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**MBA PROFESSIONAL REPORT**

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**Application of the Complexity Management Business Approach in  
DoD's Financial Functions**

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**By: Jorge I. Jimenez**

**June 2006**

**Advisors: Uday Apte  
John Mutty**

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<b>REPORT DOCUMENTATION PAGE</b>			<i>Form Approved OMB No. 0704-0188</i>
Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instruction, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188) Washington DC 20503.			
<b>1. AGENCY USE ONLY (Leave blank)</b>	<b>2. REPORT DATE</b> June 2006	<b>3. REPORT TYPE AND DATES COVERED</b> MBA Professional Report	
<b>4. TITLE AND SUBTITLE:</b> Title (Mix case letters) <b>Application of the Complexity Management Business Approach in DoD's Financial Functions</b>			<b>5. FUNDING NUMBERS</b>
<b>6. AUTHOR(S)</b> Jorge I. Jimenez			
<b>7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)</b> Naval Postgraduate School Monterey, CA 93943-5000			<b>8. PERFORMING ORGANIZATION REPORT NUMBER</b>
<b>9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES)</b> N/A			<b>10. SPONSORING / MONITORING AGENCY REPORT NUMBER</b>
<b>11. SUPPLEMENTARY NOTES</b> The views expressed in this report are those of the author(s) and do not reflect the official policy or position of the Department of Defense or the U.S. Government.			
<b>12a. DISTRIBUTION / AVAILABILITY STATEMENT</b> Approved for public release; distribution is unlimited			<b>12b. DISTRIBUTION CODE</b>
<b>13. ABSTRACT (maximum 200 words)</b> This project describes the emerging approach of Complexity Management, translates it for use in the Department of Defense (DoD), and applies its principles to DoD's financial functions. Complexity Management is a new business approach introduced by The George Group Consulting company. The basic principle behind this approach is the identification and manipulation of complexity to improve efficiencies and reduce cost in an organization. The ultimate goals for this project were to: <ul style="list-style-type: none"> <li>• Analyze the Complexity Management approach, as presented by The George Group.</li> <li>• Evaluate the feasibility of applying the approach in DoD, in particular to its financial functions.</li> <li>• Determine if this new business approach would be useful in DoD.</li> </ul> Most people would agree that DoD is an extremely complex organization due to its size, mission, and nature. As such, Complexity Management should be an imperative approach in its operations and a fundamental part of its culture. This project provides an introduction to Complexity Management and a discussion of the benefits DoD could achieve with this new business approach.			
<b>14. SUBJECT TERMS</b> Complexity Management, Operations Management, DoD Financial Systems, GFEBs, ERP, DEAMS.			<b>15. NUMBER OF PAGES</b> 55
			<b>16. PRICE CODE</b>
<b>17. SECURITY CLASSIFICATION OF REPORT</b> Unclassified	<b>18. SECURITY CLASSIFICATION OF THIS PAGE</b> Unclassified	<b>19. SECURITY CLASSIFICATION OF ABSTRACT</b> Unclassified	<b>20. LIMITATION OF ABSTRACT</b> UL

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**APPLICATION OF THE COMPLEXITY MANAGEMENT  
BUSINESS APPROACH IN DOD'S FINANCIAL FUNCTIONS**

Jorge I. Jimenez, Captain, United States Air Force

Submitted in partial fulfillment of the requirements for the degree of

**MASTER OF BUSINESS ADMINISTRATION**

from the

**NAVAL POSTGRADUATE SCHOOL**

**June 2006**

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# **APPLICATION OF THE COMPLEXITY MANAGEMENT BUSINESS APPROACH IN DOD'S FINANCIAL FUNCTIONS**

## **ABSTRACT**

This project describes the emerging approach of Complexity Management, translates it for use in the Department of Defense (DoD), and applies its principles to DoD's financial functions. Complexity Management is a new business approach introduced by The George Group Consulting company. The basic principle behind this approach is the identification and manipulation of complexity to improve efficiencies and reduce cost in an organization. The ultimate goals for this project were to:

- Analyze the Complexity Management approach, as presented by The George Group.
- Evaluate the feasibility of applying the approach in DoD, in particular to its financial functions.
- Determine if this new business approach would be useful in DoD.

Most people would agree that DoD is an extremely complex organization due to its size, mission, and nature. As such, Complexity Management should be an imperative approach in its operations and a fundamental part of its culture. This project provides an introduction to Complexity Management and a discussion of the benefits DoD could achieve with this new business approach.



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## **ACKNOWLEDGMENTS**

First of all, this project was primarily accomplished with the inspiration of my advisors. Prof. Uday Apte's Operations Management teachings on value added and process improvement are the principal reasons behind this project. Prof. John Mutty's teachings on DoD finances and the need for improvement in them is the ultimate aim of this project.

Although not an advisor, I would also like to thank Prof. John Shank who inspired me to continuously seek improvements and taught me to look for answers that are "outside the box". NPS and this project would not have been the same without his teachings.

Lastly, big thanks to my family for assisting me with this project and inspiring me to achieve bigger and better things.

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## **EXECUTIVE SUMMARY**

This project describes the emerging approach of Complexity Management, translates it for the use in the Department of Defense (DoD), and applies its principles to DoD's financial functions. Complexity Management is a new business approach introduced by The George Group Consulting company. The basic principle behind this approach is the identification and manipulation of complexity to improve efficiencies and reduce cost in an organization. This project provides an introduction to Complexity Management and a discussion of the benefits DoD could achieve with this new business approach.

The project concludes that the principles of Complexity Management and its qualitative analysis are not only useful, but imperative for DoD and its financial functions. Complexity Management emphasizes the importance of the customer for an organization's activities and simplifies the decision making process. The complexity management principles recommend that all decisions be evaluated against what adds value to the customer, or in DoD's case, the warfighter. Its primary rules are to concentrate on value added activities and minimize the cost of all required non-value added activities to the warfighter. Decision makers need to understand that additional offerings (products/services), in particular in the support functions, increase DoD's complexities while generally not adding value to the warfighter.

However, this project also concludes that the Complexity Management approach, as presented by The George Group, has a major flaw. The most relevant flaw in Complexity Management is that it is a subjective approach that is hard to quantify in a proper manner. The Complexity Management approach is based on the idea of value added to the customer and this idea is subjective in itself. Value added generally varies from person to person; it has no common standard; and it is hard to quantify. The quantification approach of Complexity Management introduced by The George Group is susceptible to numerous interpretations and variations, and therefore, not recommended.



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## I. INTRODUCTION

This project describes the emerging approach of Complexity Management, translates it for the use in the Department of Defense (DoD), and applies its principles to DoD's financial functions. Complexity Management is a new business approach introduced by The George Group Consulting company. The basic principle behind this approach is the identification and manipulation of complexity to improve efficiencies and reduce cost in an organization. The George Group Consulting wrote a book in 2004 called "Conquering Complexity in Your Business" in which it provides the principles behind this approach and attempts to provide tools to quantify complexity. The ultimate goals for this project are to:

- Analyze the Complexity Management approach, as presented by The George Group.
- Evaluate the feasibility of applying the approach in DoD, in particular to its financial functions.
- Determine if this new business approach would be useful in DoD.

Most people would agree that DoD is an extremely complex organization due to its size, mission, and nature. As such, Complexity Management should be an imperative approach in its operations and should be a fundamental part of its culture. This project provides an introduction to Complexity Management and a discussion of the benefits DoD could achieve with this new business approach. Some of the benefits include:

- Tools to identify complexity and its cost drivers. This project provides a formula which reflects the amount of complexities in an organization according to The George Group. It also includes a list of rules and precepts that can assist with the identification and evaluation of complexity.
- A methodology to assist in decision making. This project provides a decision-making diagram based on the Complexity Management principles. The diagram can be used for general scenarios and summarizes the principles of Complexity Management.

- A new method to assist with DoD's goals of implementing best business practices and improving its business processes. This could improve efficiencies, save costs, and maximize resources.

This project report is divided into three main chapters (II-IV). The goals of these chapters are to inform the reader about the basics of Complexity Management (Chapter II), its translation and usefulness in DoD (Chapter III), and finally the use of this approach in DoD's financial functions (Chapter IV).

Chapter II presents a summary of Complexity Management as presented in "Conquering Complexity in Your Business". This chapter summarizes the applicable findings in the book about complexity and provides the basic rules and precepts of Complexity Management. It also provides the basis to the quantification of complexity as presented by The George Group. The aim of Chapter II is to introduce the reader to the world of Complexity Management and to provide actual examples which demonstrate the benefits of applying this approach.

Chapter III translates the concepts of Complexity Management into DoD. This chapter provides examples in which DoD is currently utilizing the principles of Complexity Management. The main focus of this chapter is to transfer the precepts of Complexity Management into DoD's environment and evaluate the usefulness of this approach in DoD. It also presents an analysis of the quantification of complexity and evaluates its application in DoD. After reading this chapter, the reader should appreciate the value of the Complexity Management approach and how it could be applied in DoD.

The last main chapter, Chapter IV, provides a general analysis of DoD's financial functions using the principles of Complexity Management. It provides a brief background of the current financial functions of each service and DoD's attempts to improve them. The main focus of this chapter is to utilize the concepts of Complexity Management, as discussed in previous chapters, to evaluate DoD's financial functions. The aim for this chapter is to provide an understanding of how to apply the concepts of Complexity Management and have an idea of what could be done in DoD to improve the financial functions according to this approach.

The last chapter of this project (Chapter V) provides a summary of the most important findings. It also includes my conclusion as to the usefulness of the Complexity Management approach and its application in the Department of Defense.

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## II. DESCRIPTION OF COMPLEXITY MANAGEMENT

Many businesses create shareholder value primarily through process improvement. But we found that (*organizations*) which restrict their efforts to improvement approaches such as Lean and/or Six Sigma would hit a ceiling in profit generation (*cost savings*): though progress was significant, there was only so much they could accomplish through process improvement. There is an entirely separate dimension to operating improvement that often represents the single largest opportunity for cost reduction and the most significant hurdle to profitable growth in most companies... Complexity. *Michael George, Chairman & CEO of The George Group*<sup>1</sup>

### A. BACKGROUND

The concept of Complexity Management has been used and applied for centuries from the Mongol military and supply tactics, to Henry Ford's line assembly model, to current technological companies like Dell and Intel. Complexity Management is a self-explanatory approach that represents an obvious and undeniable argument, minimize or eliminate unnecessary activities in your organization and achieve better efficiency and reduction in costs. This approach requires that the whole organization emphasizes its efforts and actions towards adding value to the customer.

So why is it that most organizations don't do a better job of managing complexity? The problem arrives in moving from the conceptual idea to the practical application and use of managing complexity. The biggest challenges arrive in how to identify the complexity and quantify it before making any decisions, especially since some complexities are part of an organization's culture.

Unfortunately, until recently, no one had provided a technique to identify and manipulate Complexity. The George Group has taken the lead in trying to conquer the above challenges. Along with the assistance from academia and business' experts, The George Group has attempted to produce a systematic method to identify and eliminate the costs associated with complexity. This method is described in the following sections.

---

<sup>1</sup> George Group Consulting is a recognized authority in the development and deployment of Conquering Complexity strategies, and is also a global leader in Lean Six Sigma, [www.georgegroup.com](http://www.georgegroup.com), 30 December 2005.

## **B. THE THREE BASIC RULES OF COMPLEXITY MANAGEMENT**

In its research, the George Group has identified three basic rules for conquering complexity in any organization<sup>2</sup>. These rules are the foundation of complexity management thinking.

1. Eliminate complexities customers will not pay for
2. Exploit complexities customers will pay for (since not all complexities are bad)
3. Minimize the costs of any complexity you offer

These rules are better described and illustrated with the use of actual business cases.

**Rule #1:** “Eliminate complexities customers will not pay for”:

A common situation in today’s businesses is that they find themselves offering more products and/or services than what the customers really want (e.g. Heinz). Eliminating such complexities will eliminate cost and will result in a competitive advantage.

### Southwest Airlines vs. American Airlines<sup>3</sup>

Among other factors, Southwest’s elimination of the complexities customers do not value has been the key to its remarkable success in the extremely tough airline industry. In the airline industry, people tend to value a safe, reliable, and economic service.

Southwest, at least until recently, operated only one model of aircraft (Boeing 737) while American operated up to 14 different aircrafts models. This resulted in more spare parts, more labor costs (air and ground crews), higher training costs, and other costs that did not add any value/benefit to the customers. In addition, Southwest requested multi-tasking from its employees, standardization of ground operations which resulted in quicker turnarounds and planes flying up to 25% more per day than American. All this resulted in higher revenues and lower costs.

---

<sup>2</sup> George and Wilson, *Conquering Complexity in Your Business*, Chapter 1, p. 5.

<sup>3</sup> Based on information from George and Wilson, *Conquering Complexity in Your Business*, Chapter 1, p. 6.

Figure 2.1 illustrates the operational cost per Available Seat Mile of Southwest and some of its major competitors. This figure illustrates how the reduction of complexity in Southwest reduces cost, which in turn increases the bottom line.

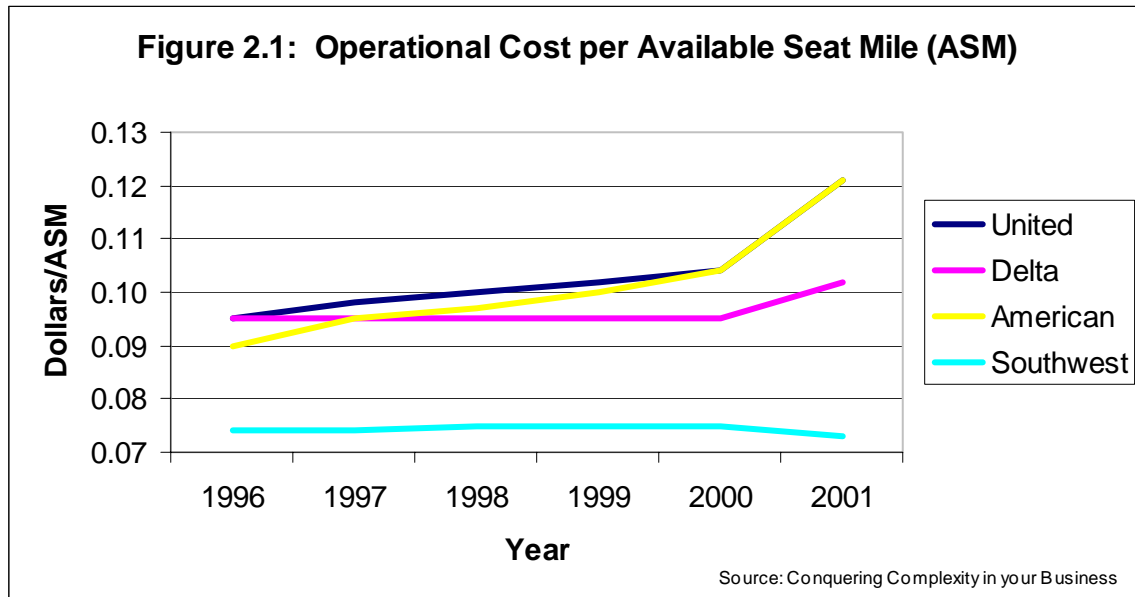


Figure 2.1: Operational Cost per Available Seat Mile (ASM)

**Rule #2:** “Exploit complexities customers will pay for”:

In some cases, complexity is not bad. It might even help an organization gain a competitive advantage. Some markets reward a highly complex offering if it can be delivered at a cost that provides an attractive value proposition.

Capital One vs. The Credit Card Industry<sup>4</sup>

Before Capital One entered the credit card market, all credit cards were offered with minimal complexity, one rate regardless of the credit worthiness of the customer. Capital One recognized there was an unfair treatment in the industry with good credit customers paying more than expected and bad credit customers paying less than expected.

Capital One spent millions of dollars in databases, complex IT, communications systems, and research and decided to tailor its credit card rates to the credit worthiness of its consumers.

<sup>4</sup> Based on George and Wilson, *Conquering Complexity in Your Business*, Chapter 1, p. 9.



This calculated risk resulted in the creation of complexity which created value to most consumers. Also, since other credit card companies began to lose their profitable consumers (the ones with good credit) to Capital One, they were forced to cover their costs by increasing their rates and fees. This created a “death spiral” since the higher other credit card companies increased the rates, the more consumers would change to Capital One (even the ones with bad credit).

**Rule #3:** “Minimize the costs of any complexity you offer”:

Regardless of whether adding or reducing complexity in an organization, one has to do it at the lowest possible cost.

#### Toyota’s Creation of Complexity at Lower Cost<sup>5</sup>

Toyota used a standardization approach in its manufacturing operations which eliminated waste in its internal products and processes, while enabling it to produce one million variants of vehicles. This approach is possible by reducing variations in the design and development of the products. Toyota currently manufactures its complete variety of cars and trucks (one million variants) from 13 foundational designs that can be customized to specific products.

Due to the automobile industry’s requirements to provide variation, Toyota has no option but to provide variety in its product which adds complexity to its organization. However, by using the modularization approach Toyota has simplified its offering of complexities. In other words, Toyota has added complexities while minimizing the associated cost of the complexities it offers to stay competitive and accomplish its mission.

The result of Toyota’s efforts in managing complexity are reflected in its stock price’s increases of 50% from April 2005 – April 2006 while its main competitors GM’s and Ford’s stock prices decreased by 50% in the same timeframe<sup>6</sup>. Lower cost means higher margins because of less complexity which also results in a better product.

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<sup>5</sup> Based on George and Wilson, *Conquering Complexity in Your Business*, Chapter 1, p. 12.

<sup>6</sup> Based on information from [http://moneycentral.msn.com/investor/home, 30](http://moneycentral.msn.com/investor/home,30) April 2006.

## **C. PRECEPTS FOR THE USE OF COMPLEXITY MANAGEMENT**

In addition the “Three Basic Rules of Complexity Management”, the authors of “Conquering Complexity in Your Business” provide six precepts for the strategic use of complexity management<sup>7</sup>. However, for this project and its application to DoD only four are required. The other two precepts mainly apply to commercial sectors which care about growth and market share.

These precepts provide a more specific guideline than the aforementioned rules. The precepts are the next level of thinking for the Complexity Management approach and offer a roadmap on how to start thinking about Complexity Management. The four applicable precepts for this project are:

### **1. Customers Define Value**

The most important task of conquering complexity is identifying what is value added and non-value added. In order to properly identify value added activities we need to understand that the customer’s perspective is the only one that matters to identify value. In other words, the customer is the one who identifies what is value added or non-value added.

The basic rule to follow this precept is that all internal activity transparent to the customer is non-value added. It is work that your customers don’t see, don’t know about, don’t care about, and won’t pay for. Although value added is a subjective measurement, it provides a focus in what really matters when evaluating complexity.

### **2. The Biggest Gains from Conquering Complexity Come from Overhead Improvements**

Overhead activities generally add value to an organization and not the customer since they are used for external requirements/complexities (legal requirements, stakeholders’ interest, etc...). Making strategic decisions that minimize the requirement of fixed and overhead costs translate into complexity reduction. Most of the non-value added activities exist in overhead or

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<sup>7</sup> Information on Precepts is based on George and Wilson, *Conquering Complexity in Your Business*, Chapter 5, p. 72.

support functions since they are mostly invisible to the customer and normally don't add any value to the customer. This precept is linked to rule #3, "Minimize the costs of any complexity you offer".

### **3. Focus on What Matters Most – 100% of Value Creation Resides in 20%-50% of Offerings**

Without a conscious focus on what adds value to the customer, the introduction or maintenance of products/services can create non-value added activities. In other words, value creation needs to be in the mind of decision makers and the organization at all times to eliminate existing unnecessary activities or avoid the creation of new non-value added activities. Improvements in valued added activities tend to be more effective in improving the efficiency and bottom line of an organization than improvements in non-value added activities.

### **4. First Eliminate Offerings that can Never Generate Positive Economic Profit, then Attack Internal Complexity**

Instead of improving the processes within an activity, ask yourself if the activity is required or value added to the customer. Don't waste time and valuable resources improving activities that can be eliminated, combined with other activities, or performed more efficiently if outsourced. In other words, get rid of unnecessary activities before improving their processes.

## **D. MEASURING COMPLEXITY**

As mentioned earlier, the problem with the concept of complexity management is that there are no quantitative means to measure complexity. This section summarizes the attempts from The George Group to quantify complexity.

### **1. The Roots of Complexity**

Imagine a company that throughout its history has only offered one product/service (X). If this company decides to start offering a second product/service (Y), this would normally add time and non-value added cost to the organization even if it is only one more product. For example<sup>8</sup>:

- Additional set-up time. Loss of productivity with the change from X to Y.
- Increased delays. Time spent on Y is time not spent on X.

---

<sup>8</sup> Example is based on information from George and Wilson, *Conquering Complexity in Your Business*, Chapter 2, p. 26.

- Increased inventory. More space and resource requirements.
- Increased overhead. Scheduling and support functions (Marketing, training, accounting, etc...).
- More errors and defects. The possibility of errors with two offerings is greater than with just one offering.

None of the above items add value or a feature to the customer. This leads to the fundamental foundation of the complexity formula; each additional feature, new service or function adds more complexity to an organization and unnecessary non-value added cost.

## **2. Process Cycle Efficiency (PCE)**

The basis to quantify complexity is the Process Cycle Efficiency (PCE). As discussed in the previous section, the main root of complexity is the accumulation of non-value added cost when an organization attempts to add more products/services. The measurement of these non-value added cost or the value added cost is the best way to measure complexity, according to The George Group. This measurement is called the PCE. The PCE is a ratio of value added time compared to total process time (lead time).

$$\text{Formula 2.1: PCE} = \text{Value-add Time} / \text{Total Lead Time}$$

The higher the PCE ratio, the more efficient is the organization and/or activity. Using mathematical logic, we can conclude that the larger the items in the denominator the lower the PCE and the larger the items in the numerator the higher the PCE.

The above formula represents what any organization needs to aim for, add value to the customer and achieve better efficiencies and a better bottom line. However, the concept of value-add is subjective and it is difficult to measure. Therefore, The George Group has attempted to remove the subjectivity of the above formula and tried to identify the components of Value-add Time and Total Lead Time. According to The George Group's research, Formula 2.1 can be broken down further to identify the components of PCE and the items which impact complexity.

$$\text{Formula 2.2: } \text{PCE} = 2V(1 - X - PD) / N(2A + 1)S$$

Numerator;

V = Total value add time in the process

X = % of products/services with quality defects

P = Processing time per unit

D = Total demand of products/services

Denominator;

N = Number of different tasks performed at an activity

A = Number of activities/steps in the process

S = Longest setup time in the process

NOTE: The actual derivation of Formula 2.2 is presented with great detail in the Appendix of “Conquering Complexity in Your Business”.

According to research done by The George Group, most companies have a PCE of less than 10%. In other words, 90% of the time is spent on non-value added activities. World class companies average 20%<sup>9</sup>. This reflects that there will normally be non-value added costs in any organization; the goal is to minimize them.

As one can interpret from the formula, the larger the PCE, the less non-value added activity/cost. Therefore, the lower the cost, the greater the gross margin for a company. This relationship has been observed by the George Group in its research and it has provided this knowledge to its customers. Figure 2.2 is a chart from one of The George Group’s customers which reflects the impact of increasing the PCE on its gross margin.

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<sup>9</sup> George and Wilson, *Conquering Complexity in Your Business*, Chapter 2, p. 29.

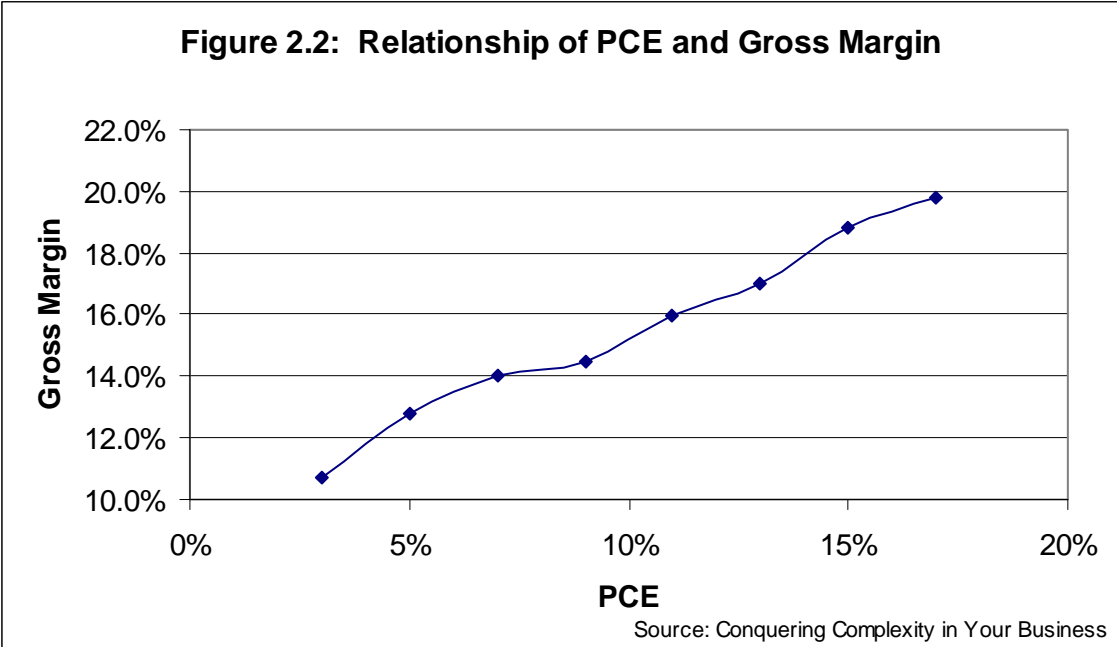


Figure 2.2: Relationship of PCE and Gross Margin

As one can see, The George Group has identified a positive relation between the PCE and an organization’s gross margin. This is due to the direct impact that the PCE has on evaluating unnecessary cost. The more focus on reducing unnecessary cost the more likely there will be higher margins.

The following chapter will expand on the findings from this chapter and will attempt to translate the Complexity Management approach for DoD’s use.

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### **III. APPLICATION OF COMPLEXITY MANAGEMENT IN DOD**

In Chapter II we discussed the concept of Complexity Management as it applies to the commercial sector and as researched by The George Group. In this chapter, we will attempt to translate and use the findings of the previous chapter in DoD scenarios.

#### **A. EXAMPLES OF COMPLEXITY MANAGEMENT IN DoD**

Just like the commercial side, DoD has realized that there is high cost behind complexity. The following are a couple of examples of DoD's actions to manage complexity in recent years.

##### **1. Aircraft Maintenance at Kirtland AFB<sup>10</sup>**

The Air Force has applied logistics and maintenance programs imported from the private business sector to change once-bloated processes into models of streamlined efficiency. Lean processes have allowed the Maintenance Squadron at Kirtland AFB to do more with less, while improving its performance. Essentially, what the Squadron has done is cut waste and combined all like processes.

With help from a consultant, airmen began the lean process in December 2004 by conducting a value stream analysis. This is a comprehensive study of all the processes involved in a particular task. The study allowed the maintenance squadron to look at its current state of operations, identify wasteful processes, and plan its future. The team identified a total of 107 steps in the MH-53J phase inspection process. Of those, 86 were deemed non-value added, and 41 of them were able to be eliminated. The remaining 45 non-value added steps were either combined or modified. The result was a 43 percent reduction in flow time. The squadron streamlined job standardization aircraft forms and re-aligned its workers to work around the clock for added continuity.

##### **2. USAF Personnel Customer Service<sup>11</sup>**

The US Air Force is currently changing the way airmen are updating their personnel records from a face to face customer service to an online approach. Beginning in the Spring 2006, airmen will go online and do within minutes administrative tasks that used to require a

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<sup>10</sup> Based on information from the Air Force News Agency, *Leaner Processes Working at Kirtland*. [www.afnews.af.mil](http://www.afnews.af.mil), 9 January 2006.

<sup>11</sup> Based on report from The Air Force Times, *AF Takes Some of the Flight Out of MPF*, 10 April 2006.



visit to the Military Personnel Flight (MPF). The aim is simple; take as many functions as possible of the local MPF and set up a system that lets an airman do these tasks himself, either through the Web or by telephone with an expanded contact center at the Air Force Personnel Center. The goal of the new approach is to move as many functions as possible from the MPFs to the Web and the contact center, reducing the number of people at the local MPFs.

The Air Force change should make personnel transactions more efficient, while improving the accuracy of the data. The new system will eliminate steps in the process and minimize the risk of errors since there are less people in the process. In the past, the Air Force asked airmen to do a simple personnel transaction by; leaving their duties, getting in a car and driving to the Personnel building, filling out the respective form for the desired transaction, and handing it to a personnel specialist. The personnel office would then enter the information in the personnel system and the airman would review the data weeks later. Since the process required multiple steps by different people, the chances for errors in the system were high. If the data were entered incorrectly, the airman would have to repeat the whole process wasting even more time from his/her duties.

In the new “do-it-yourself” system, the non-value added steps and non-required personnel are removed from the process. Airmen are able to enter the information themselves and get it right the first time. The new system does not require any more time of the airmen since they can save the time of going to the Personnel building and manually filling out the respective forms.

The Air Force doesn't have a good estimate of what the overall cost savings could be, but it expects to save at least 1,500 manpower spaces by reducing the number of personnel specialists at the local MPFs. This is a 15 percent reduction in personnel specialists in the Air Force which means less support and overhead cost for the Air Force which can be saved or used in operational activities. The new system is expected to reduce the percentage of personnel transactions that require a trip to the Personnel building from 85 percent to about 5 percent.

## **B. TRANSLATION OF COMPLEXITY ITEMS FROM COMMERCIAL TO DoD**

Before we apply the principles of Complexity Management to DoD, we need to translate and identify the key components of the precepts in DoD. First, we need to identify the customers of DoD. Second, we need to identify what is value added or not. And finally, we can evaluate and adjust the PCE formula so it can be applied to DoD's organization.

## **1. Identification of DoD's Customers**

This is the first step towards applying the Complexity Management approach in any organization. The customer is the one who defines value, and in turn, value reflects the complexities of an activity.

So, who is DoD's customer? Most people argue that the customers of DoD are the citizens and/or taxpayers of the United States of America while there are others who argue that the customers of DoD are the warfighters. The answers for this question can vary from person to person depending on their background, ideologies, and how one defines customers. For this project, I will define customer as the user/buyer/beneficiary of an organization's products and services. Since DoD's principal service is defense of the nation, one can conclude that the customer of DoD are the citizens and/or taxpayers of the U.S.A while the warfighters are the employees of DoD.

However, due to the nature of DoD's operations and service, along with the complexities of identifying the requirements of all citizens for DoD, this project will identify the warfighters as DoD's customers. All of DoD's efforts should be concentrated on making the nation a safer place and being able to defend against any threat to the nation when military action is required. The best way these efforts can be accomplished is by providing the warfighter with the best chances of succeeding. If DoD concentrates in helping the warfighter, its service of defending the nation can be better achieved. In other words, if we take care of the "employees/warfighters", then they can take care of the "customers/citizens".

For the purpose of this project, I will select the warfighters as DoD's customers for one important reason, simplicity. It is nearly impossible to identify what adds value to the citizens while it is slightly easier to identify what adds value to the warfighter. Therefore, for the remainder of this project, warfighters will be synonymous with customers while the citizens will be the stakeholders.

## **2. Identification of Value Added Activities**

One of the inherent problems with the Complexity Management approach and the PCE formula is the concept of value added. This concept, by its nature, is a subjective evaluation. What adds value or not can change from warfighter to warfighter. Therefore, for this project I used my own subjective evaluation to determine what adds value or not to the warfighter. For assistance and to maintain as much objectivity as possible, I used the guidance presented in the “Precepts for the Use of Complexity Management and the PCE Formula” in Chapter II of this project. The key questions to have in mind are:

- Is the work unknown to the warfighter?
- Does the warfighter care about the work?
- If required, would the warfighter pay for the work?

Another potential problem with the identification of value added activities is the nature and regulations of DoD. DoD is a government entity which is heavily regulated by law and administrative policies. This creates an abundance of activities and processes that are not value added to the warfighter, but are mostly required for the existence of DoD. For the purpose of this project, I attempted to identify these types of mandatory activities as External Complexities, and did not include them as value added activities. This kept true to the Complexity Management approach while shedding some light on the mandatory non-value added activities in DoD or external complexities.

## **3. Evaluation of the PCE Formula and Adjustments for its Use in DoD**

With the above assumptions in place, we can now attempt to translate the PCE formula to a DoD scenario. In Chapter II, the PCE formula is presented in its basic nature as:

$$\text{Formula 2.1: PCE} = \text{Value-add Time} / \text{Total Lead Time}$$

Furthermore, Formula 2.1 can be broken down to identify the components of PCE and the items which impact complexity according to research done by the George Group. The breakdown of the formula is:

$$\text{Formula 2.2: } PCE = 2V(1 - X - PD) / N(2A + 1)S$$

Numerator;

V = Total value add time in the process

X = % of products/services with quality defects

P = Processing time per unit

D = Total demand of products/services

Denominator;

N = Number of different tasks performed at an activity

A = Number of activities/steps in the process

S = Longest setup time in the process

The biggest advantage of using the expanded formula over the simplified formula is that it can minimize the subjectivity of identifying value-add activity by adding quantifiable or measurable items like quality defects, demand, and processing time per unit.

However, after numerous attempts using the formula and research on the derivation of the formula, I have developed serious reservations about the applicability of Formula 2.2 within DoD's context. Therefore, I recommend against using Formula 2.2. The main reason for this is that one can't completely eliminate the subjectivity of the formula because of the need to calculate value add time in the process "V" for the numerator. This provides the option of using simple subjectivity (Formula 2.1) or complex subjectivity (Formula 2.2). Therefore, I plan to use Formula 2.1 in this project report with the aim to reduce complexity.

### **C. EXAMPLE OF THE PCE FORMULA IN A DOD SCENARIO**

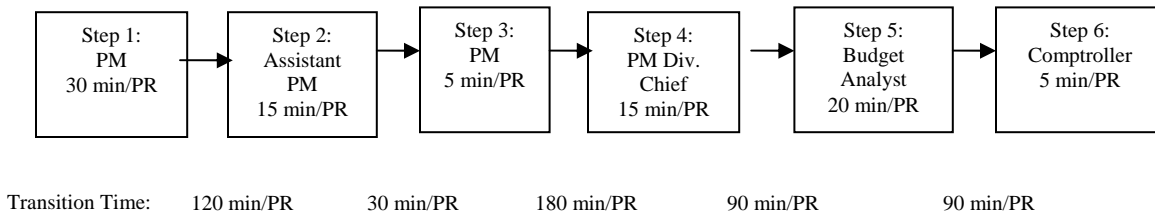
Before moving into the next Chapter of this project, let's see the application and effectiveness of the PCE formula in a DoD scenario. This example should provide an idea of how the PCE formula could be used and its drawbacks.

As a simple example, I used my own experience at my first unit. There, I encountered the task of improving the activity of Purchase Requests for goods or services. For simplicity reasons, I assumed that this is an activity by itself, which is required for the warfighter. We also need to keep in mind that the product of this activity is the Purchase Request and that the warfighter is the Program Manager.

The data in this example are approximate and have been simplified to illustrate the use of PCE in this project. However, the data should be realistic enough to clarify the application of Complexity Management to a real life scenario. The following describes the activity in the beginning, the improvements that were made, and a brief conclusion.

### 1. Description of Activity in the Beginning

The purpose of the activity is to process Purchase Request (PR) documents to procure mission required goods/services and ensure fiscal regulations were being followed. Initially, these documents were typed and hand-carried from person to person. The biggest problem with the process was the slowness of getting the document through all the bureaucratic steps. This created serious and unacceptable internal problems and delays in our mission due to lack of required goods/services. The initial process is summarized in the following flow chart:



#### Description of Steps:

Step 1: Prepare request to create Purchase Request. PM would hand-write or e-mail all relevant info and submit to Assistant PM. *Value Added Time.*

Step 2: Create/type purchase request. *Value Added Time.*

Step 3: PM would review Purchase Request and sign the form. *Non-valued Added Time.*

Step 4: PM Division Chief would review request and certify it was required for mission accomplishment. *Non-value Added Time*

Step 5: Budget Analyst ensured proper accounting was used and record request in local accounting system. *Value Added Time*

Step 6: Comptroller certified the use of funds. *Non-value Added Time*

#### PCE Calculation:

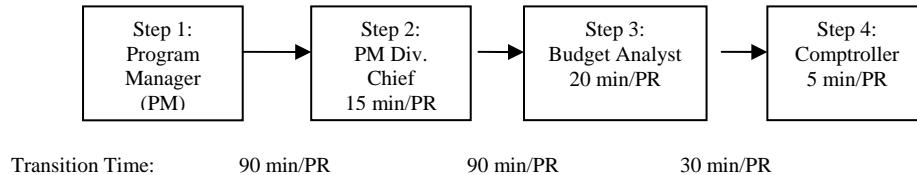
- Transition Time is *Non-value Added Time* of 410 minutes. Plus *Non-value Added Time* in the PR process of 25 minutes equals 435 minutes of *Non-value Added Time.*
- *Value Added Time* equals 65 minutes.

- Total Lead Time equals 500 minutes (10 hours/PR)
- Simplified PCE = Valued Added Time / Total Lead Time  
 $PCE = 65 / 500 = 13.0\%$

## 2. Process Improvements

After recognizing we had an overly-complex process, \$25,000 was used to procure software which created the PRs and processed the forms from person to person electronically. The software required \$3,000 per year for support and maintenance. However, the software was user friendly and allowed the elimination of the Assistant PM position which saved an annual salary cost of \$35,000. Thus, the annual savings were at least \$32,000 and the process capacity was drastically changed.

Two more persons, already involved in the process, were authorized to perform Steps 4 & 6 (Deputy Division Chiefs and Budget Analyst respectively). This ensured the documents were not waiting for approval for long periods of time while increasing the overall capacity. Also, the new software reduced the chances for mistakes in the PRs since they were done right the first time. The new process was as follows:



### PCE Calculation:

- Transition Time is *Non-value Added Time* of 210 minutes. Plus *Non-value Added Time* in the PR process of 20 minutes equals to 230 minutes of *Non-value Added Time*.
- *Value Added Time* equals 50 minutes bullets should be indented .5” from the left margin
- Total Lead Time equals 280 minutes.
- Therefore, PCE = Valued Added Time / Total Lead Time  
 $PCE = 50 / 280 = 17.9\%$

NOTE: Attempts were made to use Formula 2.2 in this example, but the answers were irrelevant and illogical.

### **3. Discussion**

The use of Complexity Management concepts and some common sense had a dramatic impact on the efficiency of the PR process.

- PCE increased from 13.0% to 17.9% (38% improvement)
- Process steps went from 6 to 4 (33% reduction)
- Non-value Added Time went from 435 to 230 minutes (47% reduction)
- Lead Time went from 500 to 280 minutes (44% reduction)
- Annual cost savings of \$32,000 (\$35,000 in salary cost minus \$3,000 of maintenance)
- Morale increase in personnel and satisfaction of making improvements (priceless)

This example uncovers some drawbacks to the PCE formula. First, it does not necessarily recognize the great reduction of non-value added time and lead time in the process. This means that there could be scenarios where Total Lead Time is reduced, but if the ratio of value added time remains the same (both value added and lead time are reduced) there is a chance that the PCE could remain the same. The second drawback that this example reflects is the amount of subjectivity behind the identification of value-added activities. There is nothing tangible or measurable which can be used to identify what adds value or not.

However, the above example does provide the impressive results that an organization can achieve using the principles of Complexity Management. If we start concentrating on the customer and what adds value to him/her, we can identify non-value added activities, reduce costs, and significantly improve efficiencies. The PCE formula is an attempt to quantify something that is hard to quantify, but the results of its principles on reducing non-value added activities can be measured and quantified in savings.

Based on the above reasons, I do not believe in relying solely on the use of the PCE formula and I do not use it in the remaining sections of this project. On the other hand, the application of the Complexity Management rules and precepts are essential to any organization and should be utilized. Complexity, like Quality, is a way of thinking and a mindset. It is not something that can be precisely measured, but it is something that needs to be identified, evaluated, and eliminated if not required. The conquering of complexities can result in dramatic improvements in any organization. Therefore, the next chapter contains a qualitative analysis of some of the complexities in DoD's financial functions.

## **IV. COMPLEXITY MANAGEMENT IN DOD'S FINANCIAL FUNCTIONS**

This chapter provides a qualitative analysis of the complexities in DoD's financial functions. It includes a brief background on DoD's financial functions and the potential benefits of the application of Complexity Management in their development.

### **A. BACKGROUND ON DoD'S FINANCIAL FUNCTIONS**

DoD currently has multiple financial systems and processes primarily because the different services (Army, Navy and Marine Corps, and Air Force) have been allowed to create and develop their own financial offerings. Each service has its own accounting system, structure, and processes which eventually link to make one input at the DoD level.

All services are currently changing their respective systems in response to a host of requirements set forth by Congress and the DoD (External Complexities)<sup>12</sup>. Some of these requirements are:

- Following standards mandated by the Chief Financial Officers Act of 1990 and the Federal Financial Management Improvement Act of 1996
- Conforming to the federal financial-management system requirements identified by the Joint Financial Management Improvement Program (JFMIP)
- Achieving all applicable accounting standards, including requirements of the U.S. Government Standard General Ledger (USGSGL) at the transaction level as set by OMB Circular A-127
- Conforming to the Department's Business Enterprise Architecture to be in synch with the processes and systems of all DoD business domains.

The following sections are a summary of the accounting/financial systems used by each service and the transformation they are going through in response to the above requirements.

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<sup>12</sup> Based on information in <http://www.gfebs.army.mil/about>, 30 April 2006.



## **1. Army - GFEB<sup>13</sup>**

The Army is in the late stages of developing the SAP based General Fund Enterprise Business System (GFEB<sup>13</sup>) which replaces numerous outdated accounting/financial systems. GFEB<sup>13</sup> is a web-based system that will allow the US Army to share financial and accounting data across the Service. By June 2006, the system, outfitted with commercial-off-the-shelf (COTS) SAP software, should complete its initial technology demonstration in Ft. Jackson, South Carolina. Full Army-wide deployment is scheduled to be phased in incrementally by 2009.

GFEB<sup>13</sup> will be one of the world's largest enterprise financial systems with more than 79,000 end-users at nearly 200 Army financial centers around the world. The new system will replace the 30-year-old Army Standard Financial System, which provides only minimal analysis for spending and revenue. The existing system only allows the Army to get funding balances and write checks to pay for purchases. The old system doesn't provide any way of looking at overall spending across the entire service and there is not a general ledger structure for the whole Army. The new system should provide those capabilities, allowing Army officials to obtain reliable financial data and do cost management for the service. It will eventually manage \$100 billion in spending by the active Army, the Army National Guard and the Army Reserves (it excludes Army Corps of Engineers).

The new system will also feed vital, up-to-the-minute information to Army leadership. GFEB<sup>13</sup> will put in place and maintain financial management systems that will give Congressional overseers the level of financial accountability they need from the Department, while providing top-tier Army and DoD leadership with timely, accurate data that should enable them to make sound business decisions in support of the warfighters.

The GFEB<sup>13</sup> contract for lead software integration was awarded in June 2005 to Accenture for \$437 million for a span of 10 years. However, other estimates are as high as \$850 million<sup>14</sup>. The above cost does not include an additional five-year contract of \$40 million awarded to Binary Consulting for Program Management Support.

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<sup>13</sup> All data within this section are based on information from GFEB<sup>13</sup> official website, [www.gfebs.army.mil](http://www.gfebs.army.mil), 30 April 2006.

<sup>14</sup> Based on information from the April 2005 article "Contracting Showdown". [www.fcw.com/article88478-04-04-05-Print](http://www.fcw.com/article88478-04-04-05-Print).

## **2. Navy - ERP<sup>15</sup>**

The Navy-Marine Corps' response to business transformation is Enterprise Resource Planning (ERP). ERP will consolidate all of the Navy's business management systems. It should standardize the current patchwork of Navy systems in areas like acquisition, finance, maintenance, personnel, and supply chain. The integration of systems should streamline organizational infrastructure, maximize synergy in business/support functions, make business processes more efficient, and reduce the cost of support operations.

Basically, ERP will provide one common database that all support functions can share with a common language and software. It attempts to integrate all support activities across an organization into a single computer system that can serve all those departments' needs. This should simplify information gathering and sharing, provide more accurate and consistent data, and avoid redundancies. Unlike the other services, the Department of the Navy is changing and consolidating all of the support functions systems and not just the accounting/financial systems.

The Navy ERP is expected to replace 347 legacy systems in areas like administration, acquisition, personnel, and financial management. The Navy's projected cost for the ERP efforts is \$800 million and the completion date is scheduled for 2011. The above cost excludes \$1 billion the Navy spent on four pilot programs to demonstrate the feasibility of applying Commercial off the Shelf (COTS) ERP programs in the Navy's business operations<sup>16</sup>.

## **3. Air Force - DEAMS<sup>17</sup>**

The Air Force has partnered with the US Transportation Command (USTRANSCOM) and the Defense Finance and Accounting Service (DFAS) to create one single financial system, the Defense Enterprise Accounting and Management System (DEAMS). Like the Army's GFEBs, the Air Force is replacing several financial systems with one system.

DEAMS should allow for the easy generation of enterprise-wide reports, reduce rework, reduce the requirement for "data calls", and generally elevate financial management capabilities.

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<sup>15</sup> Data within this section are based on information from ERP official website, [www.erp.navy.mil](http://www.erp.navy.mil), 30 April 2006.

<sup>16</sup> Based on information from GAO Report, GAO-05-858. "Navy ERP Adherence to Best Business Practices Critical to Avoid Past Failures", September 2005.

<sup>17</sup> All data within this section is based on information from DEAMS official website, [www.deams.transcom.mil](http://www.deams.transcom.mil), 30 April 2006.

The DEAMS initiative will support the accounting and financial management functions of the USTRANSCOM, USAF and DFAS. DEAMS also has the potential to expand functionality to support other Department of Defense (DoD) agencies.

DEAMS will support and replace an array of existing financial processes to include the general ledger, budget distribution, fund control, budget execution, customer orders and customer billing, collections, purchase requests, obligations, receipt and acceptance, accounts payable, cost accounting, analysis and decision support and property.

DEAMS is an Oracle based COTS. The cost for DEAMS licenses is \$22.7 million, but there is no information available on the estimated cost of systems integration, which should be the main bulk of the cost. The Oracle contract includes 60 developer licenses, 26,650 production licenses, four one-year priced optional maintenance periods and training, and familiarization training.

#### **4. DoD - SFIS**

In order to consolidate the financial information of all the services, DoD has established the Standard Financial Information Structure (SFIS). SFIS is a data structure for budgeting, accounting, and external reporting across DoD. SFIS allows for financial information to be processed more efficiently at the DoD level, so it can be reported to Congress and other external organizations. All of the services have coordinated with the SFIS Team during the development of their respective financial systems in order to comply with SFIS/DoD standards of structure and architecture. SFIS will translate the services' accounting/budgeting structures into a DoD specific structure.

### **B. APPLICATION OF COMPLEXITY MANAGEMENT INTO DOD'S FINANCIAL FUNCTIONS**

This section will attempt to apply the complexity methodology (rules and precepts) and identify the types of complexity DoD's financial functions have and whether they are required or not for DoD's operations. For ease of explanation, the analysis is split by type of complexity (Offering, Technical, and External) and determines whether the complexity is required or not.

#### **1. Offering Complexity**

As identified in Chapter II, the number of offerings (products/services) that an organization provides increases its complexity and normally its non-value added cost

requirements. Using this rationale, we can conclude that DoD is, at least one step short in the transformation of its financial systems.

DoD has allowed each service and agency to develop and organize its own accounting/financial functions for the past 30 years despite having one common source of appropriations (Congress) and regulations for all the services (Financial Management Regulations). This has resulted in hundreds of different systems, thousands of regulations, and numerous redundancies. The services have become separate financial entities with their own procedures. Over time they have become more and more different with increased offerings, and therefore, more complex. This would be acceptable if the services were independent or unrelated to each other, but these differences have increased during a time when DoD's leadership has demanded more jointness among the services. The same interoperability that is critical to joint operations on the battlefield is also necessary for efficient processes that support the warfighter.

It appears that the services are now committed to improving their financial management and they are reducing complexity within their services. Numerous offerings/services are being eliminated and the services are investing in technology to replace their legacy systems, which should result in non-value added cost savings. This is definitely a step in the right direction.

However, the complexity management approach would view the above improvements as at least one step short. After the current financial transformation is completed, DoD will have significantly fewer financial systems, but it will still allow each service to have its respective financial system with different accounting structures which will eventually be rolled into a single structure (SFIS). This means unnecessary redundancies in software management, regulations, procedures, and support personnel. The complexity of developing a joint financial system would probably be higher than the current approach, but it would likely save resources and improve efficiencies in the long term. Further argument could be made towards developing one financial system for the entire Federal Government, but that is a different discussion and research.

Another argument for one common financial system comes from a recent study performed by a business process advisory firm, The Hackett Group<sup>18</sup>. They have concluded that by moving to a single information system for finance and at the same time implementing

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<sup>18</sup> The Hackett Group is a global Business Process Advisory firm with 14 years experience in benchmark studies. It advised over 2,000 leading companies. [www.thehackettgroup.com](http://www.thehackettgroup.com), 30 January 2006.

consistent data and technology standards, organizations can cut the cost of finance operations by 23 percent<sup>19</sup>. Furthermore, their research indicated that organizations that take either of these approaches independently may see little to no savings, or even a slight increase in finance operations costs. World-class finance organizations rely on both of these approaches, which help them spend 31 percent less than their peers on finance, operate with nearly half the staff, and also complete their financial reporting cycle more quickly each month. In addition, they turn to a wide range of other complexity-reduction techniques that help them generate even more cost savings. World-class finance organizations, for example, rely on a single chart of accounts, use half the bank accounts of typical organizations, and perform fewer budget iterations.

The Hackett Group began its analysis by looking at a range of areas to identify those with the greatest ability to reduce business complexity. The research identified two areas as among the most significant—(1) the number of finance or ERP systems and (2) adherence to data and technology standards, including the use of standard hardware and peripheral software tools for finance and usage of common data definitions. The research showed that individually, reducing complexity in these two areas had little impact on cost. In fact, organizations that had not moved to a single common ERP system saw cost of finance rise slightly as they implemented standards. But when organizations focused on both together, they saw significant cost reductions.

Reducing complexity and creating a centralized system for finance in DoD can be exceptionally challenging. However, according to the above research from The Hackett Group and the complexity management principle of offerings/services analysis the potential rewards and savings are significant. In other words, the complexity of having different financial systems is not required and does not add value to the warfighter.

## **2. Technology Complexity**

Another source of complexity is technology complexity. As identified in previous sections, DoD financial functions (and other functions, for that matter) have not been able to communicate with each other because of different software languages and requirements. These differences have created unnecessary redundancies and inefficiencies in business processes. This results in significant costs for DoD and its stakeholders.

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<sup>19</sup> For more information on the research performed by The Hackett Group on ERP and common standards see the CFO Magazine article “Centralized Finance Systems Cut Costs by 23%”, December 2005.

This is one area that DoD appears to be moving in the right direction with the Business Enterprise Architecture (BEA)<sup>20</sup>. The BEA is the blueprint for all of DoD's business softwares, so there can be communication among them. BEA is the enterprise architecture for the Department of Defense's business information infrastructure processes, data, standards, business rules, operating requirements, and information exchanges. The BEA should guide and constrain investments that impact business operations in the DoD.

The enforcement of BEA in DoD's financial systems should significantly reduce the complexities of having different stand alone systems that don't communicate with each other. Although having different software providers (Oracle, SAP, etc...) goes against the complexity management approach, at least BEA provides the link to combine the information.

Taking the complexity analysis one step further one can also wonder why the Navy is the only service that is considering joining all support functions into one common software and database. Each service has stated that its new systems will provide faster, reliable, and more accurate financial information while saving future funds. The following is a statement from the Navy's ERP website identifying the benefits of the ERP systems. Similar arguments are presented by other services for their respective systems:

(ERP) will provide end-to-end supply chain integration, producing benefits in cycle time reduction, asset visibility, and financial management information. Most importantly, information about assets and inventory that was once segregated in separate systems will now be readily integrated and available, helping managers at all levels to make better-informed decisions. Navy ERP will also enable the continuing elimination of costly, stovepiped management systems, thus allowing for recapitalization in support of mission-critical needs<sup>21</sup>.

As The Hackett Group research demonstrated, organizations can save overhead cost with the use of one common financial system and one set of standards. Imagine the effects on complexities, cost, and efficiencies that one common ERP could have for all of DoD.

### **3. External Complexity**

External Complexity applies to requirements that are enforced by outside organizations. In DoD's case, the Legislative and the Executive Branch enforce numerous financial

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<sup>20</sup> Based on information from [http://www.defenselink.mil/dbt/faq\\_bea](http://www.defenselink.mil/dbt/faq_bea), 30 April 2006.

<sup>21</sup> Based on information from [www.erpnavy.mil](http://www.erpnavy.mil), 30 April 2006.

requirements. This creates complexities that do not necessarily add value to the warfighter, but are required actions for DoD's stakeholders (taxpayers/citizens). An example is the CFO Act of 1990 in which federal agencies are required to provide "clean" financial statements<sup>22</sup>. This is a requirement that does not necessarily add value to the warfighter, but it is a mandated complexity, which adds limited value to DoD's stakeholders (citizens).

As mentioned in previous chapters, one can almost never eliminate all non-value added costs in an organization. However, using Rule #3 of Complexity Management (Minimize the costs of any complexity you offer) as a guideline, one should attempt to make external complexities as efficient as possible.

The external requirement of achieving clean audits in DoD's financial statements has allowed the services to simplify some complexities, but it appears to have created new complexities. The new financial systems will eliminate numerous unnecessary complexities (e.g. redundant systems and personnel). However, the financial functions in DoD are overhead activities which add limited value to the warfighters and the citizens. As such, the development of financial systems should be minimized to the bare essentials that add value for the customers and satisfy the requirements of its stakeholders.

In my previous job in NATO, I was a first-hand witness to the organizational impact of improving the financial system to meet the same external requirements of clean audit and modernization using COTS. The result of the new system was an increase in the number of financial personnel, additional funds for training and consultancy, and additional tasks for the IT personnel. The system increased the process times and had no real benefits for the customer/warfighter. The new financial system was too complex for its purpose. From the Complexity Management perspective, the new system reduced efficiency since it added non-value cost while providing minimum, if any, increases in value added to the customers. This leads us to one of my conclusions of Complexity Management; all decision makers, whether inside or outside, of an organization need to concentrate on Rule #3 of Complexity Management principles when enforcing requirements that create loss of value and efficiencies to the customer (external complexities).

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<sup>22</sup> Based on information from [http://www.defenselink.mil/dbt/sfis\\_faqs](http://www.defenselink.mil/dbt/sfis_faqs), 30 April 2006.

External complexities are normally set-up for the benefits of stakeholders and generally do not add much value to the customers. These complexities are mandatory, so they have to be met by DoD. However, we need to remember the mission of DoD and its customers and minimize the cost of such external complexities.

### **C. RECOMMENDATIONS BASED ON COMPLEXITY MANAGEMENT PRINCIPLES**

Based on the previous Complexity Management analysis, DoD should rethink its current attempt to transform its financial functions, or at least use this attempt as a “stepping stone” to the ideal goal of one financial system with common standards. While current attempts are moving in the right direction with the reduction of systems (offerings), Complexity Management principles indicate we need to minimize the offerings that do not add value to the customer and its respective costs. The following presents a summary of the course of action DoD should have taken with regard to its financial systems had it used Complexity Management principles as a guide.

#### **1. Identify Customers for DoD and its Financial Systems**

As established in Chapter III, DoD customers are the warfighters. The customers of its financial systems, however, are primarily management and the stakeholders (Congress, Citizens, etc...). Warfighters ultimately benefit from the financial systems because they allow them to receive their required financial resources. Warfighters don't care whether the system is a basic Excel spreadsheet or a complex Oracle business software. The only real expectation that a warfighter has from a financial system is that it is seamless. They want to receive their required funds when they need it, so they can concentrate on their primary duties.

#### **2. Identify the Purpose of Financial Systems in DoD**

The main reason behind financial systems in DoD is to account for and manage financial resources. This is primarily to inform management and stakeholders on the status and uses of the funds. This adds limited value to the warfighters since it is something that they can't see, don't know about, don't care, and won't pay for. In other words, financial systems are required to meet stakeholder requirements (External Complexity) and are mostly non-value added requirements to the warfighter.



### **3. Concentrate on Adding Value to the Warfighter**

As established in Step 1, the only realistic value that warfighters want from a financial system is to receive the funds they need when they need them. Any other requirement does not add value to them. Therefore, the design of financial systems for DoD needs to, first and foremost, provide for what the warfighter wants and then satisfy the stakeholders' requirements. Unlike current attempts, which appear to be primarily for the stakeholders and secondarily for the warfighter.

### **4. Minimize Non-value Added Offerings and Their Respective Costs**

The previous steps have demonstrated that financial systems in DoD provide minimal value to the warfighter, but are required to satisfy external complexities and management. Therefore, any efforts towards improving DoD financial systems need to be concentrated on reducing their complexities and costs. The option of one common financial system and standards should be investigated to minimize offerings (complexities) and their costs.

Proper analysis needs to be done to identify whether is better (efficient, lower cost) for DoD to buy COTS software or develop a system that meets DoD's requirements. I could not find any research on DoD's part to evaluate the make vs. buy option. It appears that the decision to buy COTS software was based on two premises; (1) it is initially cheaper since DoD can avoid design and R&D costs and go straight to the procurement phase, and (2) commercial business practices are normally more efficient. The first premise is normally correct, at least in the short-run. However, the second premise does not apply to DoD since its financial system requirements are not the same as the commercial sector. The commercial sector's existence is to make money, and its financial systems are designed to meet such a goal. DoD's bottom line is not profit, it is to defend the nation while maximizing and accounting for its available resources. This means that COTS software might not be the proper solution since it is designed for different purposes.

Based on my NATO experience, COTS software may increase the financial department/overhead requirements in the military (more support personnel, more support funds) while presenting minimal, if any, additional value to the warfighter and the stakeholders. However, one experience and opinion should not close the door on COTS software. A proper make vs. buy analysis should be done at the DoD level in order to address Rule #3 of Complexity Management, "minimize the cost of any complexity you offer".

## V. CONCLUSIONS

For the ease of explanation, the conclusions are presented in two parts. The first conclusion addresses the Complexity Management approach and the pros and cons of using this approach in an organization. The second conclusion addresses the complexity of DoD's financial functions and how the use of complexity methodology could help DoD improve its operations.

### A. COMPLEXITY MANAGEMENT

Should we use the Complexity Management approach in an organization? Yes!

Should we quantify this approach as suggested by The George Group? No!

The Complexity Management approach is a worthwhile tool for DoD, but it has a few flaws like any other management approach. The methodology or theoretical idea is extremely useful for any organization to assist with its decision making and improvement efforts. However, the analytical or quantification part is less useful.

Complexity Management emphasizes the importance of the customer for an organization's activities and could simplify the decision making process. The methodology of complexity management recommends that all decisions be evaluated against what adds value to the customer, or in DoD's case, the warfighter. Decision makers need to understand that additional offerings, in particular in the support functions, increase DoD's complexities while generally not adding value to the warfighter.

The most relevant flaw in Complexity Management, as proposed by The George Group, is that it is a subjective approach that can't be readily quantified. The attempts by the authors of "Conquering Complexity in Your Business" to quantify complexity are not useful for DoD. The Complexity Management approach is based on the idea of value added to the customer and this idea is subjective in itself. Value added generally varies from person to person, it has no common standard, and it is hard to quantify. The quantification approach is susceptible to numerous interpretations and variations, and therefore, not recommended.

In my opinion, Complexity Management needs to be used like Quality Management and not as a quantifiable approach like Six Sigma. Complexity Management should offer a continuous improvement state of mind that should impact all decision making and an

organization’s culture. In DoD’s case, it would require that the whole organization work towards adding value to the warfighter while consciously minimizing costs of both value added and non-value added activities. Every decision that is made should be looked at from the customer’s perspective and not from the activity’s perspective. When possible, all processes should be evaluated and re-engineered, if required, in order to minimize unnecessary complexities and maximize value to the consumers.

Figure 5.1 provides a simplified decision-making diagram that I have created to summarize my findings on Complexity Management. It includes the principles of Complexity Management and it could be helpful in a general decision-making scenario.

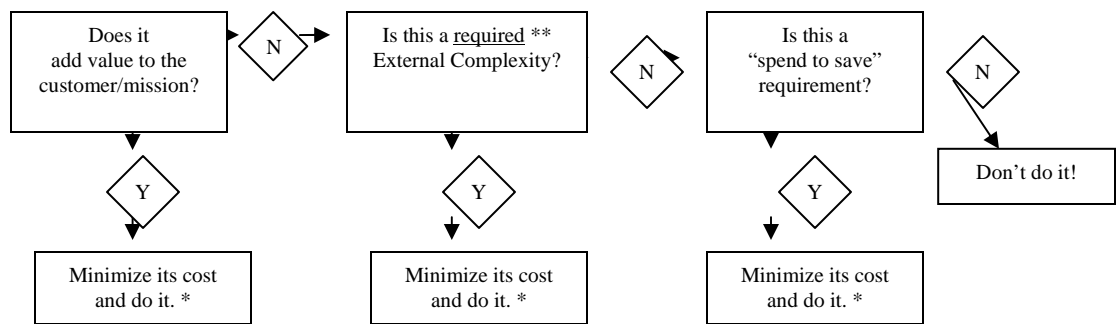


Figure 5.1: Complexity Management Decision-Making Diagram

\* If resources are available.

\*\* Ensure there are no better alternatives or ways to avoid the requirement.

## B. COMPLEXITY IN DoD FINANCIAL FUNCTIONS

Financial requirements in DoD are extremely complex as it is without adding any additional complexities. An estimate of some of the annual financial management requirements include<sup>23</sup>:

- \$700 billion in assets
- 282 active appropriations
- 124 million accounting transactions
- 140 million pay transactions to 5.5 million personnel

<sup>23</sup> Requirements are based on information from the Defense Link website, Fact & Figures sheet. [www.defenselink.mil/dbt/facts\\_figures](http://www.defenselink.mil/dbt/facts_figures)

- 9.3 million contracts annually
- 12.6 million commercial invoices
- 6.9 million travel payments
- Average of \$455 billion in disbursements

The progress that is being made with the new systems is a step in the right direction, but not nearly enough. The modernization and integration attempts should have been done in accordance with Complexity Management principles. Decision makers should have considered who are DoD's customers and their mission, and what financial management in DoD represents to them.

Financial management in DoD is a required support/overhead function (non-value added) to the warfighter and its stakeholders. Financial functions should be efficient enough to meet its requirements and be minimized as much as possible. The warfighter and the stakeholders should be telling the financial community what they need. Instead, the current transformation appears to have the financial community telling the warfighter and the stakeholders what they will get based on decisions from personnel outside the organization (external complexities).

Out of all of the current business modernization attempts from the services, the Navy's ERP approach appears to be the best way to upgrade the financial systems and minimize the non-value added of the support functions (overhead) according to the Complexity Management principles. The combination of IT for all support functions could minimize costs and increase efficiencies for its users and the customers.

Complexity Management principles should be applied in all of DoD's functions and not just the financial functions. There is much to be learned and applied from a Complexity Management approach in DoD. The operational personnel could maximize their value and efficiencies with this approach. As with Southwest (Chapter II), imagine the impact a reduction in the type of aircraft DoD uses could have in its operational costs and efficiencies. Imagine a standardization of support functions in which we could minimize support personnel and avoid redundancies of effort. We could be saving billions of dollars for the taxpayers or using the saved funds for value added activities to the warfighter.

DoD is the largest, and one of the most complex organizations in the world. It manages more than twice the dollar volume of the world's largest corporation, employs more people than

the population of some countries, and provides medical care for as many patients as the largest health management organization<sup>24</sup>. Because of its nature, it is imperative that DoD use a Complexity Management in all its decisions and cultivate the principles of such an approach in its culture. Ignoring the principles of Complexity Management in DoD could mean the loss of billions of dollars, or even lives.

Transformation ... means shifting resources from bureaucracy to the battlefield. Streamlining and modernizing is a matter of life and death, because our job is defending America as well as is humanly possible.--*Secretary of Defense Donald H. Rumsfeld on DoD Transformation, Town Hall Meeting, March 6, 2003*

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<sup>24</sup> Data are based on information from the Defense Link website, Fact & Figures sheet. [www.defenselink.mil/dbt/facts\\_figures](http://www.defenselink.mil/dbt/facts_figures)

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