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A METHODOLOGY TO APPLY BUSINESS PROCESS REENGINEERING WITHIN THE BRAZILIAN AERONAUTICAL MINISTRY

THESIS

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THESIS

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Ricardo Ferreira Gomes dos Santos

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Abstract

The Brazilian Government has developed a huge system known as SIAFI, to account all government expenses and budget. The system brought a big transformation in the way that all the government branches used to work and to expend the public money.

In addition, the economic and political pressures led the government to restructure its branches, and create the Brazilian Ministry of Defense. The new ministry was created with the intention to aggregate under one head all the three military services. In spite of all those changes the Brazilian Aeronautical Ministry did not realize the importance of staying one step ahead, by restructuring itself to be more effective and efficient.

This thesis examines Business Process Reengineering as a feasible methodology to be used to help reorganize the Brazilian Aeronautical Ministry. Using a qualitative approach, this research developed an analysis of BPR beginning with the concepts elaborated by Hammer and Champy. The research also investigated the laws, regulations, and rules used by the United States Government to apply BPR in all branches of its military. After establishing the framework, some methodologies and case studies were analyzed to obtain the big picture about the application of BPR as a managerial tool to reorganize organizations. The results of this study revealed that the methodology used by DoD and U.S. Air Force could be adapted, and generate a feasible methodology to apply BPR within the Brazilian Aeronautical Ministry. Final analysis of the research shows that some cultural problems might appear during the development of the reengineering project, but they should be minimized with the involvement of the administration and top managers.

A METHODOLOGY TO APPLY BUSINESS PROCESS REENGINEERING WITHIN THE BRAZILIAN AERONAUTICAL MINISTRY

I. Introduction

General Issue

The pressures of the modern marketplace have pushed organizations to become more effective and efficient. The modern organization must be more innovative, combative, creative, and focused on customer needs, in order to stay in the market.

Information Technology (IT) has provided the technical means to make great improvements in all of these areas. However, to make the best use of IT, it is important to re-align business activities in ways that take advantage of the new IT. One method that has demonstrated an ability to do this is Business Process Reengineering (BPR).

What are the requirements necessary to implement Business Process Reengineering within an organization? Are there relevant examples of the use of this concept? What are the methods that should be used to apply this concept? When is the right moment to start this process? These are questions that the author has had in mind since he first learned about Business Process Reengineering in the course of the last year.

"Reengineering, properly understood, is 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, 1994:32). The modern enterprise today must be efficient and competitive to become successful in the market. Reengineering is an important process

that has been applied to corporations in the United States to improve their performance, but in Brazil almost nothing has been done in this area until now.

Within the Brazilian Federal Government, including the Aeronautical Ministry, some preliminary attempts were made to use Quality Management methods in the administrative area, but unfortunately no regulatory measures were created to support these efforts. Also, the few examples of such procedures within the whole Brazilian Federal Government prevent the evaluation of the efficacy of quality measures. This lack provided the impetus resulting in the goal of this study: to develop a methodology to trace and apply the new concept encompassed with Business Process Reengineering (BPR). Therefore, this study develops guidelines to apply BPR within the framework of the Brazilian Aeronautical Ministry and possibly within the executive branch of the Brazilian Federal Government.

Historical Background

Since 1987, the Brazilian Federal Government, through the SERPRO (Servico de Processamento de Dados do Governo Federal - Federal Agency of Development and Data Processing), has been developing and implementing an integrated accounting and finance system called SIAFI system (Sistema Integrado de Acompanhamento Financeiro). This system has been revolutionary within the administrative sphere of the Federal Government with regard to accounting and finance, and has the potential to be used within the three branches of the government. The major changes were made in the executive branch, where the use of the system is mandatory.

In 1989, the government implemented the SIAPE system (Sistema Integrado de Acompanhamento de Pessoal - Personnel Accountancy Integrated System). This new

system was based on the same philosophy of SIAFI and was created to manage issues related to civilian personnel. SIAPE generates personnel payrolls and performs all payment processes throughout a civilian employee's career: from his admission into the Federal system until his retirement.

In addition to the internal disturbance and confusion generated by these new systems, especially the SIAFI system, some external factors important to BPR also deserve mention. Most important is the globalization process that forced Brazil to integrate economically with other countries. Brazil and other South American countries created MERCOSUL (Mercado dos Paises do Cone Sul (Market of Countries of South Cone)), a trade market consisting of Argentina, Brazil, Paraguay and Uruguay. The intention of these countries is to increase the economic integration among them, and to include other countries from South and North America. This integration led the Brazilian Government to reevaluate its position within the private sector of the economy, and generated the Privatization Program. The Privatization Program proposes the sale of all enterprises of which the government is the owner or over which it has major control. This situation has placed the government in a new environment where some structures are not necessary because the activities they support have been privatized. At the present, the Aeronautical Ministry is actively involved in the Privatization concept and needs to be restructured in certain areas to improve its performance.

In addition, other factors are leading the Brazilian Aeronautical Ministry to a situation where the reorganization of the structure of the organization is inevitable. The most recent and important factor was the creation of the Brazilian Ministry of Defense.

The new ministry is supposed to coordinate the three Brazilian military services, Navy, Army, and Air Force.

Proposition

As stated before, Business Process Reengineering is a new concept that leads to:

- Restructuring of the process within the organization.
- Focusing on the customer.
- Increasing motivation of participants.
- Bringing about internal reorganization.

In fact, it should be emphasized that the goal of reengineering is not simply increasing quality and productivity within the organization. It is much more powerful than that. It is a rethinking which forces the organization to put aside the knowledge obtained from previous systems; to forget the way the work was accomplished before and to decide to do it again for better results.

To create a basis for people to reengineer internal processes, this study will examine the literature of the Department of Defense (DoD), the United States Air Force (USAF), and other relevant organizations regarding Business Process Reengineering, and generate a methodology to be applied within the Brazilian Aeronautical Ministry.

Therefore, this research is intended to answer the following investigative questions, divided into two major areas, as shown.

I - About U. S. military and government uses of BPR:

1. How are the DoD and U. S. Air Force using BPR?

2. What evidences of success is found in the way that DoD and U. S. Air Force are using BPR?

3. What challenges are the DoD and U.S. Air Force facing?

II - About adapting BPR to the needs of the Brazilian Aeronautical Ministry:

1. What are the issues in the Brazilian Aeronautical Ministry that suggest a need for BPR?

2. What expectations are reasonable for BPR within Brazilian Aeronautical Ministry?

3. How can BPR best be adapted to Brazilian Aeronautical Ministry?

4. What problems might be expected with BPR because of the nature and culture of Brazilian Aeronautical Ministry?

Based on the answers to these questions, this study intends to develop a method for applying BPR within the Brazilian Aeronautical Ministry. If application of this method produces positive results, it could be used to develop methods for applying BPR throughout other Departments of the Brazilian Federal Government.

II. Literature Review

Introduction

This chapter will analyze the current literature, rules, regulations, and other documents available on business process reengineering, to establish a definition from which an examination and understanding of the processes, methods, and tools commonly used in implementing BPR, particularly within the U. S. Federal Government, can be developed. My first step will be to define what business process reengineering is. This will be done by examining the definitions and characteristics attributed to the term in the literature.

In addition, a discussion of the possible answers to the investigative questions presented in Chapter I will be conducted. This will be accomplished by reviewing the available DoD and U.S. Air Force literature on the subject. Upon accomplishing this, the needs for BPR within the Brazilian Aeronautical Ministry will be analyzed, and discussed. Finally, the relevant differences between the implementation of BPR in the U.S. Government, including DoD and U.S. Air Force, and Brazilian Aeronautical Ministry will be explored. This process will lead to the development of a plan to apply BPR within the Brazilian Aeronautical Ministry.

Today's Business

Building a better business process is the primary challenge facing today's managers. "Managers want their organizations to be flexible, lean, agile, responsive, efficient, competitive, innovative, customer-focused, and profitable" (Hammer and Champy, 1994:7).

Hammer and Champy commented in their book that the division of labor, around which companies have been organized since Adam Smith, simply don't work anymore. "Three forces, separately and in combination, are driving today's companies deeper and deeper into territory that most of their executives and managers find frighteningly unfamiliar. We call these forces the three Cs: Customers, Competition, and Change" (Hammer and Champy, 1994:17).

Today, innovations in technology are more aggressive and frequent. Organizations still struggle to find the best managerial "fit" for these rapid technological advances (Brancheau et al., 1996; Gallivan, 1994; Niederman, et al., 1991). Michael Gallivan (1994) also identified four areas that summarize the main reasons for management change:

1. Business cost pressures – focus on reducing the firm's operations costs.
2. Business service pressures – focus on better quality and customer service to external customers.
3. Technological Push – focus on the availability of new information systems, platforms, tools, and standards.
4. Information Systems (I. S.) Service pressures – focus on improving the effectiveness of delivering services to users.

These four reasons for management change, listed by Gallivan, fit directly with the three forces that drive today's organizations, according to Hammer and Champy. Cost pressures match with the competition force. In other words, the organization is directed to reduce costs in order to fulfill the competition needs. The technology push

will drive the organization to the necessary changes, and the customer force will drive the service pressures.

Modern organizations depend on creative and innovative changes to stay on track with business and to develop new products, which must be in accordance with the consumer's needs. Technological evolution is the fundamental factor for that constant renewal. The competition forces the company to practice not only competitive pricing, but also to sell products with quality and continuous innovations. Therefore, the new world reality has a dynamic effect on the management structure of the enterprise. Business process engineering is a tool designed to reorganize the enterprise according to those new parameters.

The Needs for Business Process Reengineering

Every organization strives for a maintainable increase in the final margin of profit, the improvement in customer's satisfaction, and the largest participation in the market.

In the following speech, President Clinton described an inefficiency in the private sector which undoubtedly represented the public sector as well;

"A lot of money that should be cut out of the federal bureaucracies would be found if you had a really serious effort to review operations from a quality perspective. I read in **Fortune** a great article on General Electric under Jack Welch. When he started this sort of review, they found - and this is a very well run company...- they found there were four people working in a room sending copies of reports to 24 different people...No one ever read the report. Everybody always thought someone else was. When they canceled this operation, they saved $150,000 a year. That's the sort of thing I am

convinced is out there all over the government" (Democratic Presidential Nominee Gov. Bill Clinton, August 1992).

The current business world is constantly changing, and this evolution provokes crises that can lead to a better situation. However, it is necessary to take into consideration that crises always generate opportunities to develop better ways to solve problems.

The main factor that brought the most recent crisis to the business and management environment was Information Technology (IT). IT is not just automation nor is it simply data management. IT also involves management of information. Furthermore, organizations began to realize that automation alone was not the answer to increasing the productivity. When information management is the focus, decision processes, management structure, and even the way work gets done, begins to be transformed. When an organization focuses on the management of information, entire layers of management can be reduced. In business process reengineering, applied technology is likely to change the values and culture of the organization.

IT facilitates changing organizational structure from a vertical hierarchy to a horizontal organization. In the traditional vertically structured organization, groups are arranged by function. In the horizontal organizations, teams are arranged by process. This change provides the best shape for reengineering the organization. "Task-oriented jobs in today's world of customers, competition, and changes are obsolete. Instead, companies must organize work around processes" (Hammer and Champy, 1994:27-28).

The organizations noticed that to accomplish a better situation in business they should reengineer the whole organization, and not apply the technology only to restructure certain areas within the enterprise.

Today, it is necessary to see the organization as a whole and complete body where all systems interact. This will help to identify the origin of the problems, the processes that represent a real meaning to the organization, and evaluate all the systems that exist and interact within the enterprise.

Business Process Reengineering – Concept

When an organization decides to reach for standards of managerial excellence it can use the reengineering process as a tool. Therefore, the question is how to achieve that great jump, and how to manage the reengineering process to operate with this objective in the organization.

First of all, business process reengineering is not a process in which the only purpose is quality improvement, or productivity increase in the organization. It means rethinking the organization, and beginning from zero, placing aside part or even all the knowledge formerly acquired by the organization with the previous systems. Reengineering means forgetting how the work was done previously, and deciding how to accomplish it in a more efficient way. "Reengineering, properly, is the fundamental rethinking and radical redesign of business process to achieve dramatic improvements in critical, contemporary measures of performance, such as the cost, quality, service, and speed" (Hammer and Champy, 1994: 32).

Starting from the concept stated by Hammer and Champy, rethinking the fundamental means that it is necessary to consider the following aspects:

Why is this process working in this way?

Why are tasks being executed in that way?

When questioning the process as a whole, the managers might not try to find a constant improvement of the current process, but an alternative to restructure the same process and execute it in a better way than that it was performed before.

Reengineering means throwing away the old method of doing business, and introducing deep changes in this method. It means looking for new and radical changes, and not just current changes and small improvements. "Reengineering is about business reinvention – not business improvement, business enhancement, or business modification" (Hammer and Champy, 1994–33). Therefore, it is necessary to see the organization as a group of processes that aggregate value for the customer, and not just as a group of departments vertically organized.

Also, according to Hammer and Champy (1994), the notion of drastic improvements introduces a fundamental point in the reengineering process, because it is not sought for partial improvements or mediocre performance improvements. An improvement of ten percent does not mean reengineering process; it just refers to a system of Total Quality Management (TQM) or productivity. Reengineering a process implies drastic performance improvements. It also suggests better levels of customer satisfaction, cost reduction, and growth of the organization.

Hence, despite its similarity to Total Quality Management, Business Process Reengineering is an evolution of the concept and quite distinct from TQM. Because of its emphasis on technology, BPR is more heavily reliant on information technology. IT is the critical enabler of Business Process Reengineering. Information technology will

provide the ability to break long held assumptions and rules that govern processes. However, information technology should not be applied to existing processes with the expectation of process improvement.

New information-technology-based capabilities make it possible to achieve systematic and dramatic gains in business performance. Reengineering offers one method to access these gains, but a broader process of business transformation can give organizations a greater range of benefits.

Process

The focus on business process management is another important part of Business Process Reengineering definition, but not enough to distinguish it from other business process improvement methodologies that enforce the focus on process also.

The problems that afflict modern organizations are not task problems. They are process problems according to Hammer (1996). The difference between task and process is the difference between part and whole. Michael Hammer (1996) also identifies a task as a unit of work, a business activity normally performed by one person. Then, a process is a related group of tasks that together create a result of value to the customer.

The concept of process goes beyond an organization's structure. It encompasses everything necessary to identify, produce, and deliver a quality product or service to the customer. BPR will restructure the organization in a process-oriented way, where the mission is integrated with the values, the objectives, the leadership, the motivation, the atmosphere, and the systems, although many business people are not focused to work in process-oriented environment.

Many process definitions are provided in the academic literature. One definition states that a process is "a collection of activities that work together to produce a defined set of products and services" (D. Appleton Co., 1993: 153). Hammer and Champy provided a better definition of business process in their book, *Reengineering the Corporation: A Manifesto for Business Revolution* (Hammer and Champy, 1994). They formally defined a "business process as a collection of activities that takes one or more kinds of input and creates an output that is of value to the customer" (Hammer and Champy, 1994: 35).

According to the previous statement about process, established by Hammer and Champy, the single most important word in the definition of process is "customer." The process could be thought of as a black box that effects a transformation, turning certain inputs into outputs of greater value to the customer. The customer is the trustee that gives value to the process. If the process does not produce something valuable to the customer, then the process is not a valid process.

The focus on processes is centered upon three major objectives: making processes effective, making processes efficient and making processes adaptable. The effectiveness of the process concerns the ability of the process to achieve the results desired by the organization, while the efficiency deals with minimizing the resources required in performing some activity. By incorporating the philosophy of process management, the mission becomes the emphasis as opposed to the previous style that the organization was being managed.

The change to process centering is not primarily a structural one. It is not announced by issuing a new organizational chart and assigning a new set of managerial

titles. Process centering is first and foremost a shift in perspective. It means that people in the organization recognize and focus on their processes. Processes are concerned with results, not with what it takes to produce them. The changes produced with this new alignment in the environment of the organization will facilitate the reengineering of the organization.

The focus on process will bring many benefits to the organization. The benefits for the organization that was reengineered goes far from the conventional situation. The organization will present a definition of mission, objectives, and clearly defined roles. The leadership authority will be conducted with participation in team projects. The departments, that before constituted companies, will start to work organized in processes with common objectives, seeking the best attendance to the customer. The resources will be expended in high technology of processes and administration.

The study "The State of Reengineering Report," conducted in early 1994 by CSC Index indicated that many companies reported dramatic success stories. "Reengineering the Corporation set big goals: 70 percent decreases in cycle time and 40 percent decreases in cost; 40 percent increases in customer satisfaction, quality and revenue; and 25 percent growth in market share" (Champy, 1995: 3). 621 companies of North America and Europe, representing a sample of 6,000 of the largest corporations, completed the survey.

The Federal Government has noticed the changes, and has directed all the Government Agencies to operate under this new non-traditional way of management, the reengineered environment. They recognize that the entire world is changing, and the Federal Government organizations must follow the same path in order to reduce cost, and fill the customers requirements of a good product or service. Even the highest levels of

the Chain of Command are providing support for reengineering processes, and getting attention to these new thoughts. The regulations are changing and becoming adapted to support the changes. These rules and other regulations are discussed in the next section.

Business Process Reengineering within the DoD

Within the Department of Defense the Business Process Reengineering Program (BPRP) was initially called Functional Process Improvement (FPI). The Corporate Information Management (CIM) Information Technology Policy Board established the FPI in January of 1992. The purpose of the program was to assist functional areas in making fundamental improvements in their business processes. However, the main focus of the FPI was to achieve cost savings mandated by Defense Management Review Decisions, about US$ 71.1 billion in savings during the period of 1990 through 1997.

FPI divided improvement efforts into three categories: Continuous Process Improvement, Business Process Redesign, and Business Process Reengineering. The *Framework for Managing Process Improvement: A Guide to the Methodology*, written by Robert J. Davis to support the Corporate Information Management effort, provides excellent definitions for the various methodologies:

Continuous process improvement (CPI). Continuous process improvement is most closely associated with Total Quality Management (TQM) discipline. The traditional approach is to empower self-managed teams to make task-level improvements in quality, cycle time, and cost. Improvements are incremental and sustained. They are creative responses to the constant need to get the job done in changing circumstances. CPI actions typically are wholly contained within one functional activity, although cross-

functional teams can be organized to deal with chronic or pervasive situations. To use an analogy, the objective of a CPI team is to tend to one or two trees in the forest.

Business process redesign (BPR). Process redesign is the next level of improvement. BPR actions are undertaken in a project context with planned or specific improvement objectives. The focus is on streamlining processes by detecting and eliminating non-value added process time and costs, and incorporating best practices in whole or in part. Moderate improvement in quality with respect to output products and services is usually one of the objectives of BPR. Processes generally remain intact with respect to other related processes, and there is little to moderate impact on existing supporting information systems. To continue the analogy, the forest is managed in spite of all the trees.

Business process reengineering (BRE). Process reengineering is often undertaken in response to dramatic changes in the external environment (a paradigm shift, for instance) that apply considerable pressure on the ability of the organization to fulfill its mission, improve its competitive positioning, or to even survive as an entity. BRE actions are radical and transforming. The focus is on the end-to-end process or a considerable subset of that process. Virtually all functions within the organizations are affected by BRE actions. "The existing organizational and technological infrastructures are subject to major dislocations, and pressure is applied to the very culture of the organization. To complete the analogy, the objective of the BRE team is to create a new forest with sturdier and more valuable trees" (Davis, 1994:2-11, 2-12).

"Strategic Planning, Business Process Reengineering, and Total Quality Management are a few examples of recent management techniques trying to optimize on

the advantages that information technology can bring to an organization" (Martin, 1989; Wassenaar, 1990). The application of BPR is a difficult and challenging task that is by no means trivial. The following section is a breakdown of the legislation that was issued in an attempt to formalize the use of information technology within the Federal Government area, and consequently provide the framework for all BPR projects.

Legislation

Throughout the Government, there is a growing understanding that to survive and flourish an agency must revalidate its mission, set a solid visionary course for the future, and reconfigure its business operations to achieve better results with reduced resources available (Yoemans and Beckett, 1996). For this reason, the United States Congress and the Federal Administration have issued the following legislation to encourage changes and improve performance.

Paperwork Reduction Act of 1980

This act was the first document where Congress officially introduced the term Information Resources Management (IRM). It was enacted to ensure that federal information processing resources and telecommunications technologies were acquired, and used in a manner that improved service delivery, and program management.

The act also called for Federal Agencies to increase productivity, reduce waste and fraud, and wherever practical and appropriate reduce the information-processing burden.

The major points of the act included:

- Defined information as a resource.

- Directed agencies to designate a senior official for Information Resource Management (IRM).
- Required agency IRM plans and reviews.

Government Performance and Results Act of 1993

The Government Performance and Results Act introduced a new set of reporting requirements into the budget process for each Federal agency. The main purposes of the GPRA included:

1. Improved planning and management of Federal programs.
2. Increased accountability and better assessment of results.
3. Improved communication with Congress and the public.
4. Better information for congressional and agency decisions.
5. Increased public confidence in the Federal Government.

In order to focus attention on managing for results, GPRA and the Office of Management and Budget (OMB) guidance for its implementation are quite specific about concepts that should anchor planning and assessment. Performance assessment should report outputs and outcomes in the clearest form possible.

President's National Performance Review

President Clinton created the National Performance Review on March 3, 1993 with Vice President Gore as its leader. The President asked the Vice President to report results about the Federal Government reinvention by September 7, 1993. David Osborne, co-author of the bestseller, Reinventing Government, served as a key advisor.

On March 18 of 1994, President Clinton issued the Performance Agreement between the President of the United States and the Administrator of the General Services

Administration (GSA) as a result of the National Performance Review. This performance agreement was intended to improve the management of the Executive Branch. It represented the beginning of a continuous improvement process to reinvent the Federal Government, and meet the needs and expectations of the American people.

In terms of the agreement, the GSA accepted the challenge to reinvent itself, becoming more efficient and less costly. The agreement provided the framework for decisive action in a time that required more than marginal change. It also reflected multi-year objectives, as well as specific performance measures to be accomplished. The Performance Agreement defined the following topics:

1. GSA will become a non-mandatory source of supplies and services, and seek to be the provider of choice for customer agencies;
2. GSA will continue to reinvent and seek innovative ways to improve customer service;
3. GSA will be an employer of choice;
4. GSA will reengineer as many of its functions as possible to be the best in its class;
5. GSA will accomplish specific measurable results.

This document calls for a dramatic improvement in the way the Government goes about its business.

Paperwork Reduction Reauthorization Act of 1995

The Paperwork Reduction Act (PRA) of 1995 is a revision to chapter 35, coordination of Federal Information Policy, title 44 of the United States code, previously known as the Paperwork Reduction Act of 1980. The revision in 1995 more clearly

defined the previous act, and added directions to the appointment of a senior level executive of each federal agency to be the focal point for information resources management and policy issues. The PRA defined information resources as "information related resources, such as personnel, equipment, funds and information technology" (PRA: Sec. 3502.6) necessary to improve the agency performance. A summary of the purposes outlined in the PRA follows.

1. Minimize the paperwork burden for all concerned parties resulting from the collection of information by or for the Federal Government.
2. Ensure public benefit and maximize the utility of the information used by or for the Federal Government.
3. Make uniform Federal Information Resources Management policies and practices as a means to improve the productivity, efficiency, and effectiveness of Government programs.
4. Improve the use and quality of Federal information to strengthen decision making and accountability.
5. Minimize the lifecycle costs of information to Federal Government.
6. Strengthen partnership between the Federal Government and state, local and tribal governments.
7. Effectively use information technology to facilitate the sharing and dissemination of public information.
8. Ensure the integrity of the Federal Statistical System.
9. Ensure the lifecycle process of information by or for the Federal Government is in accordance with applicable laws.

10. Effectively use information technology to improve Federal Agencies mission performance.
11. Improve accountability and responsibility of information resources management policies and guidelines of all Federal agencies to Congress and the public.

The list above outlines the overall guidance for the use of information, effective management of information, and application of information technology within the Federal Government.

Moreover, the act directs the appointment of "a senior official who shall report directly to such agency head to carry out the responsibilities of the agency" as detailed in the PRA. The Office of Management and Budget was assigned overall authority for implementation of the act. The Paperwork Reduction Act of 1995 offers much more guidance and direction on other matters pertaining to information collection, dissemination, and privacy.

Information Technology Management Reform Act of 1996

The Information Technology Management Reform Act of 1996 (ITMRA) is also known as the Clinger-Cohen Act. Under this act of Congress, major information technology (IT) purchases cannot be undertaken without specific justification from the standpoint of their ability to support organizational mission requirements. Specifically, agency heads are required to analyze the missions of their organizations, benchmark and assess the performance of their business processes, and, based on this analysis, redesign their mission-related administrative processes (as appropriate) before making significant investments in information technology to support those missions. An ultimate aim of this legislation is to force organizations into maximizing the potential of technology to

improve performance, rather than simply automating inefficient business processes. Thereby, the main purpose of this act was to improve the productivity, efficiency, and effectiveness of Federal programs.

The act assigns new responsibilities to the Director of the Office of Management and Budget, and to the heads of executive agencies. It also creates the new position of Chief Information Officer (CIO) in each executive agency. This, in effect, more clearly defines the requirement of the Paperwork Reduction Act to appoint a senior official to carry out these duties. The ITMRA defines these responsibilities as:

1. Monitoring performance of the agency's IT programs, evaluating the performance of IT programs on the basis of applicable performance measurements, and advising the agency head about whether to continue, modify, or terminate a program;
2. Annually, as part of the agency's strategic planning and performance evaluation processes, assessing the extent to which the positions and personnel at the executive and management levels of the agency meet the requirements for achieving agency performance goals for information resource management.

Further, ITMRA requires the head of each executive agency to establish policies and procedures that will ensure that all information systems of the agency are designed, developed, maintained, and used effectively and efficiently.

Defense Directives

Within DoD the regulations that provide guidance to reengineer processes are related with the information technology management.

The Department of Defense directive 8000.1 was issued in 1992, and provided guidance to the Paperwork Reduction Act of 1980. However, due to revisions to the PRA in 1995 and enactment of the ITMRA of 1996, the content of DoDD 8000.1 is largely of historical impact.

The other important guidance published by DoD was the DoD8020.1-M – Interim Guidance on Functional Process Improvement. This document provided the methodology for all BPR projects to be developed within the DoD. The DoD8020.1-M can be broken down into seven basic steps:

1. Strategic Planning;
2. Organizational Preparation;
3. Activity Modeling;
4. Activity Based Costing;
5. Benchmarking;
6. Simulation;
7. Implementation.

Overall, the regulations issued by the DoD bring the following initiatives:

- Stress top-down leadership, commitment, and support for change;
- Focus on customers;
- Call for improved employee empowerment;
- Focus on visions and outcomes rather than inputs;
- Emphasize quality for products and services produced;
- Recognize the need for reductions in time and cost.

Information technology provides the ability to break long held assumptions and rules that govern processes. As a matter of fact, automation is not reengineering but gives it the biggest support. BPR should be combined with other management methods to help the organizational unit accept the redesigned work flows, adjust its organizational structure, and change its culture. Business Process Reengineering, despite the similarities, is not the same as Total Quality Management, or Process Improvement.

Business Process Reengineering versus Total Quality Management

The connectivity between these two management processes is clear. According to Yoemans and Beckett (1996), they both address the need for process improvement with BPR jump-starting a broken process, and TQM continuously improving a basically functional process.

TQM and BPR have similar traditions and are often confused, but these methodologies are quite distinct from one another. While both emphasize the importance of processes and focus on the needs of process customers, there are important differences in the type of improvement that each methodology seeks. Quality programs seek continuous incremental improvement working within the framework of existing processes. Reengineering seeks breakthroughs by changing existing processes. Another difference is the primary enabler of both. The TQM enabler is the statistical control whereas the enabler in BPR is information technology.

Hence, despite its similarity to TQM, BPR is actually an evolution of the concept and quite distinct from TQM. Both methodologies share some similar implementation techniques. But, because of its emphasis on technology, BPR is more heavily reliant on systems analysis and design techniques. Another explanation that is important to better

clarify and understand the meaning of BPR is the distinction between BPR and Business Process Improvement. The aspects of this differentiation will be discussed in the next section. A quick breakdown of the major differences is exhibited in the next table.

Table 1. Differences between BPR and TQM.

	BPR	TQM
Level of Change	Radical	Incremental
Starting Point	Clean Slate	Existing process
Frequency of Change	One-time	One-time/Continuous
Time Required	Long	Short
Participation	Top-down	Bottom-up
Typical Scope	Broad, cross-functional	Narrow, within functions
Risk	High	Moderate
Primary Enabler	Information Technology	Statistical control
Type of Change	Cultural and Structural	Cultural

(Adapted from Davenport, 1993: 11)

Business Process Reengineering versus Business Process Improvement

While Business Process Reengineering is based on changes that affect the redesign of the business process as one whole, Business Process Improvement focuses on how to improve an existing process or service, acting in one department instead of the whole organization.

Improvement is a term used to connote programs, which improve mainly the organization's existing business processes, and are not promulgated by a requirement for radical overhaul of the existing organization process.

The concept of fundamental or radical change is the basis of the major difference between Business Process Reengineering and Business Process Improvement. BPI tends

to be more of an incremental change that may affect only a single task or a segment of the organization. When using BPI, organizations can achieve significant incremental improvements in service delivery and other business factors. The expected outcomes of BPI initiatives are not as dramatic as those associated with BPR initiatives, and the process to achieve the changes is not as traumatic as seen with BPR.

Most parts of the Federal agencies in the United States Government are applying more process improvement initiatives than BPR initiatives, although they give them the label of reengineering processes.

The following table adapted from the General Service Administration Report of 1994 - GSA Report KAP-94-2-1 - shows the key elements that differentiate both processes.

Table 2 – Differences between BPR and BPI

Element	BPR	BPI
Degree of Change	Radical (e.g. 80%)	Incremental (e.g. 10-30%)
Scope	Entire process	Single area, Function, or Organization Unit
Time	Years	Months
Driver	Business	Technology
Focus	Redefine process	Automate or eliminate the Function
Work Structure	Unified	Fragmented
Orientation	Outcome	Function

(Adapted from US GSA Report KAP-94-2-1, 1994:7)

Brazilian Aeronautical Ministry Organizational Structure

This section covers the organization of the Brazilian Aeronautical Ministry (M.Aer.) provided by the author, an officer in the rank of major who has worked in the organization for the last 25 years.

As stated in the Brazilian Constitution of 1988, the Brazilian Aeronautical Ministry is the organization responsible for establishing the national aerospace policy and controlling overall aeronautical activities. In wartime its main objective will be to achieve and maintain air superiority over Brazilian territory. This task is to be accomplished by the armed branch of the Ministry – the Brazilian Air Force (FAB). The Brazilian Aeronautical Ministry, as shown in the following figure, is composed of:

- Aeronautical Staff (EMAER), the organization responsible for planning and consulting activities of the Aeronautical Minister.
- Economic and Financial Secretary (SEFA), the organization responsible for manager budgeting, and the financial activities.
- General Logistic Command (COMGAP), the organization which has the responsibility of supporting all logistics functions within the M.Aer.
- Air General Command (COMGAR), the organization whose mission is to performing the combat activities.
- Personnel General Command (COMGEP), the organization which is responsible for the management of the manpower activities.
- Training Department (DEPENS) the organization responsible for the training activities within the M. Aer.

- Research and Development Department (DEPED), the organization whose tasks are research, development, and forecasting the industrial activities in the aerospace field, and finally,
- Civil Aviation Department (DAC), which is responsible for planning and controlling the civil aviation activities.

The structure below represents the overall view of the Brazilian Aeronautical Ministry. The reasons that indicate its need for Business Process Reengineering will be explained in the next section.

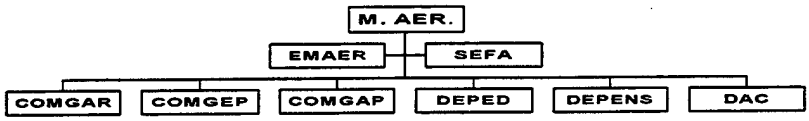

Figure 1 –Brazilian Aeronautical Ministry

The Present Needs for BPR within the Brazilian Aeronautical Ministry

The Brazilian Aeronautical Ministry has experienced, since 1987, many changes originated by the implementation of the system SIAFI (Sistema Integrado de Acompanhamento Financeiro – (Accounting and Finance Integrated System)). The system was developed according to the Brazilian Federal Government parameters, through the SERPRO (Servico de Processamento de Dados do Governo Federal – (Federal Agency of Development and Data Processing)). This system has been revolutionary within the administrative sphere of the Federal Government with regard to accounting and finance, and has the potential to be used within the three branches of the

government. The major changes were made in the executive branch, where the use of the system is mandatory. Among the many changes that were brought by the system, some positives are the following:

- Adoption of a central bank account at the Banco do Brasil (Bank of Brazil) to pay all government's debts, issues, receipts, and receive all taxes and incomes.
- Massive increase in the use of computer tools to analyze accounting and financial demonstratives and balances.
- Increase the power of the legislative branch to inspect the executive branch and its departments concerning their expenditures.
- More accurate control of the Federal Government accounting provided by the system.
- Radical change in the way departments and organizations spend the government's budget.

The negative aspect brought with the new system was the lack of continuity between the old and new processes of spending the government's money, and the accounting process used to register it. The SIAFI system introduced a new way to control the government's process of spending public money, but the government did not previously prepare the laws and regulations to direct the reorganization of its structure, and the new way to prove where the public money was spent.

In 1989, the government implemented SIAPE (Sistema Integrado de Acompanhamento de Pessoal (Personnel Accountancy Integrated System)). This new system was based on the same philosophy of SIAFI and was created to manage issues related to personnel, and works for civilian personnel only. SIAPE generates personnel

payrolls and performs all payment processes from the admission of new personnel into the Federal system until their retirement. The Brazilian Aeronautical Ministry was the first organization within the Federal Government that accepted and mandated the use of the system within its bases, depots, and other agencies. The acceptance of the new system without any previous study of its possible impact, or adaptation to the existing regulation, resulted in duplication of control and general confusion. This situation persists today.

In addition to the internal reorganization problems and confusion generated by the SIAFI system, some external factors important to BPR also deserve mention. Most important is the globalization process that forced Brazil to integrate economically with other countries. Globalization also brought the big economic crisis of 1998 and 1999 that led Brazil to reexamine the budget with significant cuts ordered by the IMF (International Monetary Fund).

This integration also led the Brazilian Government to reevaluate its position within the private sector of the economy, and generated the Privatization program. The program proposes the sale of all enterprises of which the government is the owner or over which it has major control. This situation has placed the government in a new environment where some structures are not necessary to perform privatized activities.

The most recent and important factor that will affect the Brazilian Aeronautical Ministry was the issue of the law 9573, which creates the Brazilian Ministry of Defense, which will be over and coordinate the activities of the three separate military services, Navy, Army and Air Force. Consequently, the Brazilian Aeronautical Ministry is immersed in this new concept and needs to be restructured in certain areas to improve its

performance and become more compatible with the new structure. Moreover, the militaries that direct the Ministry did not perceive the great opportunity it should be to reorganize the whole structure of the Aeronautical Ministry while the Ministry of Defense is being organized. They did not visualize that the new structure might become more lean, and focused on specific issues more related with the Brazilian Air Force, the armed arm of the Brazilian Aeronautical Ministry.

Consequently, business process reengineering is the fundamental tool to help the Brazilian Aeronautical Ministry to rethink its structure and reorganize itself. Using BPR they will achieve a better product when become reorganized.

Summary

This chapter examined the basic characteristics of Business Process Reengineering, as described by pioneers such as Hammer and Champy. The legal framework that provided support to BPR implementation within the DoD and U.S. Air Force was also discussed individually. The final sections of this chapter discussed the differences between BPR and other management processes. Finally, the structure of the Brazilian Aeronautical Ministry was introduced, and the last section discussed the challenges represented by its needs.

Chapter IV presents an analysis of data gathered from case studies, and presented as "lessons learned," in an attempt to determine the steps to build a technique to apply BPR, and also answer the investigative questions posed in the first chapter.

III. Methodology

Overview

The objective of this research is to develop a methodology to apply Business Process Reengineering within the Brazilian Aeronautical Ministry, in order to create a basis to reengineer current internal processes. To achieve this objective, the following investigative questions will be addressed:

I - About U. S. Military and civilian uses of BPR:

1. How are the DoD and U. S. Air Force using BPR?
2. What evidences of success is found in the way that DoD and U. S. Air Force are using BPR?
3. What challenges are the DoD and U. S. Air Force facing?

II - About adapting BPR to the needs of the Brazilian Aeronautical Ministry:

1. What are the issues in the Brazilian Aeronautical Ministry that suggest a need for BPR?
2. What expectations are reasonable for BPR within Brazilian Aeronautical Ministry?
3. How can BPR best be adapted to Brazilian Aeronautical Ministry?
4. What problems might be expected with BPR because of nature and culture of Brazilian Aeronautical Ministry?

This chapter details the research design employed to gather evidence to answer the above questions. The characteristics of the research and the methods of collecting and analyzing data will now be discussed.

The type of data to be analyzed for this research determined the method of data collection and analysis. The qualitative approach was used to develop the present research. In the development process, the data investigated are written laws, academic articles, directives, World Wide Web pages, books, dissertations, theses and publications related to BPR. The search will be undertaken for evidence to support the proposed methodology.

Research Design

As a qualitative study, this research uses the grounded theory approach, focusing on understanding the implementation of BPR within the U. S. Federal Government, the DOD and U.S. Air Force, and exploring "lessons learned" from case studies analyzed. This approach will also be used to develop a BPR methodology that can be applied within the Brazilian Aeronautical Ministry based on the study's results.

The grounded theory approach is "the method that uses a systematic set of procedures to develop an inductively derived theory about a phenomenon" (Strauss and Corbin, 1990:23). It will be useful here because it allows a focus on contextual and proceeding elements as well as the action of key players associated with organizational change, while reengineering processes within one organization.

The topic BPR is sufficient to provide adequate content through the investigation of many documents, academic literature and World Wide Web pages on the Internet

related to this field. Thus, it will be necessary to search the literature for examples of implementation of BPR in military and civilian organizations, within the U.S. government, and create parameters to develop the methodology.

Data Collected

In order to get a better understanding of BPR and its application, the data collection for this study was divided into three parts. The first part consisted of analysis of published books, academic articles and theses related with BPR. The information collected to provide a definition of the term Business Process Reengineering, and to obtain the parameters used to apply it, came from the following sources:

1. Reengineering the Corporation: A Manifesto for Business Revolution (Hammer and Champy, 1994);
2. The Reengineering Revolution (Hammer and Stanton, 1994);
3. Framework for Managing Process Improvement: A Guide to the Methodology (Davis, 1994);
4. Reengineering Management: The Mandate for New Leadership (Champy, 1995);
5. Beyond Reengineering: How the Process-Centered Organization is Changing our Work and Our Lives (Hammer, 1996);
6. Academic articles, theses and other publications.

These sources of data were the main components used for understanding the meaning of BPR, and the analysis of the data collected were discussed in the second chapter of this thesis, "Literature Review."

The second part of data collection focused on the application of BPR within the U. S. Federal Government, specifically the Department of Defense and U.S. Air Force. To do this, laws, directives, rules, regulations, and other Federal Government, Department of Defense, and Air Force official textual information related with BPR were analyzed. The major sources of this data consisted of:

1. Paperwork Reduction Act of 1980;
2. Government Performance and Results Act of 1993 (GPRA);
3. President's National Performance Review;
4. Paperwork Reduction Reauthorization Act of 1995;
5. Information Technology Management Reform Act of 1996 (ITMRA);
6. Defense directives and other regulations.

These sources of data were the main components analyzed to understand the use of BPR, within the Federal Government, the Department of Defense, and the U. S. Air Force, and also get the definition of parameters to apply BPR. The first part of these data, composed of books, academic articles, theses and other publications was discussed in the second chapter of this thesis, "Literature Review," when the laws, regulations and rules were analyzed. This part also included methodologies used to apply BPR, and will be examined in the fourth chapter of this thesis.

The third part of the data collected for this research was based on the "lessons learned" from various case studies, and the requirements of the Brazilian Aeronautical Ministry. This part of the study will also be addressed in the next chapter of the thesis, "Analysis and Results."

The case study approach has often been useful in investigating complex social areas or concepts such as BPR. The data sources consulted in this part of the study were in the form of scholarly journals, academic articles, reports, and World Wide Web pages related to the topic BPR. The information obtained from this data serves as supplemental information to the previous data sources.

The goals for this research are to interpret and critically analyze the data sources. During the research the interpretation of the text was used, and the regularities were explored to allow for analysis and inferences about the implementation and usefulness of BPR. A review of all pertinent literature in this field was conducted in developing the methodology.

Summary

This chapter examined the methodology followed in an attempt to answer the investigative questions addressed. The qualitative approach was explained, and each step necessary to collect the data for this study was delineated. Further, the analysis and results will be exposed.

IV. Analysis and Results

Overview

This chapter will cover the analysis of data collected from the literature researched. The main focus of this chapter is to provide answers to the research questions. By answering these questions and by exploring the "lessons learned" in the case studies, the objective will be to assess the potential for applying Business Process Reengineering to the Brazilian Aeronautical Ministry.

Data Analyzed

The data were first analyzed to form a baseline definition of Business Process Reengineering, which is "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, 1994: 32). To achieve the research objective, it was necessary to interpret the definitions of BPR found in the literature, and discussed in the second chapter of this thesis. Content analysis was applied to analyze the different points of view that emerged about BPR and its applications. The study of texts for salient themes and patterns, from which inferences were made, were also used (Marshall and Rossman, 1995).

During this analysis, books, legal documents, and directive texts were analyzed for understanding and meaning. As recurring themes like TQM and Activity Based Costing (ABC) were detected, notes were made so further iterations of analysis could be accomplished to better understand the material. This iterative analysis allowed individual documents to be incorporated into a meaningful whole. The "lessons learned" from the

field were very special and productive for understanding the whole process developed when the methodologies were applied.

Application of Business Process Reengineering – Methodologies

Business Process Reengineering is an innovative change approach, which aims at achieving dramatic performance improvements by radically redesigning business processes. It allows the optimization of workflow and improves the productivity in an organization. It often entails the integration of cross-functional activities and cultural changes.

A successful BPR process doesn't happen just because roomfuls of people exchange a lot of ideas about how to streamline operations. A disciplined step-by-step approach to implementing BPR is critical to the effort. BPR can foster dramatic improvement in productivity only when properly guided under a comprehensive methodology. Earlier studies present BPR methodologies by means of approaches, life cycle, or guidelines.

Davenport and Short proposed a five-step approach to reengineer business processes (Davenport and Short, 1990):

1. Develop business vision,
2. Identify critical processes,
3. Understand the current processes,
4. Brainstorm new processes,

5. Build a prototype of the new process.

The steps proposed by Davenport and Short are self-explanatory and don't need clarifications at all.

Klein also proposed a methodology consisting of five stages (Klein, 1994): Preparation, Identification, Vision, Solution, and Transformation. In the preparation stage, the team who will perform BPR is organized. During the identification stage, a customer-oriented process model of the business is developed. In the vision stage, critical processes for redesign are identified. In the solution stage, the technical and social requirements for the new processes are planned. In the transformation stage, the BPR plans developed in the solution stage are implemented.

Guha introduced another methodology, which contained six steps for BPR (Guha, et al., 1993). The six steps are Envision, Initiation, Diagnosis, Redesign, Reconstruct, and Monitor. In the envision stage, BPR opportunities are identified and management support is secured. In the initiation stage, the BPR team is organized and performance goals are set. In the diagnosis stage, the pathologies of the existing processes are identified. In the redesign stage, alternatives are evaluated and new processes are planned and prototyped. In the reconstruct stage, the new process is installed. In the monitor stage, the performance is measured and linked to quality improvement.

Based on previous guidelines Kim presented a paper in 1996 with a five stage methodology (Kim, 1996). The five stages proposed are Envision, Definition, Diagnosis, Design and Implementation. The stages are subdivided in main tasks with detailed activities. Envision includes developing business vision, selecting one BPR champion,

benchmarking, defining BPR objectives and evaluating current processes. Definition has the following tasks: identify critical processes, determine the project scope, establish the project team, build the project plan, and assess the potential impact. The diagnosis stage contains the following activities: document existing processes, uncover pathologies, develop performance measurement, define performance objectives, and assess the potential impacts. The design stage has the following tasks: explore and evaluate alternatives, design the new process, develop strategies for change, design IS architecture, and builds a prototype. The last stage, implementation, is composed of installation, refine performance objectives, and test and tune.

The methodology also presents deliverables for each stage, to assist analysts in defining checkpoints and milestones.

Dividing a BPR process into several stages gives structure to the complicated project and makes BPR implementation more manageable.

Application of Business Process Reengineering – The DoD Methodology

This section addresses the answer to the investigative question: *How are DoD and U.S. Air Force using BPR?*

The first methodology for BPR used within the DoD was provided by the DoD 8020.1-M and can be broken down into five stages. This methodology was developed in early 1993 (D. Appleton Co., 1993), and the five stages are:

1. Strategic Planning;

2. Activity Modeling;

3. Activity Based Costing;

4. Benchmark;

5. Simulation.

Strategic Planning was the first step mandated by DoD in its methodology. This was the technique that the organization uses to establish the context in which it would operate with respect to its defined mission. The strategic plan established the vision for the desired state of the organization. The strategic plan also established objectives, processes, goals, and the work plan. At this stage, the project team identifies the major customers' groupings and requirements; an analysis of its weaknesses, strengths, opportunities and threats with respect to the external environment; an identification of the core competencies of the organization; and identification of breakthrough objectives for the organization. "Two types of studies are carried out at this time. The first of these is an analysis of how the enterprise functions; the second is a management-oriented study of how it might be made to function better with the help of technology" (Martin, 1989: 103).

The second stage was called Activity Modeling. Modeling provides a method of communication, which is important, when the process that is being reengineered is cross-functional. Modeling was used by organizations to enhance the understanding of the processes. The use of activity, or "as-is" modeling, helped to describe how things were, and also how it would be, based on the redesign criteria, called "to-be" modeling. In the activity modeling stage the business was decomposed step-by-step into activities that make up the process. The team usually develops a model of the activities and data associated with the process.

There are many ways to perform activity modeling, but the DoD Corporate Information Management Information Technology Policy Board has mandated IDEF0 as the standard for DoD activity modeling. IDEF0 is a structured modeling technique that was developed by the Department of Defense. This study will therefore limit its definition of activity modeling to IDEF0 since its use is mandated.

In the third stage of the BPR methodology the team project used the model to quantify process level of effort through Activity Based Costing (ABC).

Activity Based Costing is a technique to quantitatively measure the cost and performance of activities, resources and cost objects, including overhead, when appropriate. ABC captures organizational costs for the factors of production and administrative expenses, and applies them to the defined activity structure. It is an accounting technique that allows an organization to determine the actual cost associated with each product and service produced by that enterprise without regard to the organizational structure of the enterprise. The application can be as rigorous as a definite mathematical distribution, or as creative as a selective assignment using a surrogate indicator. ABC is a process of simplifying and clarifying decisions required by the process evaluators and senior management. This provides the organization with more accurate costing information and improves the organization's ability to discriminate between value-added and non-value-added activities. "A value-added activity is defined as an activity with input costs plus activity costs that are lower than the value of its output product or service. Correspondingly, a non-value-added activity is defined as an activity with input costs plus activity costs that exceed the value of its output product or service" (D. Appleton Co., 1993: 103).

In the fourth stage the team project used the Benchmark technique to facilitate the development of alternative solutions.

"Benchmarking is a technique for measuring processes against those of recognized leaders to establish priorities and targets leading to process improvement" (Davis, 1994: A-2). Lawrence S. Pryor provides a good definition of benchmarking as "measuring your performance against that of best-in-class companies, determining how the best-in-class achieve those performance levels, and using the information as a basis for your own company's targets, strategies, and implementation" (Evans and Lindsay, 1996: 339).

Types of benchmarking vary from one author to another. According to Evans and Lindsay there are three types:

- "Performance benchmarking, which involves pricing, technical quality, features and other quality or performance characteristics of products and services.

- Process benchmarking, which centers on work processes such as billing, order entry, or employee training.

- Strategic benchmarking, which examines how companies compete and seeks the winning strategies that have led to competitive advantage and market success" (Evans and Lindsay, 1996:340).

The last step proposed by the former DoD methodology was Simulation, the technique of modeling the implementation of alternative solutions to evaluate their

effectiveness. This technique relies on computers and simulation theory to allow the organization to more effectively and efficiently evaluate alternatives.

The latest version of the methodology, commonly referred to in the DoD as the Management Framework (D. Appleton Co., 1993), is described below. This methodology is the product of an evolution that has taken place over the last two years in an attempt to develop the best and most efficient and effective approach to BPR in DoD.

The tasks to be performed are:

1. Define:

Define functional objectives. A framework is established by defining these baselines, objectives and strategies for the function. Determine the functional management strategy to be followed in streamlining and standardizing processes. Establish the process, data, and information systems baselines from which to begin the process.

2. Analyze:

Analyze the business processes to eliminate non-value added processes, simplify and streamline limited value added processes, and examine all processes to identify more effective and efficient alternatives to the process, data, and system baselines.

3. Evaluate:

Evaluate alternatives to baseline processes through a preliminary functional economic analysis to select a preferred course of action.

4. Plan:

Plan implementation of the preferred course of action by developing detailed statements of requirements, baseline impacts, costs, benefits, and schedule.

5. Approve:

Extract from the planning data the information needed to finalize the functional economic analysis, which is used by senior management to approve proceeding with the proposed process, and any associated data or system changes.

6. Execute:

Execute the approved process and data changes, and provide functional management oversight of any associated information system changes.

To the extent that the redesigned process requires an investment to implement, the team would develop a business case, also called Functional Economic Analysis (FEA), which compared the risk-adjusted financial benefits of alternative solutions. Functional Economic Analysis provides a framework for exploring alternative opportunities for improving business process based on sound business case practices. The technique to develop the FEA is out of the scope of this research.

Following the tasks above, a 25-step methodology has been developed by the DoD that is intended to assist the agency in taking the BPR project team from developing a strategic plan to the development of a final Functional Economic Analysis or business case. The 25-steps are:

"Step 1: Develop/Validate the strategic plan

Step 2: Develop/Validate the business systems plan

Step 3: Develop/Validate the business plan

Step 4: Construct performance cells

Step 5: Establish process improvement project

Step 6: Conduct baseline analysis

Step7: Conduct improvement analysis

Step 8: Redesign/Reengineer processes

Step 9: Prepare functional economic analysis decision package

Step10: Assess organizational capability

Step 11: Identify organizational change requirements

Step 12: Develop organizational change management plan

Step 13: Assess technical capability

Step 14: Identify technical change requirements

Step 15: Develop technical change management plan

Step 16: Configure technical change management plan

Step 17: Develop application systems

Step 18: Develop database structures

Step 19: Design implementation plan

Step 20: Develop systems migration and integration plan

Step 21: Develop project execution plan

Step 22: Deploy organizational change management plan

Step 23: Implement/Deploy technical change management plan

Step 24: Operate/Maintain information systems

Step 25: Conduct continuous process improvement program" (D. Appleton Co., 1993).

These steps go far beyond the scope advocated by any other methodology applied in the private sector to generate a BPR solution.

Case Studies

In this section the case studies give valuable anecdotal evidence for addressing the answers to the investigative questions established in the Proposition section of Chapter I. The questions are: "*What evidences of success is found on the way that DoD and U.S. Air Force are using BPR?*" and "*What challenges are DoD and U.S. Air Force facing?*"

At this point the research looks for evidences of success when the BPR methodology was applied. The "lessons learned" from the case studies also helped to answer the investigative questions.

The Air Force's Reengineering Effort – "Lean Logistics" (GAO/NSIAD Report-96-5).

"Lean Logistics" is the name of the reengineering project that the Air Force started in order to improve its logistics system. The reengineering process became the main effort developed by the Air Force in recognition that the current process operates an inefficient and costly logistics system. The reengineering program also began in recognition of increasing budgetary pressures, the changing global threat, and the need for radical improvements to its logistics systems.

The current Air Force logistics system is slow and cumbersome. Under the current process, the Air Force can spend several months or even years to contract for an item or piece parts and have it delivered or it may take several months to repair the parts and then distribute them to the end user. The complexity of the repair and distribution process creates many different stopping points and layers of inventory as parts move through the systems. Parts can accumulate at each step in the process, which increases the total number of parts in the pipeline.

The Air Force has developed both a three-level and a two-level maintenance concept to repair component parts. Under the three-level concept (organizational, intermediate, and depot), a broken part must pass through a number of base level and depot-level steps in the pipeline. After a mechanic removes a broken part from the aircraft, it is routed through the base repair process. If the part cannot be repaired at the base, it is sent to the Air Logistics Center (ALC) and enters the depot repair system. After it is repaired, the part is either sent back to the base or returned to the Defense Logistics Agency (DLA) warehouse, where it is stored as serviceable inventory. When DLA receives a request for a part, it ships the part to the base, where it is stored until needed for installation on an aircraft.

Currently, the Air Force estimates that this repair cycle takes an average of 63 days to complete. This estimate, however, is largely based on engineering estimates that do not provide an accurate measure of repair cycle time. The actual repair time may be significantly longer because the Air Force does not include in its estimate the time a part sits in the repair shop or in storage awaiting repair.

Under the two-level maintenance concept (organizational and depot), items that were previously repaired at the intermediate base maintenance level will be repaired at the depot level, thus significantly reducing the logistics pipeline, inventory levels, and maintenance personnel and equipment at the base level (GAO/NSIAD Report-96-5: 27-29).

Since 1994, the Air Force has striven to obtain better results and a new reengineered logistics process. The initiative, called Lean Logistics is spearheaded by Air Force Material Command (AFMC), and aims to improve service to the end user while simultaneously reducing pipeline cost, time and excess inventory. The primary concepts to be followed by the project are:

1. Consolidated serviceable inventories, in which minimum levels of required inventory were stored in centralized distribution points in ALCs;
2. Rapid transportation of parts between bases and ALCs;

3. Repair of broken parts at ALCs as they arrive from bases or as centralized inventory levels drop;
4. Improved tracking of parts through the repair process.

AFMC has developed the plan for implementing its Lean Logistics concept in the Air Force, and the first tests were scheduled to begin in fiscal year 1996. However, according to the GAO's report, a number of leading-edge practices that worked successfully in the private sector at reducing cost and improving service, were not incorporated into the Lean Logistics.

The teams, involving personnel from AFMC headquarters and each ALC, have been redesigning five underlying business processes as following:

Table 3: Business processes and areas analyzed within AFMC

Business area	Current process	Future process
Requirements determination	Purchase or repair of items based on forecasts produced by three different requirement computation systems and manual intervention.	Automated process to buy or repair items based on actual demands created when items are taken from the consolidated serviceable inventory
Stock control and distribution	Complex distribution process characterized by multiple layers of inventory, lack of asset visibility, and manual intervention.	Automated process to ship items where and when needed.
Workload management	Complex process to match requirements with internal Air Force sources of repair and available funding.	Streamlined process to channel Air Force repair requirements to any source of repair (Air Force, contractor, and other services).
Production	Lengthy aircraft overhaul and component repair processes.	Increased throughput, reduce operating expenses, reduced inventories.
Depot maintenance business area operations	Management information and measures focused on output efficiency.	Management information and measures focused on repair cost.

(Adapted from GAO/NSIAD Report-96-5: 32)

Also, some obstacles were detected in the same report issued by the GAO. Those obstacles are important and must be surpassed. One of them is the "corporate culture" within DoD and the Air Force, traditionally resistant to change. Another big problem is the necessary support from all functional groups and top management within AFMC, and DoD. At last, two points that appear to be obstacles must also be surpassed. One is the role of some organizations in the new approach that must be redirected. Thus, the role of DLA as the traditional supplier of consumable items and as a storage and distribution service must change. The final point is the development of an information system that provides the accurate, real-time information needed. Without these logistics system improvements, the Air Force will continue to operate a logistics system that results in billions of dollars of wasted resources.

The DoD Temporary Duty Travel Reengineering Effort

(GAO/AIMD/NSIAD-95-90)

Mission travel for the DoD is big business. Military and civilian members, stationed around the world, filed 8.2 million temporary duty travel vouchers in 1994, which included travel for business, deployment, and training purposes. This process for managing the travel inconveniences the traveler, and virtually drowns everyone in a sea of paper.

DoD travel processing is done on a decentralized basis. Travel processing generally includes the following elements:

1. Authorizing the funding and appropriate means of travel and issuing travel orders;
2. Arranging transportation and accommodations and developing itineraries;

3. Making travel expenditures, purchasing tickets, and collecting receipts;
4. Preparing and processing vouchers based on receipts and other supporting documents;
5. Reconciling accounts, auditing vouchers, making payments, and generating management reports.

Indirect travel costs for this process may be 30 percent of direct costs. Travel processing differs not only among the military services, but also within each service. The number and type of steps to complete the processes vary depending upon local policies and the degree to which automation is used. However, DoD officials pointed out that certain steps are usually performed at all locations.

The overall steps followed by most of the agencies are described bellow:

> Prior to the travel, the traveler obtains information, which is used by a clerk to prepare a written travel order. The traveler's supervisor then must approve the travel order. The administrative/budget office reviews the travel order, assigns a travel order number and an accounting code to the travel order, and establishes an obligation of funds. If the traveler needs a cash advance, the local disbursing/travel office computes and pays the advance. Because there is sometimes no single point for a DoD traveler to make all travel arrangements; travelers may have to rely on several offices to make transportation, lodging, and car rental arrangements.
>
> After returning from a trip, the traveler must also complete numerous steps. For example, the traveler manually prepares a travel expense voucher and attaches receipts and other supporting documents. The voucher is approved by the traveler's supervisor and sent to one of over 700 voucher-processing centers for computation. To compute the proper expense, the processing centers usually refer to DoD's travel regulations, which total 1,357 pages. A supervisor then audits the expense, particularly to identify any disallowances. A clerk sorts the five copies of the voucher and distributes them. A disbursing office collects from the traveler any unused advances or reimburses the traveler for any amounts due, depending on the claim. The disbursing office then records the payment and files vouchers and supporting documents (GAO/AIMD/NSIAD-95-90: 5).

In June 1995, the Under Secretaries of Defense for Acquisition and Technology, Personnel and Readiness, and Comptroller, and the Director of Administration and

Management, chartered the DoD Task Force to Reengineer Travel. The objectives were to reduce overall costs, improve customer service, and support mission requirements. The vision to be pursued was a seamless, paperless system that meets the needs of the travelers, commanders, and process owners.

The final key features provided by the task force were:

1. Simple rules and automated tools will help to carry out the responsibilities.
2. Simplified accounting and management information system will let supervisors track their funds.
3. Arrangements are based on mission rather than status of traveler.
4. Travelers and supervisors will have one-stop shopping for all arrangements through mandatory use of a Commercial Travel Office (CTO).
5. Data will be entered once, regardless of source, and all levels will rely on electronic records rather than paper documents.
6. Travelers will be paid fairly and quickly through a process they can easily understand and use.
7. No more paper statements of non-availability.
8. The traveler would hold all receipts, not the Government.
9. Travelers will use commercial travel cards to pay for all travel expenses, consistent with mission requirements. Travelers will not receive cash advances, except in the most unusual circumstances. The traveler must use the travel card for advances or pay most charges on the travel card.
10. Continuously assess performance for improvement.

The implementation of these recommendations was managed by the DoD Comptroller, according to designation made by the Under Secretary of Defense. The Comptroller created a transition task force of functional experts and Service and agency representatives. The task force process includes a steering group of Major General/Rear Admiral or equivalent representatives from all the Services, and it has a working group level to tackle the specifics of implementation.

They have prepared an entitlement package that will replace chapter 4 of both the Joint Federal Travel Regulations and the Joint Travel Regulations, which cover military and civilian travelers, respectively. They simplify the regulations and reduce the existing entitlements by over 90 percent.

The biggest issue here was to overcome the "corporate culture," its distrust of the new technology and the reengineering process in general. The pilot project was tested and gave the notion about the cost reduction. The last phase of the project was developing performance measures to use throughout the testing and implementation phases. They included total cycle time, indirect and direct costs of travel, and customer satisfaction.

Reengineering the Supply Chain – Department of Energy (Bodrock, 1995)

The Kansas City division of Allied Signal Inc., a prime contractor to the Department of Energy (DoE), operates a facility that produces non-nuclear components of nuclear weapons. "The division is a government-owned facility with 3,200 employees, operating under government rules and regulations, including the Federal Acquisition Regulation (FAR)." (Bodrock, 1995: 20A).

Prior to the reengineering process, in 1993 Allied Signal took up to six weeks to purchase low-cost, non-inventory, off-the-shelf items. The agency's internal customers, its employees, might need a part on the same day they asked for it, or the next day, but they had to fill out a requisition and wait. In the analysis of 10,000 transactions, the cross functional team designated to reengineer the process found that, on the average, each transaction "entailed 106 steps, cost $280 and took 267 hours to complete." (Bodrock, 1995: 20A)

The team designated to reengineer the process took five months to come up with the recommendations and another five months to set up and pilot the process. They first studied the enterprise and the specific process to be reengineered. After benchmarking the commercial best practice, the team tested and installed a purchase-card program that reduced transaction costs by 75 percent and processing time by 98 percent. "The cards, which work like credit cards are currently used by 200 employees, and may be issued to as many as 320 employees," (Bodrock, 1995: 20A) or 10 percent of the total workforce. The purchase card is just one step in Allied Signal's broader move toward world-class procurement and material management, a move that is being accomplished within the framework of the FAR and with strong support from DoE.

Allied Signal's experience shows that leadership, a reasonable amount of time and structured procedures for solving problems are necessary for bringing about process and culture change. Finally, Allied Signal now has a logical, structured, nine step process for defining problems, envisioning new process outcomes, implementing change and measuring results.

The Army Corps of Engineers Reengineering Process (Caudle, 1994)

The Army Corps of Engineers is the largest engineering management organization in the world. In the early 1980s, the Corps began to review its business processes. To modernize its automated systems from a business perspective, the Corps chose to pursue a business modernization approach rather than the traditional approach of automating existing processes. Information systems planning studies showed legacy systems did not meet management needs and future systems development needed to proceed in a more orderly and disciplined manner and involve more field office and functional managers. The Corps realized that it had to change its systems development approach from building "stovepipe" systems to building corporate, integrated, shared data systems.

> The business modernization approach followed four general steps – strategic planning, tactical planning, structured requirements analysis, and systems development. In 1984, the Corps developed its strategic approach, methodology, and tools, followed in 1986 by the start of requirement analysis, defining key systems, and starting specific systems design. In the early 1990s, new systems were developed and by 1997 four major systems were scheduled to be completely deployed – financial management, program and project management, real state management, and resident engineer environment. (Caudle, 1994: 80)

An integrated set of business systems plans was completed during 1984-1986, using agency-wide information systems planning methodology. Eight business processes were identified as a priority for systems reengineering. These business processes were systematically reviewed and restructured using the Corps methodology for business reengineering. Several iterations of process and data models were developed during the information engineering processes beginning with high level models. During the final phase of business reengineering procedure the application is placed into operation.

The effort looked at all the major software systems used in the Corps with the goals of reducing data collection, verification, and processing costs. The process achieved the cost reduction in system design, development, and maintenance. It also improved accuracy, completeness, availability, timeliness and usefulness of information for operational users and decision-makers.

Despite the existence of many case studies, this research focused on specific case studies where the author detected the participation of organizations within the DoD, U.S. Air Force, or the Federal Government.

A feasible methodology for Business Process Reengineering within Brazilian Aeronautical Ministry

This section answers the most important investigative question of this research: *How can BPR best be adapted to Brazilian Aeronautical Ministry?*

While the data collected and analyzed within the case studies did not reflect all the steps used to develop the business process reengineering method within the organizations, there was sufficient information to suggest promising directions. The data were not sufficiently clear to provide evidence from the use of one specific methodology for the teams that worked in the reengineering project object of this analysis. Even so, the research brought a very good idea about the steps to pursue in order to reengineer one process.

The most important thing to have before BPR starts is top management support. The support provided by the DoD comptroller was fundamental to the success in the case study on "Reengineering the DoD Temporary Duty Travel" (GAO/AIMD/NSIAD-95-90). It chose to lead the reengineering project, which will help to institutionalize the new

management philosophy. The DoD has a straightforward concept of how it is going to transform its existing travel system to achieve this vision: Simplify the rules, delegate authority, and use the best industry practices. The agency has a methodical plan: Collect baseline data on current travel process and test new procedures at pilot sites, then implement the new system one region at a time.

Again, with the "Lean Logistics," the same top management support is very important to provide the AFMC team with the necessary support to reengineer the Air Force's logistics system.

After that, the plan to apply Business Process Reengineering within the Brazilian Aeronautical Ministry is not very different from the DoD methodology. This research final proposition relies on the stages that are described bellow:

1. Envision the organization. In the first stage of the proposed methodology the team members will become familiar with the whole organization, in order to understand how it works. They will analyze all the structure and evaluate the current business processes of the entire organization.
2. Analysis of processes. In the second stage the team project will identify the critical processes for the organization, determine the reengineering project scope, build the reengineering project plan and assess the potential impact of the project.
3. Reengineering. The third stage will be used by the team to redefine the process that will be reengineered, define performance measurement, and objectives of the new process. In this stage they will also explore and

evaluate alternatives for the project, design the new process, and design I. S. architecture.

4. Implementation. The fourth stage, implementation, will be used to install the new process. At this time, they will refine performance objectives, test and tune the final product.
5. Continuous Improvement. The last stage will be used to benchmark the process reengineered, and evaluate if the process is achieving the customers needs. In this stage, the team will compare the new project with different sector practices that could be used to improve it.

These five stages listed above compose the backbone of the methodology to be applied within the Brazilian Aeronautical Ministry. The stages can be divided into steps, like the DoD's methodology, as shown:

1. Envision the organization:

   Construct the organizational structure charts and diagrams

   Develop and validate the strategic plan.

   Develop business area analysis.

   Develop and validate the business system plan.

   Develop and validate the business plan
2. Analysis:

   Conduct baseline analysis.

   Conduct Improvement analysis.

   Conduct processes analysis.

   Identify organizational change requirements

Identify organizational capabilities.

Assess technical capabilities.

Identify technical change requirements

3. Reengineer:

Redesign/Reengineer process.

Configure technical plan.

Design implementation plan.

Develop information system plan.

Develop system migration, development, and/or integration plan.

4. Implementation:

Develop project execution plan.

Implement technical changes.

Implement change management plan.

Operate and maintain information systems.

Training users in the new system.

Adjust the new process.

5. Continuous improvement:

Develop testing and benchmark new process.

Measure the results obtained.

Conduct continuous training of users.

Conduct continuous process improvement program.

The steps outlined above is a tentative effort to clarify the methodology to implement BPR within Brazilian Aeronautical Ministry, but some steps can be suppressed if the organization has already met those requirements.

Issues About the Methodology to be Applied Within the Brazilian Aeronautical Ministry

This section was developed to address the answers to the investigative questions related with the development of one BPR methodology to apply within the BAM.

The investigative question, *"What are the issues in Brazilian Aeronautical Ministry that suggests a need for BPR?"* is related with the whole environment that involves the BAM and is very specific. The environment and the issues that suggest the need for BPR within Brazilian Aeronautical Ministry were explained in detail in Chapter II.

To summarize, the research pointed to two main issues that represent the needs of BAM. The first one is the changes inducted by the use of the information technology – SIAFI system. The second is the creation of the Brazilian Ministry of Defense that might generate the administrative revolution within the military arena.

The methodology developed in the previous section intended to address the answer to the investigative question *"How can BPR be adapted to Brazilian Aeronautical Ministry?"*

Therefore, the methodology generated for use within the BAM is one adaptation of the present methodology used by the DoD and U. S. Air Force when conducting a reengineering project. The research did not find evidences that might be used against the

fact that the methodology used before could not be adapted and used in another situation in the future.

The other investigative questions, which are addressed in this section to clarify more details, are the following.

- *"What problems might be expected with BPR because of the nature and culture of Brazilian Aeronautical Ministry?"*

Some problems might be expected with BPR within the organizations. The first and most important is the existing culture. The current Brazilian Aeronautical Ministry culture was developed under a military oriented government. The government became more civilian oriented 12 years ago, after 1985, but many aspects of BAM are still much like the old military style government. In spite of the small size of the Brazilian Aeronautical Ministry, the cultural problem might hinder the development of a broad reengineering process. The "rethinking philosophy" established during the BPR project may be misunderstood by top managers, afraid of losing positions or influence, who could interfere in the development of the restructured model.

- *"What expectations are reasonable for BPR within Brazilian Aeronautical Ministry?"*

Like many new managerial tools, BPR might generate a great expectation about the results to be obtained during its introduction. In this phase, it is recommended that high expectations should be placed aside, and some reasonable results demonstrated to guarantee the necessary support and confidence. It is advocated that one small project should be designated to be the first one to be reengineered. After implementing the cultural adaptation, the second most important factor is the involvement of the

administration in the project. The lack of preparation within the organizations is the other obstacle to be overcome, because if one project fails in this first phase it could prejudice all further projects planned to be reengineered.

Summary

Chapter IV presented the results and analysis of data compiled for this study. The methodologies that exist to reengineer one organization were discussed, and some case studies were analyzed to construct a vision of one feasible methodology to apply BPR within the Brazilian Aeronautical Ministry.

It was found that the case studies did not establish a good vision of all steps pursued by the teams when they reengineered their processes. Even so, the author defined the basic plan for one methodology to apply BPR within the BAM. Finally, the problem to be faced when apply BPR were discussed.

In Chapter V, the impact and significance of these findings will be discussed along with limitations of the study, conclusion, and recommendations.

V. Discussion

Overview

In Chapter IV, results and analysis of this study's data were presented. Chapter V discusses the significance of the discoveries, identifies limitations of the research, and offers conclusions and recommendations.

Significance of Findings

The findings of this research are evaluated in the following sections.

Research Problem

This study undertook a systematic, qualitative study of business process reengineering within DoD, United States Air Force, and the U.S. Federal Government. The goal required that the literature be examined and evaluated in a rigorous manner concerning its value to the development of a new methodology. This was a broad and ambitious goal for this study.

The second chapter, "Literature Review," evaluated BPR and all the regulations and rules that are part of its framework. The fourth chapter broadened the study and analyzed some existing methodologies and case studies related to the use of BPR within DoD and U.S. Air Force. Unfortunately, the case studies were not sufficient to clarify the methodologies used within either DoD or the U.S. Air Force.

Investigative Questions

The original investigative question for this research was divided into two major areas to focus the analysis. The first area covered the use of BPR within Federal

Government, DoD and U.S. Air Force. The author found evidence in the NPR of 1993, and other related regulations that encourage the use of BPR within the Federal Government. Consequently, the DoD established the broadest program to apply BPR in all its services, initially called Functional Process Improvement (FPI). The FPI was introduced within DoD by the Corporate Information Management (CIM) Information Technology Policy Board in January of 1992. The main purpose of the program was to assist functional areas in making fundamental improvements in their business processes. The program implies the use of BPR as a management tool to solve problems. The methodology used for all the areas and services of the DoD was very simple initially, but it became more detailed as it was used more often. Nevertheless, the most frequent problem the teams faced was the lack of top management support for the changes to be implemented. In addition, all reports analyzed announced cuts in cost and performance improvement.

The second major area addressed was how to best adapt existing BPR methodologies and create a new one to address the needs of the Brazilian Aeronautical Ministry.

At this point, methodologies were examined and some case studies were discussed to obtain a better understanding of the steps followed by those teams that developed a project related with BPR. Some issues arose at this point and they suggest that the Brazilian Aeronautical Ministry requires restructuring according to the present circumstances. The research showed that Business Process Reengineering could be a very efficient tool to conduct this process. The study also suggests that the methodology used by DoD is perfectly adaptable and could be adopted within the Brazilian

Aeronautical Ministry. Perhaps, one of the most significant results of this study was the creation of the methodology in Chapter IV.

The construction of the methodology to guide projects was the intended outcome of this study. Although, some obstacles may be very hard to overcome, the political and top management support offers the promise of leading the methodology to a very successful achievement.

Finally, it is necessary to emphasize that the reengineering process is not a question of connection between "stovepipes." The reengineering process encompasses more than just rebuilding systems and software. As a matter of fact, it is almost a philosophy to look at the whole organization in a new light.

There is also one significant alert that Hammer and Stanton wrote in their book "Reengineering Revolution." They established "the top ten ways to fail at reengineering." They are:

1. Don't reengineer but say that you are.
2. Don't focus on processes.
3. Spend a lot of time analyzing the current situation.
4. Proceed without strong executive leadership.
5. Be timid in redesign.
6. Go directly from conceptual design to implementation.
7. Reengineer slowly.
8. Place some aspects of the business off-limits.
9. Adopt a conventional implementation style.
10. Ignore the concerns of your people. (Hammer and Stanton, 1994: 33)

Limitations of Study

The main limitation of this study is the potential unintentional bias on the part of the author. Inherent in any qualitative study is the interpretation bias presented by the researcher. A conscious effort was undertaken to avoid personal bias during the development of this study, but of course it cannot be ruled out as an influence.

Another limitation is the lack of a test procedure for the methodology developed. Testing should provide evidence about its applicability within any organization of the Brazilian Government.

Recommendations

Based on the above, it is recommended that the methodology developed in this study should be applied, tested, and evaluated within the Brazilian Aeronautical Ministry. The results of these tests should be compared to the effects found within DoD or U. S. Air Force. The overall results should provide cost reduction, better customer satisfaction, and process improvement. The final results of such tests could provide insight to whether the methodology is feasible for wide scale adoption within the Brazilian Aeronautical Ministry.

Summary

This thesis research studied Business Process Reengineering. The discussion began in Chapter II with the clarification of BPR and the concepts that have been evolving since the beginning of this decade. Furthermore, in the same chapter, the relevant legislation, rules, and regulations were analyzed to establish a framework that guided the Federal Government and DoD to apply BPR as a powerful tool to reorganize their organizations. In the same chapter the structure of the Brazilian Aeronautical Ministry and its needs were discussed in order to clarify the scope of the research.

Finally, in Chapter IV the methodologies developed by other researchers were discussed, in addition, the methodology used by DoD was depicted and analyzed. From this discussion the idea about one specific methodology to apply BPR within the Brazilian Aeronautical Ministry arose. In order to further sustain the ideas about the new

methodology some case studies were analyzed, though they did not describe the specific steps followed by the teams that performed the reengineering projects. Nevertheless, the information obtained was instrumental for establishing a framework for developing a Business Process Reengineering model for use in projects within the Brazilian Aeronautical Ministry.

VI. References:

Best, David P. The Fourth Resource: Information and its Management. Hampshire, England: Aslib/Gower, 1996.

Bodrock, Phil. "Reengineering the Supply Chain," Government Executive: Reengineering Guide (Supplement): 20A (September 1995).

Brancheau, James C., Brian D. Janz, and James C. Wetherbe. "Key Issues in Information Systems Management: 1994-95 SIM Delphi Results," MIS Quarterly, 20: 225-242 (June 1996).

Caudle, Sharon L., Wilpen L. Gorr, and Kathryn E. Newcomer. "Key Information Systems Management Issues for the Public Sector," MIS Quarterly, 15: 171-188 (June 1991).

Caudle, Sharon L. Reengineering for Results: Key to Success from Government Experience. Washington DC: Center for Information Management, National Academy of Public Administration, 1994.

Champy, James. Reengineering Management: The Mandate for New Leadership. New York: Harper Collins Publishers, 1995.

D. Appleton Company. Corporate Information Management: Process Improvement Methodology For DoD Functional Managers (Second Edition). Fairfax VA. January 1993.

Davenport, T. H. Process Innovation: Reengineering Work Through Information Technology. Boston: Harvard Business School Press, 1993.

Davenport, T. H. and Short J. E. "The New Industrial Engineering: Information Technology and Business Process Redesign," Sloan Management Review, 31: 11-27 (Summer 1990).

Davis, Robert J. Framework For Managing Process Improvement: A Guide to the Methodology. Arlington VA: ASD/C3I, 1994.

Department of Defense. Defense Information Management Program. DoD Directive 8000.1. Washington DC: GPO, 1992.

Department of Defense. DoD Information Technology Management Strategic Plan. Washington DC: GPO, 1996.

Evans, James R. and William M. Lindsay. The Management and Control of Quality. Saint Paul MN: West Publishing Company, 1996.

Gallivan, Michael J. "Changes in the Management of the Information Systems Organization: An Exploratory Study," Proceedings of the 1994 Computer Personnel Research Conference on Reinventing IS. 65-77. New York: ACM, 1994.

General Accounting Office. Best Management Practices: Reengineering the Air Force's Logistics System Can Yield Substantial Savings. Report No. GAO/NSIAD-96-5B-266259. Washington DC: The GAO Office, 1996.

General Accounting Office. Best Management Practices: Travel Process Reengineering within DoD. Report No GAO/AIMD/NSIAD-95-90 B-259460 Washington DC: The GAO Office, 1995.

General Services Administration. Federal Government Business Process Reengineering: Lessons Learned. Report KAP-94-2-I. Washington DC: The GSA Office, February 1994.

Guha, S., Kettinger W. J. and Ten, J. T. C. "Business Process Reengineering: Building a Comprehensive Methodology," Information Systems Management: 1322-1354. (Summer 1993).

Hammer, Michael. Beyond Reengineering: How the Process-centered Organization is Changing Our Work and Our Lives. New York: Harper Collins Publishers, 1996.

Hammer, Michael and James Champy. Reengineering the Corporation: A Manifesto for Business Revolution. New York: Harper Collins Publishers, 1994.

Hammer, Michael and Steven Stanton. The Reengineering Revolution. New York: Harper Collins Publishers, 1994.

Kim, Chung "A Comprehensive Methodology for Business Process Reengineering," The Journal of Computer Information Systems, 37: 53-57. (Fall 1996).

Klein, M. M. "The Most Fatal Reengineering Mistakes," Information Strategy: The Executive's Journal: 21-28. (Summer 1994).

Marshall, Catherine and Gretchen B. Rossman. Designing Qualitative Research (Second Edition). Thousand Oaks CA: SAGE Publications, 1995.

Martin, James. Information Engineering: A Trilogy, Book 1: Introduction. Englewood Cliffs NJ: Prentice-Hall, Inc. 1989.

Niederman, Fred, James C. Brancheau, and James C.Wetherbe. "Information Systems Management Issues for the 1990s," MIS Quarterly, 15: 475-500 (December 1991).

Strauss, A. and Corbin, James. Basics of Qualitative Research. Newbury Park CA: Sage, 1990.

United States Congress. Information Technology Reform Act of 1996. Division E, Public Law 104-106. Washington DC: GPO, 1996.

United States Congress. Paperwork Reduction Act of 1995. United States Code 44, Chapter 35. Washington DC: GPO, 1995.

Wassenaar, Arjen. "Linking Information Systems Planning to Business Strategy." in Business Strategy and Information Technology. New York: Routledge, 1990.

Yoemans, Michael S. and Janice L. Beckett. "Achieving Breakthrough Improvement Through Business Process Reengineering," Armed Forces Comptroller: 7-11. (Winter 1996).

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13. ABSTRACT *(Maximum 200 words)*

The purpose of this research was to examine Business Process Reengineering as a feasible methodology to be used to help reorganize the Brazilian Aeronautical Ministry. Using a qualitative approach, this research developed an analysis of BPR beginning with the concepts elaborated by Hammer and Champy. The research also investigated the laws and regulations used by the United States Government to apply BPR in all branches of its military. After establishing the framework, some methodologies and case studies were analyzed to obtain the big picture about the application of BPR as a managerial tool to reorganize organizations. The results of this study revealed that the methodology used by DoD and U.S. Air Force could be adapted, and generate a feasible methodology to apply BPR within the Brazilian Aeronautical Ministry.

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