an effort to shrink the process vertically, like combining jobs sought to shrink the process horizontally. How many times in the current process are workers required to go to a manager for a decision? What about exceptions and special cases? Reengineering empowers workers by letting the people who work within the process make decisions. Strive to allow front line workers in redesigned processes to make decisions and enjoy " fewer delays, lower overhead costs, better customer response, and greater empowerment for workers" (Hammer & Champy, 1993, pp. 53). If the decisions require monitoring, build the checks into the process, consider Decision Support Systems (DSS) and other information technology tools to supply knowledge, monitor the process, and empower the workers.

3. Substitute Parallel for Sequential Processes

Arrange the steps of the process in a natural order. Is the process linear? Are there some tasks that could be performed at the same time (in parallel)? Does step 1 *need* to be *completely* finished before step 2 starts? Or could step 2 begin when a certain amount of data are provided from step 1? Artificially imposing a linear sequence on a process slows it down. Reengineered processes sequence work by what needs to follow what. (Linden 1993, Hammer & Champy 1993)

4. Processes Have Multiple Versions

Triage is used by the medical community to separate cases by urgency or need. Imagine if all patients in a hospital were required to go to the emergency room whether they needed to or not. Business processes should work the same way. Separate the normal, simple case from the urgent, complex, exceptions, and abnormalities. This not only speeds up the process for the simple cases but also frees up the resources to work on the most difficult cases. For instance, IBM credit uses triage to separate the simple cases that may be performed by a computer from the medium-hard cases that require a case worker, from the most difficult cases that require a case worker with the assistance of specialist advisors. One process to handle all cases results in a process that must be complex enough to handle the most difficult cases. A multi-version process, when applicable, is faster. (Hammer & Champy, 1993)

5. Work is Performed Where it Makes the Most Sense

Traditional organizational boundaries require integration between functions for even the simplest tasks. After reengineering the interaction between the process and the organization can be quite different. For example, the IMPACT credit card now gaining widespread use throughout DOD allows an artillery unit or a headquarters element to buy needed supplies, under a certain threshold, directly from vendors, thereby taking Purchasing and Contracting (P&C) out of the loop. This allows the units to get certain supplies quicker and frees up the resources at P&C to work on larger contracts. Likewise, instead of monitoring and ordering the level of Pampers or Crest on its shelves, Wal-Mart has now shifted that responsibility to Proctor and Gamble. This allows Wal-Mart to concentrate on retailing, and P&G is better able to predict demand and smooth out its production curve. In both of these examples, work that was traditionally performed by one unit or organization has been given to customers (or suppliers) with the results being a reduced need for coordinating the flow of information and products across organizational boundaries. Reengineering attempts to reduce the amount of integration required by performing work where it makes the most sense. (Hammer & Champy, 1993)

6. A Case Manager Provides a Single Point of Contact

Sometimes even reengineered processes are complex to the point that work must be separated because one person is not able to do everything or due to internal control reasons. In such instances, it may be useful to use a case manager is to minimize and simplify the interface with the customer. The case manager takes an input and works it through the process thereby shielding the customer from the complexity. For instance, in Charlottesville, Virginia a person wanting to open a business spent two days going to and from the Commissioner of Revenue's office, the safety office, and the community development office. Within each office numerous duplicate forms were filled out and checked for zoning, handicapped access, and architectural review. A team from the three offices reengineered the process. Now the process uses a cross-trained case manager at one location, to interact with the customer, who fills out one form. According to Linden (1993), the entire process now takes less than a half-hour for the customer and the workers "love" it because they do not have to shuffle paper.

7. Reconciliation is Minimized

Reengineered processes are simplified by reducing the number of external contact points in a process that must be reconciled. In the Wal-Mart case, it is no longer required that Wal-Mart prepare and submit a purchase document to P&G. In addition to the time saved by not producing the purchase document, Wal-Mart also reduced the reconciliation required at the end of the process. Now there is no need to double check everything against the purchase document, Wal-Mart need only reconcile the invoice and the payment with inventory received. A similar reengineering effort took place at Ford Motor Co. where instead of manually reconciling the purchase order, receiving document, and invoice with the payment it is now done electronically. If Ford had only applied technology to the process this might be a good example of automation. However, Ford reengineered the process first and no longer accepts invoices from its suppliers. Payments are made automatically based on the purchase order and the electronic verification from the warehouse that the goods have been received. The result at Ford was a 75 percent

headcount reduction in Accounts Payable and improved financial information. In both these examples IT enabled a new process to perform its function without time-consuming manual reconciliation. The checks and controls are built into the system. (Hammer & Champy, 1993)

8. Hybrid Centralized/Decentralized Operations are Prevalent

Reengineered processes combined with IT allow organizations to enjoy the benefits of centralization and decentralization in the same process. Shared databases and remote computing open windows of opportunity to capitalize on the economies of scale offered by centralization while allowing for the faster decision making decentralization offers smaller organizational elements. (Hammer & Champy, 1993)

For instance, one company equipped their sales force with notebook computers and wireless modems. Now while visiting prospective customers the salespeople are connected to the central office and all the product and inventory information contained there. Controls prevent the sales force from quoting unreasonable prices or promising delivery times that the organization can not keep. The technology allowed the company to reengineer the process to " eliminate the bureaucratic machinery of regional field offices, enhance the sales representatives' autonomy and empowerment," and at the same time " improve the control the company has over selling prices and conditions." (Hammer and Champy, 1993)

9. Bring "Downstream" Information "Upstream"

Capture information once at the source. How often are numerous pieces of paper with the same information filled out for different steps in the same process? If possible, standardize forms and get the information needed for the entire process at one time. Leverage IT to electronically make that information available to workers in the process. (Linden, 1993)

In Singapore for example, the complex administrative process allowing cargo ships to unload and reload cargo was taking more time than the physical movement of goods on and off the ship. This had the effect of reducing the throughput the port could handle.

For Singapore to compete with its larger neighbors it had to expand capacity. The administrative process was reengineered by capturing all information needed for the process at one time. The coordination between agents, freight forwarders, shipping companies, banks, insurance companies, port authorities, customs, and the cargo ship is now done on one form. Moreover, this form is now electronically sent (Electronic Data Interchange (EDI)) to the port before the ship arrives. By the time the ship pulls into port, its goods have cleared customs, the port is prepared to begin off-load, trucks are ready to haul the goods, and the fees are paid. Through reengineering and IT what once required 20 hours for an average container ship and as many as 20 different forms is now done in 10 hours and on one form. (Applegate et al., 1996)

10. Scrutinize Every Piece of Paper in the System

Every time a piece of paper enters the system, demand to know why. Paper must be moved around, signed, filed. Paper slows things down. Reengineered processes use advanced technology, face-to-face communications, and trust. (Linden, 1993)

11. Communication Flow is Horizontal

Workers in a process have the ability and are encouraged to communicate. Instead of resolving issues by passing it up the hierarchy, workers are encouraged and expected to communicate across business interfaces. This helps to ensure smooth process flow and engaged, empowered workers. (Davenport, 1993)

B. BRAINSTORMING

Brainstorming is a group technique to stimulate creativity through a facilitated group discussion. In this exercise group members are encouraged to blurt out any and all ideas and suggestions that come to mind. A facilitator writes down all ideas, judging none. Ridiculous ideas are encouraged, as they may act as stepping stones to more productive ideas through association (Young, 1993). Consider conducting this activity away from the work area to help stimulate the creative process.

Each brainstorming session has three phases: generation, clarification, and evaluation. (AT&T, 1988)

In the generation phase, participants are briefed on the rules of brainstorming and generate ideas on how to design or improve the existing process. Quantity is the goal, not quality. Ideas are not explained in detail or judged. Participants are instructed to try to present their ideas in three words or less. If the group becomes stuck the facilitator may have the group take a break or a creative pause. The rules of brainstorming are as follows (AT&T, 1988):

- State the purpose clearly
- Each person may take a turn in sequence, or ideas may be expressed spontaneously
- Offer one thought at a time
- Don't criticize ideas, don't discuss ideas
- Build on others' ideas, combine and improve ideas
- Record all ideas where they are visible to team members.

In the next phase, clarification, each idea is discussed to clarify what was meant by each idea. The purpose is to ensure that each member of the team understands the suggestion. During the evaluation phase duplicate or irrelevant ideas are removed from the list through group discussion.

Currid (1994) provides the following example of how brainstorming and a cross-functional team can solve problems and produce breakthrough ideas:

> A number of years ago, Pacific Power and Light (PP&L) was faced with solving an on-going problem that resulted in an unsafe job situation for the PP&L linemen.
>
> Being in the Pacific Northwest the ice storms would place great strains on the lines causing the lines to frequently break. PP&L removed the ice from the lines by sending linemen into the field, to climb the towers, and shake the lines with long poles. Climbing the icy towers resulted in falls and injury.

PP&L had attempted a number of brainstorming sessions with the linemen with no positive results. A new facilitator asked that a diverse group be assembled for the next session. In this session were linemen, supervisors, accountants, secretaries, and people from the mailroom.

After several hours, the facilitator was concerned that the effort would be as unproductive as the others were, and requested a break. During the break he heard two linemen discussing an incident where a lineman had been chased through the woods by a bear after coming down one of the towers. The facilitator retold the story to the group. A lineman then suggested using the bears to knock the ice off of the poles, then another lineman suggested placing honey at the top of the towers to get the bears to climb and knock the ice off. One of the senior linemen suggested that the "fat executives" place the honey pots on top of the towers after the storm.

After the laughter died down, a secretary spoke for the first time. "I was a nurse's aide in Vietnam. I saw many injured soldiers arrive at the field hospital by helicopter. The downwash from the helicopter blades was amazing. Dust would fly everywhere. It was almost blinding. I wonder if we just flew the helicopter over those power lines at low altitude, would the downwash from those blades be sufficient to shake the lines and knock the ice off?"

This time there was no laughter - just silence. Ever since that meeting, PP&L uses helicopters to fly over the lines after ice storms. It works beautifully. Linemen are no longer required to climb up ice covered poles to shake the lines. The brainstorming session was a success. But remember, if they hadn't found the bear, they may never have found the helicopter.

This example demonstrates that brainstorming may be used during reengineering to generate ideas. Brainstorming does not solve any problems, it promotes ideas that must be scrutinized and supported by data before incorporation into the process. (Davis 1994, AT&T 1988)

C. STREAMLINING AND SIMPLIFICATION

Streamlining and simplification are methods used to take an existing process and modify it in order to smooth the product or information flow, remove waste or excess, and prevent errors from occurring. Process streamlining and simplification might be better suited for material describing CPI or TQM due to the incremental nature of the changes. Nevertheless, they are presented here to encourage ideas for the redesign of the process or allow for an examination of the newly designed process for further improvements.

The items presented below are questions the reengineering team should ask themselves about each activity or piece of paper in the process. " Yes" answers highlight areas where the process might be further improved. These questions may be used as a checklist for the reengineering team: (Harrington, 1991, pp. 135-142)

- Are there unnecessary checks and balances?
- Does the activity inspect or approve someone else's work?
- Does it require more than one signature?
- Are multiple copies required?
- Are copies stored for no apparent reason?
- Are copies sent to people who do not need the information?
- Are there people or agencies involved that impede the effectiveness and efficiency of the process?
- Is there unnecessary written correspondence?
- Do existing organizational procedures regularly impede the efficient, effective, and timely performance of duties?
- Is someone approving something he or she has already approved? For example, approving capital equipment that was already approved during the budget cycle.
- Can this activity or stage of the process be eliminated?
- Can this activity or stage be combined with another?
- Could a single activity produce a combined output?
- Does the way it is done create more unnecessary work downstream?
- Can the real value added (RVA) activities be done at a lower cost with a shorter cycle time?
- Can the no value added (NVA) activities be eliminated? If they cannot how can they be minimized?

- Are the business value added (BVA) activities necessary? Is there a way to minimize their cost and cycle time?

D. BENCHMARKING

Benchmarking, or best practices as it is sometimes called, is the continuous process of comparing the "what" and "how" of an organization's processes to other similar processes. Author Michael Spendolini offers a more precise definition of benchmarking:

> A continuous, systematic process for evaluating the products, services, and work processes of organizations that are recognized as representing best practices for the purpose of organizational improvement. (Spendolini, 1992, pp. 9)

Camp (1989), whose experiences at Xerox prompted him to write a book about benchmarking, defined it as "the continuous process of measuring products, services and practices against the toughest competitors or those companies recognized as industry leaders." Xerox's experiences with benchmarking began in the late 1970s when they discovered that their Japanese affiliate, Fuji-Xerox, was selling copiers for less than what it cost U.S. Xerox to manufacture the copiers (Harrington, 1991). By comparing the two processes through measurement (metrics) and process analysis, Xerox reduced the cost of its U.S. based manufacturing process. This was so successful they began an ongoing formal program in 1983 to benchmark both manufacturing and support processes.

Fifteen years later, there is no shortage of companies benchmarking everything from customer service to warehouse operations. This provides numerous opportunities for military organizations to compare their process with the world's best and in turn improve their own processes.

1. Why Benchmark?

Benchmarking provides a way to qualitatively and quantitatively compare two or more similar processes. Benchmarking requires a lot of work and staff time, but it provides a way to see a similar process in action, thereby reducing the risk associated with

the implementation of a " new" process. A recent survey reveled that a clear majority (67 percent) of companies have benchmarked and that 75 percent of those rate their experience as successful (Conference Board, 1993).

Harrington (1991) wrote that benchmarking:

- Provides a way to improve customer satisfaction
- Defines best applicable processes
- Helps eliminate the "not-invented-here" syndrome
- Increases the effectiveness, efficiency, and adaptability of processes
- Transforms complacency into an urgent desire to improve
- Helps set attainable, but aggressive, targets
- Increases the desire to change
- Prioritizes improvement activities
- Creates a continuous improvement culture

Davenport (1993) and Hammer (1993) recognize benchmarking's ability to spark new ideas and provide realistic performance objectives for organizations to not only strive for but to match and exceed. Benchmarking helps reengineering by finding breakthrough ideas and CPI by identifying small changes in the existing or reengineered process for further refinements.

2. How to Benchmark?

While the concept behind benchmarking is very simple it does require training and expertise. For example, a common theme throughout the literature studied was the protocol and etiquette deemed acceptable in the dealings with benchmarking partners (Spendolini, 1992; GAO/NSIAD-95-154; Harrington, 1991; Davis and Davis, 1994). Benchmarking requires a partner, such as another organization, to share sensitive data.

This relationship must be grown and fostered throughout the life of the project. Davis (1994) presents a Benchmarking Code of Conduct that attempts to define this protocol.

Benchmarking may be done internally, competitively, or functionally (generic). Internal benchmarking is comparing similar processes within the same organization. For instance, 1st Force Service Support Group (FSSG) benchmarking its warehousing function with 2nd FSSG's would be an example of internal benchmarking. For internal benchmarking, the data are easy to collect, easy to compare, but the limited focus restricts the diversity that might be seen by identifying a benchmark outside the organization. (Spendolini, 1992)

Competitive benchmarking, as it is called, is measuring and comparing processes or services between similar organizations. If the Marine Corps was to benchmark its budget development process with the Air Force's this could be called competitive benchmarking.[8] Competitive benchmarking compares similar processes between similar organizations, so while the comparison may be applicable, this too is restrictive in its approach. (Spendolini, 1992)

Generic (or functional) benchmarking compares similar process in dissimilar organizations, such as the Marine Corps benchmarking its warehousing function with L.L. Bean (as Xerox did), or shipment tracking with Federal Express. Generic benchmarking provides a high potential for discovering innovative practices, develops professional networks for on-going comparison, and highlights transferable technology and practices. However, it is also time consuming and the practices discovered may be incompatible with present organizational culture or capabilities. (Spendolini, 1992)

Davenport (1993) identified yet another type of benchmarking called innovation benchmarking. Davenport, focused on IT, highlights the practice of looking at other organizations, good or bad, to see how they are using new technologies in some part of their process. He furnishes the example of a division at AT&T who is frequently visited

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[8] Although from the perspective of DOD this would be considered internal benchmarking.

by outside organizations examining AT&T's innovative use of notebook computers, cellular technology, and networks to provide a "virtual office" for some of the staff. These companies are not examining an entire process, but one small part that enables a process. Benchmarking purists may not recognize this as true benchmarking but the comparison makes sense. (Davenport, 1993)

Benchmarking is not a "snapshot" or one-time project, it is a long-term effort. Benchmarking is meaningful and useful only when organizations compare themselves over time. As each organization improves and refines its processes or measurements it is shared with the other companies.

These measurements are at the heart of benchmarking and are used to identify possible partners and compare the processes. Benchmarking measurements are usually quantitative. These metrics answer the questions of: How much? How fast? How good? When? Where? and How Long? To ease comparison between organizations the measures are usually reflected in the form of ratios: output per worker, error rates, staffing schedules, customer satisfaction, asset turnover, yield (unit output per unit input), inventory turnover, and unit cost (Spendolini, 1992; Harrington, 1991; Conference Board, 1993).

Organizations have tailored the benchmarking process to their organization. Many different methods for benchmarking exist. For example, Xerox's ten step process (Spendolini, 1992), AT&T's nine step process (Spendolini, 1992), Alcoa's six step process (Spendolini, 1992), Harrington's 30 step process (Harrington, 1991), Spendolini's five step process (Spendolini, 1992), and DOD's six step process (Davis and Davis, 1994). It is not clear which method is the "best way." However, for sake of brevity the DOD's six-step process is outlined below: (Davis and Davis, 1994)

- *Lay a strong foundation for benchmarking success.* Select the process. Then analyze the process, calculate metrics and define performance gaps.
- *Select benchmark partners with best-in-class processes.* Create a benchmark team. Then, based on the processes selected conduct research to determine the benchmark partners. Contact the potential partners, narrow the list, develop

briefing packages and questionnaires and set the benchmark meeting dates and times with the final partners.

- *Plan for a productive benchmark session.* Develop agendas, train the benchmark team on their responsibilities, complete travel plans and logistics.

- *Conduct a thorough benchmark.* Gather data on best-in-class companies through site visits, telephone interviews and questionnaires. Define the practices in use in both your organization at that of your partner and compare and contrast them. Debrief after each benchmark meeting to ensure all information was received and recorded accurately.

- *Analyze the benchmarking results and plan to create a best-in-class process.* Quantify the differences in practices and metrics between your organization and your partner's organization. Then determine which of your partner's practices will help you reach your goals of improving your benchmarked process. Finally, determine how best to achieve the desired improvement in your benchmarked process and create a plan to implement it.

- *Implement your improved process and monitor the results.* Put your plan into action to improve your benchmarked process. Measure the improvement and identify the causes, if any, for the difference between the expected level of improvement and the level attained. Continue to monitor the results and complete on-going benchmarking studies at regular intervals in the future.

The recommended readings at the end of this chapter provide references to important material for reading before beginning benchmarking.

E. RECOMMENDED READINGS

The following readings pertain to the material presented in this chapter:

Reengineering principles:

For further explanation and examples of the reengineering principles consult Michael Hammer and James Champy's book *Reengineering the Corporation* chapters four and eight, or Russ Linden's article "Business Process Reengineering: Newest Fad, or Revolution in Government?" in the November 1993 issue of *Public Management*.

Brainstorming:

For other ideas to stimulate creativity in the reengineering team see "Business Process Redesign: Creating and Environment for Discontinuous Thinking" by Dan Young. This thesis, available through DTIC, devotes an entire chapter (chapter 5) on how to encourage creative thinking.

Benchmarking:

Michael J. Spendolini's book *The Benchmarking Book* (1992), and Robert and Roxy Davis's paper "How to Prepare For and Conduct a Benchmark Project" (1994) further explain the steps and techniques for benchmarking. The Davis paper may be obtained through DTIC or the ECPI.

VI. PHASE V: IMPLEMENTATION & CHANGE MANAGEMENT

The implementation of a new process in an organization requires abandoning the comfortable, old ways of doing things. Workers tasks and roles in the organization are transformed, besides just " doing things differently" their interactions between one another and with leadership will likely change as they become empowered to make decisions. Management's recognition of the magnitude of change and the plans to smooth the transition will have a lasting impact on the success of implementation. This chapter presents Phase V of reengineering, the implementation of the new process and change management. In the first section, the development of a business case is discussed. This is the decision document the reengineering team presents to senior leadership for approval of the recommended changes. Next, the various aspects and plans for the implementation of the new process are highlighted. Lastly, the pitfalls to avoid and the environmental enablers of organizational change that can make or break the change effort are discussed.

A. THE BUSINESS CASE

The results of phase 4 (design the new process) produced a number of design alternatives that are available for implementation. Next, the EIT should be presented with a decision package, sometimes called a business case or a Functional Economic Analysis (FEA).

A business case provides all the information needed for higher authority to make an informed decision on whether or not to proceed with the proposed slate of process changes and improvements. It justifies the resources necessary to bring the reengineering effort to fruition. At a minimum the business case should document all the relevant facts of (Maluso, 1996):

- Why is the reengineering effort needed (issues and opportunities)?

- How will the results of the effort solve the issues or opportunities facing the organization?
- What is the recommended solution(s)?
- How does each solution address the issues or opportunities?
- What will happen if the BPR effort is not undertaken (the do nothing scenario)?
- When will the solutions be deployed?
- How much money, people, and time will be needed to deliver the solution and realize the benefits?

The business case is as much a decision tool as it is a disciplined way for the reengineering team to document the "story" of their effort and review their facts and assumptions (Maluso, 1996).

For each of the proposed solutions the reengineering team should assess the processes by prototyping, pilot testing, and/or computer modeling. Prototyping is a "quasi-operational" version of the new process that is used to test the design and suitability of its various aspects. A pilot is a small scale, fully operational, implementation of a new process. Computer modeling uses software based simulation to test process attributes. These types of testing allow both the designers and users of the process to see the process in action and highlight any unforeseen problems. (Davenport, 1993)

The General Accounting Office in their Business Process Reengineering Guide (GAO/AMID-10.1.15) provides the following key assessment questions:

- Has the team documented the new workflow, with all of the interfaces and dependencies noted?
- Has the team documented the new information flow?
- Has the team identified and documented the impact of the proposed process on the agency's information and system architectures, along with any needed changes?

- Has the team identified changes needed to: organizational structures, management systems, job descriptions and skill requirements, facilities, and personnel compensation and reward systems?

- Has the team identified any changes to legislation, regulations, policies, and rules that would be required to implement the alternative process?

- Has the team identified the constraints and assumptions that may affect the cost and benefits of alternative solutions? Did they estimate the impact of constraints and assumptions on the alternative process?

- Has the team conducted a preliminary feasibility test of the alternative through simulation or other means? Have they clearly and accurately documented the results of the feasibility test?

- Has the team clearly expressed the quantitative and qualitative benefits in mission or program improvement terms (e.g., changes in quality, cost, speed accuracy, or productivity)?

- Has the team developed performance indicators for the newly designed process?

- Has the team assessed how information technology could be best used to support the alternative work processes?

- Has the team aligned its new process alternatives with key stakeholders' and customers' expectations and performance requirements?

Not all of the GAO's assessment questions may be applicable to a specific improvement project but may serve as checklist to evaluate the business case.

The Functional Economic Analysis (FEA) format is DOD specific and is required for large-scale improvement projects requiring investments in information technology (Davis, 1994). Specifically the Functional Economic Analysis (FEA) is step 9 of the DOD's FPI methodology. The eight sections of the Functional Economic Analysis (FEA) are described in detail in DOD8020.1-M, the DOD FEA Guidebook, and are listed below:

- Functional Area Strategic Plan Summary

- Functional Activity Strategic Plan Summary

- Functional Activity Performance Targets and Measures

- Proposed Functional Activity Improvement Program
- Economic Analysis of Proposed Process
- Data Management and Information System Strategies
- Data and System Changes
- Data and System Cost Analysis

As may be gathered from the above list the Functional Economic Analysis (FEA) is an extensive document detailing the entire reengineering effort. For smaller improvement efforts an entire Functional Economic Analysis (FEA) may not be appropriate or productive, however, users should review the elements of the Functional Economic Analysis (FEA) to determine relevant aspects for inclusion in the decision paper. The TurboBPR software introduced earlier can help the reengineering team develop and present the estimated cost savings of proposed alternatives.

With the approval of the new process by senior leadership, the reengineering team is now set to begin the detailed planning of implementation.

B. IMPLEMENTATION

Implementation of the approved alternative is how the reengineering team will turn the plan into reality. The implementation plan is the steps and actions that will lead the organization from its present state to its future state. Two alternatives exist for the implementation of the new process, a revolutionary change plan, or an evolutionary change plan. Revolutionary change implements most or all of the new process at once. This is best achieved in a crisis environment, using outsiders to wedge the new process in an organization. Evolutionary change happens more slowly, bringing pieces of the new process on-line in an incremental fashion, involving employees in the change effort, and adapting implementation dates to the ability of the organization to adopt to the change. Table 6-1 shows the difference between the two paths.

	Evolutionary Change	Revolutionary Change
Leadership	Insiders	Outsiders
Employee Involvement	Involve employees	Exclude Employees
Communication	Broad	Limited
Motivation	Self-improvement	Crisis
Yardsticks	Flexible	Firm
Culture / Structure	Adapt to employees	Qualify employees
Information Technology	Process first	Simultaneous process and IT

Table 6-1. Alternative Change Paths.
From Stoddard and Jarvenpaa, 1995.

The revolutionary implementation plan implements the new process quickly and in its entirety. Hammer (1995) subscribes to this "no pain, no gain" view of implementation, and feels the turmoil and pain caused by the "dramatic change" will result in a quicker payoff of the initiative.

Other authors (Stoddard and Jarvenpaa, 1995; Dalziel and Schoonover, 1988) state that while the process designs developed during reengineering are radical, the implementation of those changes need not be radical. The quick implementation of new processes "are disruptive, costly and generally viewed as unduly risky and countercultural." (Stoddard and Jarvenpaa, 1995) These authors propose the implementation of the new design in an evolutionary fashion. Bringing pieces of the process on-line incrementally demonstrates the efficiencies of the new processes in order to stimulate and gain support from process stakeholders. Individuals then have time to adjust to the change and may plan accordingly.

> By taking a evolutionary path, firms initially compromise their radical vision, however they are able to get started; they are able to get on with change programs, gain direct measurable benefits in the short-term, and learn how to change (so as to continue to change). Over time, the firm moves toward the radical vision through incremental cumulative changes. (Stoddard and Jarvenpaa, 1995, pp. 3)

Implementing changes in an evolutionary fashion ultimately reduces the risk associated with resistance, and the cost of the improvement effort.

Dalziel and Schoonover (1988) present implementation as a process consisting of five sub-processes: clarifying plans, integrating new practices, providing education, fostering ownership, and giving and getting feedback.

1. Clarifying Plans

The first step, clarifying plans, further refines and details specific steps of the change program. Concerns and expectations raised by leadership during the approval process are incorporated into the plan. The plan should be kept simple and flexible, as revisions and the "ongoing interpretation" of the plan are likely to shift dates and milestones as the plan progresses. A solid and workable plan should be able to answer the following questions:

- Are measurable milestones and timelines built into the change plan?
- How realistic are the goals and deadlines?
- What is the specific timeline for change?
- Why is the first group of end users selected?
- Are all parts of the organization affected by the reengineering changes involved?
- Who is responsible for implementing the plan?

Once the reengineering team is comfortable with the answers to these questions the change plan and periodic updates to the progression of the changes must be communicated to all personnel and stakeholders that will be affected. (Dalziel and Schoonover, 1988)

2. Integrating New Practices

Leaders prepare users for the implementation of the new process, attempting to make the change as smooth and comfortable as possible. The reasons for change and the

timelines for implementation are described in end-user terms and communicated to the organization. Dalziel and Schoonover (1988) reemphasize the importance of implementing change in an evolutionary fashion using small steps with specific milestones:

> Change leaders gradually integrate the change effort into the organization, gearing the rate of change to the organizational context, rather than cramming it into a prefixed timeline. (Dalziel and Schoonover, 1988, pp, 114)

The first changes to be made should be key parts of the new process that have the highest likelihood of success. The likelihood for success is determined by the acceptance of change by a particular part of the organization or where the functional manager is particularly supportive of the change. By reaching for the low-hanging fruit first, these changes can be used to gain momentum and acceptance throughout the organization. For instance, a bank was implementing a new computer system, and rather than introducing the system to the entire organization, they instead chose one location where the managers were supportive of the change. After successful implementation at that branch, it was used as the model to then bring other branches on. This phasing allows the change agents to work out the timelines and unforeseen problems. As each step of the implementation is completed it is communicated to the rest of the organization. (Dalziel and Schoonover, 1988)

3. Providing Education

Part of the implementation plan is a series of training and education classes that will introduce the new process to the users. The education plan should demonstrate the benefits of the new process to everyone involved. Workers must understand the reasons for change. Goals for time and cost improvement are communicated to all effected. Training members on new tasks and responsibilities is accomplished prior to the changeover. As the implementation plan phases in pieces of the process, the education and training plan ensures roles and responsibilities are known. Feedback from user groups is incorporated in the training plan. (Dalziel and Schoonover, 1988)

4. Fostering Ownership

Workers are more apt to accept change if they are part of the effort. By fostering ownership and commitment of the change effort, the resistance to change is minimized. Involving members throughout the process through task forces, communication of the need to change, and communication of the planned changes fosters ownership. The talents and skills of workers are used through participative management thereby tapping into the " creativity and energy of workers." This type of management necessitates that managers balance " control and facilitation, formal and informal discussions, recognition of individual and group effort, loosely fashioned strategies and firmly committed plans" (Dalziel and Schoonover, 1988, pp. 124). Workers are empowered by delegating authority to make the changes on their own. (Dalziel and Schoonover, 1988)

Dalziel and Schoonover (1988) present the following ways to foster ownership:

- Frame the change in a manner that increases the end users' self-image or status in the organization.
- Ask for suggestion before implementation; use end users as consultants.
- Specify "milestones" for seeking end-user feedback.
- Institute special methods (e.g., meetings, surveys) for specifying feedback.
- Publicize ways in which user suggestions are incorporated in change plans.
- Build in incentives for innovation and change.
- Collaborate with end users about ways to integrate changes into normal operations.

Leaders who involve end users in the change effort reduce the likelihood of encountering stiff resistance and smooth the effects of the entire implementation process.

5. Giving and Getting Feedback

Closely related to the process of fostering ownership is giving and getting feedback. At each step of implementation the process owner encourages workers to voice their suggestions and concerns about the new process. This is done through face-to-face

encounters, written communication, interviews, the grapevine, working committees, and suggestion boxes. With each successful step workers are given feedback and reinforcement. Leaders (Dalziel and Schoonover, 1988):

- Institute high visibility or high impact programs first.
- Use a range of feedback processes.
- Make sure project outcomes are clear, accessible, rewarding, and relevant.
- Ensure that the process of feedback includes the larger organization.
- Use feedback to advance the change effort.
- Publicize the use of coworkers' suggestions and input.

It is through these five processes that leaders of change generate a team spirit and commitment to the implementation goals. (Dalziel and Schoonover, 1988)

C. ENVIRONMENTAL ENABLERS AND INHIBITERS

Change is uncomfortable, the status quo is familiar and comfortable. Reengineering is about change, and no matter how evolutionary the implementation plan is the change will likely strain members of the organization. Even positive organizational change produces anxiety and resistance (Davenport, 1993). Members who have been around awhile and advanced through the ranks because of the system are also likely to resist the change. This section presents some of the environmental enablers and inhibitors for change. The term environmental is used because this is not a list of specific actions that should take place at some specific time, but a description of the long-term aspects (culture, mindset, attitudes) that must be considered throughout the entire effort, from recognition of the problem, to implementation, to the ongoing process of continuous improvement.

1. Leadership

Without the support of senior leadership in an organization the effort will likely fizzle out. Senior leadership must be on-board, vocal and passionate about the entire reengineering process. Part cheerleader, part coach, they must rally the organization around the plan, pushing forward, establishing direction.

> Reengineering...is the leader's personal crusade, in which many others will be enlisted, but which no other can serve as a substitute. Ongoing and visible participation is necessary in order for a leader to live up to the demands of the role. This is one of the most difficult personal adjustments that executives must make in adapting to the style of reengineering. (Hammer, 1995, pp. 44)

Besides talking the talk, leadership must back up their words with actions, be willing to commit resources and their best people, and accept change themselves. They must understand the importance of change, set high standards, insist on results, and have an understanding of the human aspects (e.g., new attitudes, behaviors) of reengineering (Davenport, 1993). Even for small initiatives passionate, fire-in-the-belly leadership is required. Leadership must firmly, relentlessly, and calmly point the direction.

2. Overcoming Resistance to Change

> There is no undertaking more difficult to take in hand, more perilous to conduct, or more uncertain in its success, than to take the lead in the introduction of a new order of things. Because the innovator has for enemies all those who have done well under the old conditions, and lukewarm defenders in those who may do well under the new.
>
> - Nicolo Machiavelli, 1513

Resistance to change is natural and inevitable. Organizational members may actively or passively resist change. Sometimes the resistance to change may be hard to spot, resistance to change appears in many different forms, such as denial that any problem actually exists, being too busy to implement the changes, stalling, or claiming to implement the new process but never getting around to actually doing it. Managers must expect resistance, identify it, understand the reasons behind it, confront it, and ultimately manage it. (Hammer, 1995)

Hammer (1995) presents five ways to overcome resistance to change:

- Incentives - Positive and negative incentives to bring resistors into the fold. Now opportunities, more fulfilling jobs, recognition for successful efforts, and the threat of punishment may provide the incentive to accept the change.

- Information - As explained in the previous section information and knowledge reduces uncertainty. Many people resist change out of ignorance and anxiety. Educate workers on the reasons for change, the new process, and how the change will affect them.

- Intervention - Confront resistors one-on-one, listen to their problems, offer support and reassurances. Help them overcome their discomfort and fear of the new situation.

- Indoctrination - Let the message be heard loud and clear. Reengineering is not and option, but a necessity. When people see the purpose and necessity of a reengineering effort, it is far harder for them to reject, demonize, or misconstrue it.

- Involvement - Get people involved in the change effort. Bring them on as part of the team. Participation brings a feeling of control and self-interest in the outcome.

None of the implementation or change strategies are out of line with how a competent military leader should act and lead. Consider the instructions for leadership as promulgated by Marine Corps Manual, Section B, Paragraph 1100 "Military Leadership":

Commanders must:

- Strive for forceful and competent leadership throughout the entire organization. (leadership)

- Inform the troops of plans of action and reasons therefor, whenever it is possible and practicable to do so. (communication)

- Endeavor to remove on all occasions those causes which make for misunderstanding or dissatisfaction. (involvement)

- Assure that all members of the command are acquainted with procedures for registering complaints, together with the action taken thereon. (feedback)

- Build a feeling of confidence which will ensure the free approach by subordinates for advice and assistance not only in military matters but for personal problems as well. (intervention)

To help ease the anxiety and overcome the resistance to change the reengineering leader must ensure members of the organization understand the need to change, and create positive impressions of the outcomes (Davenport, 1993). The involvement and suggestions of workers aids the change effort, however, the very nature of the changes proposed by reengineering necessitates a top-down driven effort.

D. GAO KEY ASSESSMENT QUESTIONS

The General Accounting Office provides the following assessment questions for evaluating reengineering implementation and the management of organizational change:

- Does the plan for facilitating change across the organization identify specific change management tasks? Align the change management tasks with the project and implementation timetables? Assign responsibilities to specific individuals for carrying out change management tasks? Provide for periodic assessments of employee needs, concerns, and reactions?

- Have senior leadership clearly identified and explained concern regarding customer service issues and other change drivers, and emphasized that major improvement are imperative?

- Has the communications effort directly addressed the common objections to change, and explained why change is necessary, workable, and beneficial? Was the communications effort begun early in the process?

- Have senior executives made a commitment to assist employees to make the transition to the new process? How was this commitment communicated and reinforced to the employees?

- Have executives called attention to the efforts, contributions, and innovations of employees during the reengineering project, and widely shared credit for success with everyone?

- Has the agency provided training to its staff, managers, and executives to prepare them for the new roles and responsibilities called for by the new process?

- Have executives and managers negotiated new, clear understandings about how authority and responsibility for the new process will be allocated?

- Have executives involved managers in defining the agency's policies and procedures for using agency performance indicators to assess managerial and staff performance?

E. RECOMMENDED READINGS

The following readings pertain to the material presented in this chapter:

Changing Ways: A Practical Tool for Implementing Change Within Organizations (1988) by Murray M. Dalziel and Stephen C. Schoonover describes a leadership approach for managing change, key success factors, and guidelines for integrating change into the organization.

" Implementing Change: A Guide for the DOD Functional Manager" by Kenneth C. Ritter (1993) draws on numerous sources to present change strategies useful for implementing changes associated with process improvement.

Chapter nine of Thomas Davenport's book *Process Innovation: Reengineering Work through Information Technology* (1993), provides additional information on change management.

VII. CONCLUSION

> The American people will continue to expect us to win in any engagement, but they will also expect us to be more efficient in protecting lives and resources while accomplishing the mission. Commanders will be expected to reduce costs and effects of military operations...expenditures will be more closely scrutinized than they are at the present.
>
> -Chairman Joint Chiefs of Staff, Joint Vision 2010

> The Marine Corps must embrace the winds of change, make them our ally, and make them our force multiplier. We must be a forward-thinking, learning organization that strives, day in and day out, to improve our efficiency, to improve our effectiveness, and to challenge the status quo.
>
> - Charles C. Krulak, General, United States Marine Corps, 31 August 1997

A. DISCUSSION

No longer satisfied with maintaining the status quo, military organizations are turning to process improvement techniques to streamline their business processes for better efficiency and effectiveness. Business Process Reengineering is one strategy to accomplish this task.

The purpose of this thesis is to provide newly appointed process owners or reengineering team members with a concise and practical guide to BPR. Throughout the course of research, the author combed through over one hundred books and articles in order to find the most applicable material on process improvement for use by the smaller organizations operating within the DOD. The results of the research produced an introduction or primer to reengineering, and highlighted a set of resources that readers may use in preparation for their reengineering initiatives.

The concepts behind reengineering are not new. The idea of looking at an organization as a collection of interdependent processes or systems was found in organizational theory texts published in the 1960s. What makes reengineering unique is combining the foundations of systems theory with modern information technologies. The tools that technology provides allows for processes to be accomplished in new and exciting ways.

Reengineering is examining a process holistically, leveraging technology, to make radical changes in the process in order to dramatically improve performance. Other process improvement techniques (e.g., Continuous Process Improvement (CPI), redesign) also examine the process to seek improvement. The difference between the techniques is the process scope (the end-to-end process, or a piece of the process) and the amount of change that is likely to occur (incremental or radical).

Prior to reengineering the organization must determine who its customers and stakeholders are, their needs and expectations, and how the organization will meet and exceed those expectations. Goals and performance measures set the level of performance desired and focus the reengineering effort. The reengineering leader, the reengineering teams, and the process owners play important roles in the organization's future as they will be responsible for the successful redesign and implementation of the new process. The first processes reengineered should be the ones that are the easiest to fix and have the highest potential for organizational improvement.

Once identified, the process is examined using a variety of modeling and accounting tools such as process maps, flow charts, IDEF0, ABC, time-based measurements, and value-added assessment. Each tool presents the process in a slightly different way, either through pictures or numbers. The process is documented and ideas for improving performance are noted.

Reengineering is the creative act of building a new process from the ground up, while redesign is the modification of the existing process to remove tasks and activities that provide little value to the organization. A number of reengineering principles surfaced in the research and are presented for consideration. For instance, brainstorming is used to help stimulate creativity in the reengineering team to produce new ideas for the process design. Benchmarking is comparing the process to similar processes to identify performance measures and discover innovative ways other organizations have structured their processes.

Implementation of the new process must consider the organizational and human elements of adapting to the changes brought about by reengineering. Strong leadership skills are required to encourage the acceptance of new tasks and responsibilities throughout the organization.

Reengineering is but one of many techniques that military leaders can use to design smoother processes thereby seeking higher efficiency and higher effectiveness. However it is only by leveraging multiple strategies (e.g., CPI, BPR) for process improvement and adopting a culture of continuous improvement can the military fulfill the expectations of stakeholders (e.g., Congress, taxpayers) and become a world-class organization.

B. AREAS FOR FURTHER RESEARCH

During the research three related topics emerged that require additional research:

Consultants can provide advice and help with reengineering efforts. However, the expense associated with hiring outside consultants may be cost prohibitive for small organizational elements. What affect does the use of outside consultants have on intra-service reengineering projects? Are the benefits associated with an experienced guiding hand aiding the project commensurate with the costs of hiring outside assistance?

Proponents of IDEF0 find this technique helpful. Others claim it slows down and distracts reengineering team members away from their primary duties. Research needs to be conducted to determine the utility of this tool. To what extent does IDEF0 help the reengineering team produce an innovative design for the new process? Is it currently performed because it is required for large-scale improvement projects, or because it adds value to the improvement process?

Benchmarking provides a way for military organizations to compare their processes with other military and similar private sector processes. To what extent is Benchmarking being used? Does the greatest benefits lay in Benchmarking military processes with other military processes or with private sector processes that may not be as comparable, but that might highlight innovative ways to perform the process?

APPENDIX - PROCESS IMPROVEMENT METHODS

The literature surveyed for this thesis reveled numerous methods for process improvement. These step-by-step instructions are most applicable to a particular approach to process improvement (i.e., Continuous Process Improvement, Business Process Redesign, Business Process Reengineering) in the continuum introduced in Chapter 2. For instance the steps and procedures for accomplishing CPI are different from the methods to accomplish BPR. This section briefly discusses three published methods for process improvement: Harrington's Business Process Improvement (BPI), Davenports Process Innovation, and DOD's Functional Process Improvement (FPI). These methods span the process improvement continuum from CPI to BPR. Figure 2-5 places each of these methodologies on the continuum. To highlight some of the differences between the methods, each is summarized below:

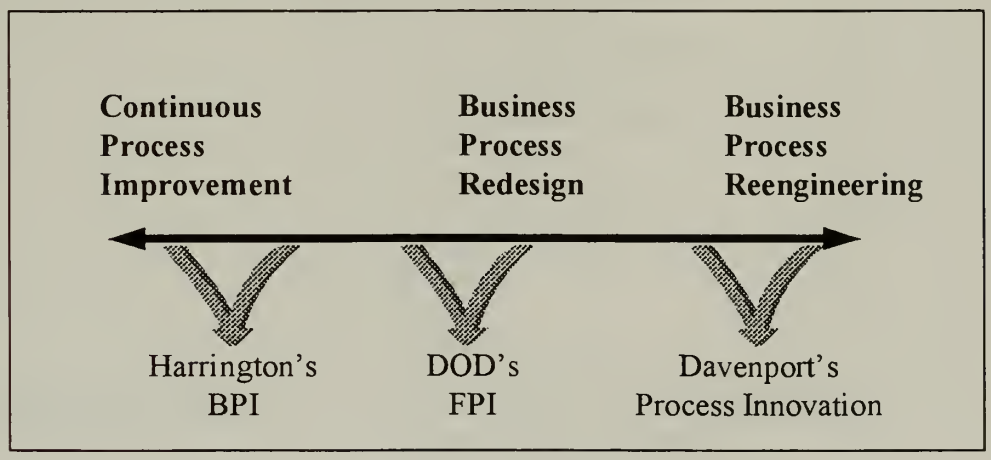

Figure A-1. Relative position of each methodology.
Adapted from Baden and Peters, 1997

A. HARRINGTON'S BUSINESS PROCESS IMPROVEMENT

Harrington (1991) approached process improvement incrementally using a continuous process improvement strategy. He codified a method to approach process improvement in a methodical manner drawing from TQM. As shown in Table A-1, Harrington's model includes five phases: preparing the organization and reengineering team, choosing and analyzing a process, modifying the process so it is more efficient and effective, measuring the results of the new process, and establishing a program of continuous improvement. Notice Harrington does not emphasize the role of strategic planning in directing the improvement process, or the importance of information technology's ability to shape the new processes, however, this is consistent with CPI and its focus on incremental improvements.

Phase	Tasks
Organizing for Improvement	1. Establish an Executive Improvement Team (EIT) 2. Appoint a BPI Champion 3. Provide executive training 4. Develop an improvement model 5. Communicate goals to employees 6. Review business strategy and customer requirements 7. Select the critical processes 8. Appoint process owners 9. Select the Process Improvement Team (PIT) members
Understanding the process	1. Define the process scope and mission 2. Define the process boundaries 3. Provide team training 4. Develop a process overview 5. Define customer and business measurements and expectations for the process 6. Flow diagram the process 7. Collect cost, time, and value data 8. Perform process walkthroughs 9. Resolve differences 10. Update process documentation
Streamlining	1. Provide team training 2. Identify improvement opportunities 3. Eliminate bureaucracy 4. Eliminate no-value-added activities 5. Simplify the process 6. Reduce process time 7. Errorproof the process 8. Upgrade equipment 9. Standardize 10. Automate 11. Document the process 12. Select and train the employees
Measurements and controls	1. Develop in-process measurements and targets 2. Establish a feedback system 3. Audit the process periodically 4. Establish a poor-quality cost system
Continuous improvement	5. Qualify the process 6. Perform periodic qualification reviews 7. Define and eliminate process problems 8. Evaluate the change impact on the business and on customers 9. Benchmark the process 10. Provide advanced team training

Table A-1. Harrington's Process Improvement model.
From Harrington, 1991.

B. DOD'S FUNCTIONAL PROCESS IMPROVEMENT

The DOD Functional Process Improvement (FPI) model, shown in Table A-2, provides a step-by-step methodology for process improvement. The most recent document outlining this methodology is "Framework for Managing Process Improvement" by Robert Davis produced for the Assistant Secretary of Defense (Command, Control, Communications and Intelligence). This manual of over 400 pages is devoted to process improvement within DOD. It was used extensively in the writing of this document and is a necessary reference for those embarking on improvement efforts.

The document's completeness and coverage of all areas to be considered are unequaled in the present day management literature surveyed for this study. However, the document's depth and completeness come with a cost. There are three weaknesses associated with the FPI methodology (Snider, 1994):

First of all, following the process as outlined in FPI will surely consume vast amounts of resources (i.e., manpower, money, equipment) within the organization using it. The methodology is also time intensive, as each step done and document generated may take months to complete (Snider, 1994).

Second, is the degree of knowledge and skill level required by the practitioners of the improvement effort. The use of specific tools, such as IDEF0, are complicated, time consuming, and require participants trained in modeling processes. This complexity may be necessary for large inter-service reengineering projects. However, the documentation, technical training, and time invested in these activities may not be as relevant to smaller intra-service activities.

Third, FPI seems to be focused primarily on incremental improvements. This is an important consideration in any improvement effort. However, it neglects that the order-of-magnitude increases in performance that organizations strive for may sometimes only be achievable through radical changes in the entire process.

	Phase	Steps
	Strategic and Business Planning	1. Develop or validate the strategic plan 2. Develop or validate the business systems plan 3. Develop or validate the annual business plan 4. Construct performance cells (performance measures) for processes 5. Establish the process improvement project
	Business Process Reengineering	6. Conduct baseline analysis 7. Conduct improvement analysis 8. Redesign/reengineer process 9. Prepare functional economic analysis decision package
	Organizational change management	10. Assess Organizational capability 11. Identify organizational change requirements 12. Develop organizational change management plan
	Technology change management	13. Assess technical capability 14. Identify technical change requirements 15. Develop technical change management plan
	Enterprise engineering	16. Configure technical platform 17. Develop application systems 18. Develop database structures 19. Design implementation plan 20. Develop systems migration and integration plan
	Project execution	21. Develop project execution plan 22. Deploy organizational change management plan 23. Implement/deploy technical change management plan 24. Operate/maintain information systems 25. Conduct continuous process improvement program

Table A-2. DOD Functional Process Improvement Methodology.
From Davis, 1994.

C. DAVENPORT'S PROCESS INNOVATION

Davenport (1993) introduces a concept and method for process innovation, essentially a synonym for BPR. Davenport stresses a senior management (top-down) directed effort employing cross-functional teams leveraging information technology to radically change an existing process. Table A-3 highlights the tasks of each phase.

Additionally, Davenport's work (1993) relates specifically to the reengineering of certain process types. He draws on his experience at Ernst and Young to provide strategies and IT enablers for product and service development processes, delivery and logistic processes, marketing processes, order management processes, service processes, and management processes.

	Phase	Tasks
	Identify Processes for Innovation	1. Enumerate major processes 2. Determine process boundaries 3. Assess strategic relevance of each process 4. Render high-level judgments of the "health" of each process 5. Qualify the culture and politics of each process
	Identifying Change Levers	6. Identify potential technological and human opportunities for process change 7. Identify potentially constraining technological and human factors 8. Research opportunities in terms of application to specific processes 9. Determine which constraints will be accepted
	Developing Process Visions	10. Assess existing business strategy for process directions 11. Consult with process customers for performance objectives 12. Benchmark for process performance targets and examples of innovation 13. Formulate process performance objectives 14. Develop specific process attributes
	Understanding Existing Processes	15. Describe the current process flow 16. Measure the process in terms of the new process objectives 17. Assess the process in terms of the new process attributes 18. Identify problems or shortcomings of the process 19. Identify short-term improvements in the process 20. Assess current information technology and organization
	Designing and Prototyping the New Process	21. Brainstorm design alternatives 22. Assess feasibility, risk, and benefit of design alternatives and select the preferred process design 23. Prototype the new process design 24. Develop a migration strategy 25. Implement new organizational structures and systems

Table A-3. Methodology for Process Innovation.
From Davenport, 1993.

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