NAVAL POSTGRADUATE SCHOOL
Monterey, California

THESIS

ONLINE REVERSE AUCTIONS:
A PRICING TOOL FOR GOVERNMENT CONTRACTING

by

Bruce A. Roll

December 2000

Thesis Advisor: Mark E. Nissen
Associate Advisor: William R. Gates

Approved for public release; distribution is unlimited

REPORT DOCUMENTATION PAGE			Form Approved OMB No. 0704-0188
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.			
1. AGENCY USE ONLY *(Leave blank)*	**2. REPORT DATE** December 2000r	**3. REPORT TYPE AND DATES COVERED** Master's Thesis	
4. TITLE AND SUBTITLE: Online Reverse Auctions: a Pricing Tool for Government Contracting			**5. FUNDING NUMBERS**
6. AUTHOR(S) Roll, Bruce A.			
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Naval Postgraduate School Monterey, CA 93943-5000			**. PERFORMING ORGANIZATION EPORT NUMBER**
9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES) N/A			**10. SPONSORING / MONITORING AGENCY REPORT NUMBER**
11. SUPPLEMENTARY NOTES The views expressed in this thesis are those of the author and do not reflect the official policy or position of the Department of Defense or the U.S. Government.			
12a. DISTRIBUTION / AVAILABILITY STATEMENT Approved for public release; distribution is unlimited.			**12b. DISTRIBUTION CODE**

13. ABSTRACT ***(maximum 200 words)***

Reverse Auctions (RA) are the next generation of procurement application software designed to link acquisition reform and common DoD procurement business processes with commercial best practices and advances in electronic commerce. When fully implemented, it will serve the DoD and Federal Government. This research examines RAs and emerging electronic commerce technologies that are revolutionizing the business industry today. Through a literature review and interview process, an analysis of RAs along with eBreviate, a commercial RA contracting venture and leading RA software applications in e-commerce is presented. Innovation analysis is applied to the data gathered from the research to develop a new process design. As analysts predict that by 2003, business to business e-commerce will grow to $1.3 trillion and 95% of business industry is going to go to RAs, only an aggressive implementation of innovative technologies today will prepare Government for the procurement needs of tomorrow. It is to this end that this research is conducted, with the intent of fostering innovative change in Government pricing.

14. SUBJECT TERMS Systems			**15. NUMBER OF PAGES** 86
			16. PRICE CODE
17. SECURITY CLASSIFICATION OF REPORT Unclassified	**18. SECURITY CLASSIFICATION OF THIS PAGE** Unclassified	**19. SECURITY CLASSIFICATION OF ABSTRACT** Unclassified	**20. LIMITATION OF ABSTRACT** UL

NSN 7540-01-280-5500

Standard Form 298 (Rev. 2-89)
Prescribed by ANSI Std. 239-18

THIS PAGE INTENTIONALLY LEFT BLANK

Approved for public release; distribution is unlimited

ONLINE REVERSE AUCTIONS: A PRICING TOOL FOR GOVERNMENT CONTACTING

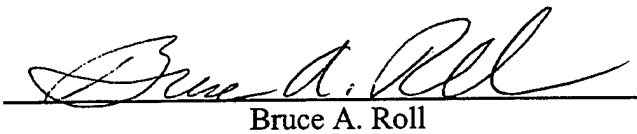
Bruce A. Roll
Lieutenant Commander, United States Navy
B.S., Emporia State University, 1985

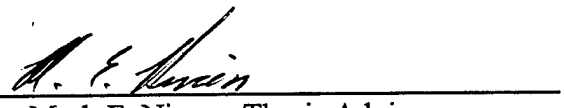
Submitted in partial fulfillment of the
requirements for the degree of

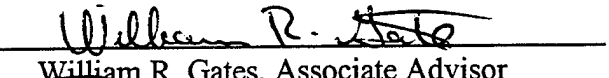
MASTER OF SCIENCE IN MANAGEMENT

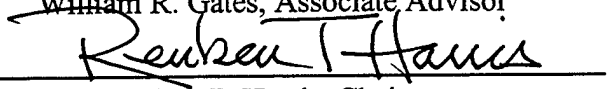
from the

NAVAL POSTGRADUATE SCHOOL
December 2000

Author: 
Bruce A. Roll

Approved by: 
Mark E. Nissen, Thesis Advisor


William R. Gates, Associate Advisor


Reuben T. Harris, Chairman
Department of Systems Management

THIS PAGE INTENTIONALLY LEFT BLANK

ABSTRACT

Reverse Auctions (RA) are the next generation of procurement application software designed to link acquisition reform and common DoD procurement business processes with commercial best practices and advances in electronic commerce. When fully implemented, it will serve the DoD and Federal Government. This research examines RAs and emerging electronic commerce technologies that are revolutionizing the business industry today. Through a literature review and interview process, an analysis of RAs along with eBreviate, a commercial RA contracting venture, and leading RA software applications in e-commerce is presented. Innovation analysis is applied to the data gathered from the research to develop a new process design. As analysts predict that by 2003, business to business e-commerce will grow to $1.3 trillion and 95% of business industry is going to go to RAs, only an aggressive implementation of innovative technologies today will prepare Government for the procurement needs of tomorrow. It is to this end that this research is conducted, with the intent of fostering innovative change in Government pricing.

THIS PAGE INTENTIONALLY LEFT BLANK

TABLE OF CONTENTS

I. INTRODUCTION 1
A. PURPOSE 1
B. BACKGROUND 1
C. RESEARCH QUESTIONS 3
1. Primary Research Question 3
2. Secondary Research Questions 3
D. METHODOLOGY 3
E. SCOPE AND ORGANIZATION 4
F. EXPECTED BENEFITS OF THIS THESIS 5

II. BACKGROUND 7
A. INTRODUCTION 7
B. FEDERAL ACQUISITION PRICING PROCESS 7
1. Introduction 7
2. Pricing 8
C. AUCTION HISTORY 10
1. Introduction 10
2. Auction Types 12
3. How Auctions Work 12
D. ONLINE REVERSE AUCTION TECHNOLOGY 15
1. Introduction 15
2. Downward Auctions 16
E. PROCESS REENGINEERING 17
1. Overview 17
2. Improvement versus Reengineering 17
3. Davenport Methodology 20
a. Phase 1: Identifying Processes for Innovation 20
b. Phase 2: Identify Change Levers 22
c. Phase 3: Developing Process Vision 22
d. Phase 4: Understand Existing Processes 23
e. Phase 5: Design and Prototype the New Process 24

III. REVERSE AUCTIONS 27
A. RESEARCH FOCUS AND APPROACH 27
1. Overview 27
B. REVERSE AUCTIONS 27
1. History 27
a. Commercial RAs 28
b. Government RAs 28
c. The Government RA Pricing Process 30
2. Current Status 33
3. Future Vision 34

4. System Advantages 36
a. Automated System *36*
b. Implementation Plan *36*
c. Broad Range of Functionality *36*
5. System Disadvantages 36
a. User Interface *36*
b. Not Web-Based *37*
C. EBREVIATE 37
1. History 37
2. Current Status 39
3. Future Vision 40
4. System Advantages 40
a. User-friendly Interface *40*
b. Web-Based Network System *41*
5. System Disadvantages 41
a. Doesn't Deal with Regulations *41*
b. New Technology *41*
D. RA INDUSTRY COMPETITORS 41
1. FreeMarkets 41
2. Frictionless Commerce 42
3. ACS Government Solutions Group (ACS GSG) 42
E. SUMMARY 43
IV. PROCESS INNOVATION 45
A. PHASE V: DESIGN AND PROTOTYPE THE NEW PROCESS 45
1. Brainstorming 46
a. System Needs *46*
b. Brainstorm Summary *49*
2. Assess Feasibility, Risk and Benefit 49
a. Feasibility *49*
b. Risk *50*
c. Benefit *52*
d. Design Selection *53*
3. Prototype the New Process 53
a. User-friendly Interface *54*
b. Web-based System *54*
4. Implementing New Organizational Structures and Systems 55
B. SUMMARY 55
V. CONCLUSIONS AND RECOMMENDATIONS 57
A. CONCLUSIONS 57
B. ANSWERS TO RESEARCH QUESTIONS 59
1. How can Reverse Auction Technologies Innovate the Government Pricing Process? 59
2. Answers to Secondary Research Questions 59
a. What is the Government Pricing Process and What are DoD's e-Commerce Requirements? *59*

b. What are the Advantages and Disadvantages of Reverse Auctions? *59*
c. Who is eBreviate and why is Their Reverse Auction System So Successful? *59*
d. What are the Advantages and Disadvantages of eBreviate? *60*
C. RECOMMENDATIONS **60**
1. Explore the Feasibility of a User-Friendly Interface Capability for RAs **60**
2. Make Implementing a Web-Based RA System a Top Priority **60**
3. Develop an Implementation Strategy for Integrating RAs into Government Pricing **61**
4. Pursue Development of RA Capability **61**
D. SUGGESTED FURTHER STUDIES **61**
1. End-user RA Access **61**
2. Effect of RAs on Small Business **62**
LIST OF REFERENCES **63**
INITIAL DISTRIBUTION LIST **65**

THIS PAGE INTENTIONALLY LEFT BLANK

LIST OF FIGURES

Figure 2.1. Market Type Comparison. [From Ref. 2] 9
Figure 2.2. Perfectly Competitive Firm. [From Ref. 4] 10
Figure 3.1. RA Pilot Program Results. [From Ref. 14] 29
Figure 3.2. US Companies Adopting B2B and Downward Auctions. [From Ref. 12] 35
Figure 4.1. Web-based RA Prototype. 55

THIS PAGE INTENTIONALLY LEFT BLANK

LIST OF TABLES

Table 1.1. Process Improvement versus Process Innovation. [Ref. 1].....19
Table 2.1. Davenport's Process Innovation Framework. [Ref. 1] 21
Table 3.1. US Industry Profiles for 2000. [Ref. 12].....34
Table 4.1. Options 1 and 2. 46
Table 4.2. Option Risk Assessment. 51

THIS PAGE INTENTIONALLY LEFT BLANK

ACKNOWLEDGMENTS

I would like to first acknowledge the patience and understanding of my wife Evelyn, whose loving support has been greatly appreciated throughout the drafting of this Thesis.

Furthermore, I give my sincerest thanks and appreciation to Dr. Mark Nissen and Dr. William Gates. Both gentlemen provided exceptional guidance and editorial comments for my research despite their busy and hectic schedules.

Finally, I extend a hand of thanks and admiration to Mike Murphy -- my friend and supportive mentor -- for his insight and lasting contribution to this work.

THIS PAGE INTENTIONALLY LEFT BLANK

I. INTRODUCTION

A. PURPOSE

This research reviews and evaluates the contract pricing process, specifically the effect of Reverse Auctions (RA), and examines how this application of a process innovation can make the contract pricing procedure more efficient and effective. The objective is to recommend innovative concepts that offer dramatic performance improvements for the procurement process, which can be implemented in future versions of the Federal Acquisition Regulation (FAR) or its successor. This work is not intended to detract from the tremendous effort that has brought the contract pricing process to fruition; rather, it augments this effort by adding support to existing ideas and recommending additional areas for innovative system change.

B. BACKGROUND

In the early Nineties, the Defense budget was significantly reduced to meet the reduced threat, and it is barely keeping up with inflation at present. Government acquisition reform has taken on many forms over the past decades. The main reason for this movement was, and is today, to become better and smarter stewards of vital resources.

The acquisition reform initiatives in the 1994 Federal Acquisition Streamlining Act (FASA) and the 1996 Federal Acquisition Reform Act (FARA) have made sweeping changes in DoD procurement and have led to innovative changes to deal with a decreasing defense budget. At the same time, the mission of the Department of Defense

(DoD) has become more complex and is greatly expanding. This serious dilemma of trying "to do more with less" has permeated the Government environment.

The DoD procurement system has also been criticized by Congress, industry, and from within, as sometimes ineffective in establishing a reasonable price for products or services either received or contracted for under the present procurement methods. This thesis exercises an alternative to one of the presently employed Department of Defense procurement methods. This thesis investigates the basic characteristics of an on-line RA as an alternative method of DoD procurement pricing. Online RAs might contain advantages for other governmental agencies, including state and local governments, as it has for some private corporations. It is the next generation of procurement application software designed to link acquisition reform and common DoD procurement business processes with commercial best practices and advances in electronic commerce.

An on-line RA is often called a "buyers' auction" because sellers bid against each other to win a buyer's business. RAs empower the buyer to find the best deal and they give the participating firms more information by announcing the current low bid. Information means a corresponding reduction in the seller's uncertainty. This simplifies the bid formulation process. Bid information gives sellers the opportunity to exploit this information by changing their bids. With on-line RAs, a firm could save much of the resources it currently devotes to developing complicated bidding strategies. The availability of information and the opportunity to change bids increases competitive pressure. This pressure forces bidding downward. Formal negotiations lack this competitive pressure, because there is no information about the low bid to force competing bids down. Online RAs could reduce prices for DoD, by making it harder for

contractors to collect excess profits and driving less efficient firms from the market. However, the Government will still make a best value determination and can make an award to the offeror of its choice.

Although the online RA program is only now being implemented in DoD contracting offices, and is in its infancy as far as its future potential is concerned, RAs represent the first step toward efficient and effective contract pricing.

C. RESEARCH QUESTIONS

1. Primary Research Question

How can Reverse Auction technologies innovate the Government pricing process?

2. Secondary Research Questions

- What is the Government pricing process and what are DoD's e-commerce requirements?
- What are the advantages and disadvantages of Reverse Auctions?
- Who is eBreviate Inc. and why is their Reverse Auction system so successful?
- What are the advantages and disadvantages of eBreviate?

D. METHODOLOGY

This thesis uses a deductive approach, utilizing Thomas Davenport's Process Innovation framework [Ref. 1]. This framework analyzes Reverse Auction strategies to determine what acquisition processes and tasks in emerging e-commerce technologies are most likely to elicit positive and innovative contract pricing change. Data were collected via Government regulations, books, periodicals, theses, the Internet, and interviews. The interviews were conducted with knowledgeable contracting professionals and e-commerce experts. These methods are fused to develop an integrated perspective of how contract pricing can be innovated through online reverse auction technology.

E. SCOPE AND ORGANIZATION

This thesis focuses on innovating contract pricing utilizing e-commerce technologies, particularly the function of online reverse auctions in the Federal Acquisition Process (FAP). It uses data from online reverse auction contractors, online reverse auction users, commercial e-commerce procurement professionals, and contracting experts to validate findings and conclusions. This thesis makes recommendations on how to innovate contract pricing with online reverse auctions in concept, rather than addressing the infrastructure or programming required to create or support such a system.

Chapter II follows this introduction and provides background information for the chapters that follow. It reviews the basic framework of the Federal acquisition pricing process and the history of auctions, describes online RA technology and outlines Davenport's Process Innovation Framework.

Chapter III examines the concept of online reverse auctions. This examination begins by describing DoD's pricing systems and assesses a commercial RA application called eBreviate. This chapter concludes by discussing related RA applications in electronic commerce.

Chapter IV then applies Davenport's Process Innovation Framework to the information provided in Chapter III. Knowledge gained from analyzing the Government and commercial applications is then discussed, and opportunities are identified for intelligent agent applications.

Chapter V makes recommendations for RA pricing improvements and suggests a migration strategy for their implementation. Research questions are answered and key

conclusions are summarized. The thesis concludes with recommendations for further research along these lines.

F. EXPECTED BENEFITS OF THIS THESIS

The audience of this study includes DoD policy makers, DoD workflow systems architects, and both current and future RA users. This thesis provides a valid alternative to regular contract pricing strategies by offering an innovative option to the way contracts are currently processed using manual pricing methods. The alternative may reduce cycle time, assist contracting professionals, improve the acquisition process, save money, and strengthen the contracting program.

THIS PAGE INTENTIONALLY LEFT BLANK

II. BACKGROUND

A. INTRODUCTION

This background chapter reviews the DoD procurement pricing process. Auctions and RA software technology are also described. RAs are fast becoming one of the greatest advances in electronic commerce. Essentially, auctions promote flexible pricing. A hundred years ago, flexible pricing mechanisms were the norm. There were very few fixed pricing systems. The Internet will bring us back to the past. RAs are unmistakably among the hottest features of the Internet today. The final section in this chapter outlines Davenport's process innovation framework model, which is applied to the information presented in Chapter III and analysis presented in Chapter IV.

B. FEDERAL ACQUISITION PRICING PROCESS

1. Introduction

An important part of a Contracting Officer's (KO's) job is conducting the price analyses necessary to ensure that the Government purchases supplies and services from responsible sources at fair and reasonable prices. Contractors, on the other hand, are in business to cover costs and to contribute to attaining corporate operational objectives (profit). [Ref. 2]

Price, from the buyer's perspective, is the money paid a seller to deliver a product or perform a service. The FAR defines price as "Cost plus any fee or profit applicable to the contract type." [Ref. 3] It is important to remember that if prices do not cover supplier costs and provide a profit, losses will result, which could lead to unsatisfactory performance and contractor default. [Ref. 2] A price based on adequate price competition should involve two or more responsible offerors submitting priced offers that

satisfy the Government's contract requirements, or a price that is reasonable in comparison with current or recent prices for similar items. [Ref. 3]

2. Pricing

The way that a contractor covers costs depends on production methods and sales volume. Their profits depend on competition, objectives of the firm, necessary investment, and the risk involved. These factors are incorporated through one of several pricing strategies: mark-up pricing, which is based on a percentage of direct or total cost; margin pricing, which is a percentage based on the relationship between cost and profit; or rate-of-return pricing, which is based on a return percentage of the investment amount. [Ref. 2]

Companies in a competitive market must also consider price, product, place, and promotion and develop pricing schemes to account for these attributes. Although there are many different pricing strategies, RAs force all participating contractors to use the Market-Competition pricing strategy. Emphasis is on competitive action/reaction to pricing decisions that competitors have made or are expected to make. Contractors using this strategy in relatively homogenous markets establish prices based on what the competition charges, or what they think the competition is going to charge. [Ref. 2]

Government KOs are required to purchase supplies and services from responsible sources at fair and reasonable prices. [Ref. 3] These terms take on different meanings based on the participant's perspective. Fair to the Government is a fair market value that is provided by an efficient and economical firm. Fair to the Seller is a realistic price in terms of the seller's ability to satisfy the contract and earn a normal rate of return for the industry. Thus, a reasonable price is what a prudent and competent buyer/seller would be

willing to pay/receive given market conditions, economic conditions, and competition. [Ref. 2]

Competition is the most important of these factors. As illustrated in Figures 2.1 and 2.2, the forces of supply and demand work effectively under perfect competition, providing a "perfect" pricing balance between buyers and sellers.

LEVEL	BUYERS	SELLERS	MARKET ENTRY/EXIT	RELATIVE PRICING POWER
Perfect Competition	Many independent	Many independent	Relatively easy	Pricing balance between buyers and sellers
Effective Competition	Limited independent	Limited independent	Relatively easy	Relative pricing balance between buyers and sellers
Oligopoly	Many independent	Few independent	Restrictions	Relatively greater pricing advantage to sellers
Oligopsony	Few independent	Many independent	Relatively easy	Relatively greater pricing power to buyers
Monopoly	Many independent	One	Restrictions	Considerable pricing power to sellers
Monopsony	One	Many independent	Relatively easy	Considerable pricing power to buyers
Bilateral Monopoly	One	One	Restrictions	Pricing power established by negotiation (as in sole source Government negotiation)

Figure 2.1. Market Type Comparison. [From Ref. 2]

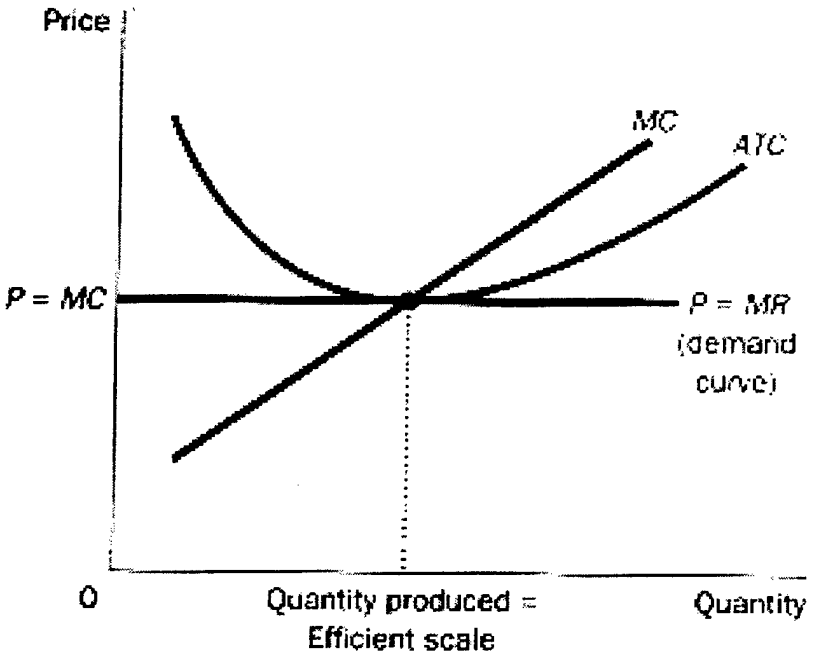


Figure 2.2. Perfectly Competitive Firm. [From Ref. 4]

Under perfect competition, profix maximizing firms produce the output where price equals marginal cost. [Ref. 4] Excess profits are eliminated by competition and any uncompetitive firms will be forced to adapt by reducing production costs or be driven from the marketplace.

C. AUCTION HISTORY

1. Introduction

According to the Merriam-Webster Collegiate Dictionary, tenth edition (1998), an auction is a "sale of property to the highest bidder." [Ref. 5] The exact date and time that auctions were first organized is not exactly known, although historians agree that they have been in existence for quite some time. As early as the fifth century, the Greeks held auctions to sell mature women to the highest bidder for the purpose of marriage. [Ref. 6] However, the Romans are believed to be the first to sell goods at auction. The Chinese

used auctions to sell surplus property to raise money for their religious leaders and temples. The British organized regular auctions of books and art in the 1600s.

As American culture evolved in the 1700s, British methods came to America along with immigration. Because there was no thriving economy, there was very little place for auctions and auctioneers. The only time that auctions seemed to be necessary involved selling property to satisfy debts or pay taxes. In addition, public slave auctions helped fuel the largest slave market in the western world. [Ref. 6] This practice probably did more to degrade the auction method than any other act. As the Civil War progressed, many troops further tarnished the auctioneer's already damaged image by auctioning property seized from landowners and merchants as they marched. The auction business remained in the same rut through the remainder of the 1800s and the first half of the 1900s. [Ref. 6]

Auctions began to make great strides after World War II, when businessmen saw an opportunity to use the auction method as an alternate marketing tool. Accordingly, private auctions boomed in the post war period, to sell goods and real estate and the modern auction business was born. Businessmen nurtured the business. They raised the reputation of auctions to a higher plane through links to banks, attorneys, accountants, the court system, government agencies, and the public. [Ref. 6]

The Internet has put its own spin on the growth of auctions. The Internet allows anyone connected to the network to operate a server that can function as an exchange or auction. Because of the Internet's global reach, new exchanges can grow very rapidly. In the year 2003, business-to-business (B2B) e-commerce in the U.S. is projected to reach $1.3 trillion, while business-to-consumer (B2C) transactions are expected to reach

$146 billion. [Ref. 7] Total B2B Internet auction transactions could reach $1 trillion by 2004, with up to 1 million auctions conducted annually. [Ref. 8]

2. Auction Types

The English auction is the most common online-auction. In this system, the seller announces a reserve price or low opening bid and decides when to end the auction. The price is raised successively throughout the auction until only one bidder remains. Also referred to as the oral or ascending bid-auction, the English auction is the most commonly used auction form, and the one with which society is most familiar. The auction clears when bidding activity stops. The object on sale goes to the highest bidder at the bid price. [Ref. 6]

Dutch auctions are the converse of English auctions because the auctioneer calls out an initial high price and then lowers the bid successively until some bidder accepts the current bid. [Ref. 6]

In the First-Price Sealed-Bid Auction model, potential buyers submit sealed bids and the exchange awards the item to the buyer who submits the highest bid. The winner pays their bid price. First-price sealed bid auctions are commonly used by governments in awarding procurement contracts [Ref. 6]

3. How Auctions Work

Auction price movement falls into one of three patterns: up, down or haphazard. Price goes up until the bidding stops, price goes down until the bidding stops, or each bidder communicates privately and individually with the auctioneer, in which case price is not required to go up or down (haphazard). [Ref. 6]

Most traditional auctions involve many buyers vying for the good or service being offered by one seller. But today's RAs instead include many sellers bidding for the business of one buyer. In many auctions, price is the name of the game; in others, the best price may not win. Throughout history, auction formats often gave auctioneers the power to ignore bids from undesirable bidders, even if they offered the best price. [Ref. 6]

Today, price-only auctions are typical, but total cost auctions are the wave of the future. Total cost functionality enables buyers or sellers to more formally indicate which non-price factors are important. They enable a buyer, for example, to incorporate purchase criteria into their negotiations, including warranty, quality, delivery time, customer service and the cost of changing vendors. The auction reflects more of the variable factors used to make a true purchase decision. Taking multiple factors into account helps buyers find the suppliers who will best meet their needs. [Ref. 6]

Historical auction methods include yelling out, submitting sealed written bids, shaking the auctioneer's hand and squeezing his fingers in a prescribed manner, whispering, raising a bidding paddle, and signaling by tugging on your ear. Today, bidders are using their "Faceless" computers, obviating the need for such blatant bidding practices. Internet bidding can take place from anywhere, anytime an auction is held. [Ref. 6]

Some auctions, such as those held on eBay, are open to all. Other auctions are strictly by invitation only. Today, open auctions are more likely to involve simple, transactional goods and are more typical of business-to-consumer (B2C) or consumer-to-consumer (C2C) transactions. [Ref. 6] Invitation only, or closed auctions are more likely

to be used for B2B or business-to-Government (B2G) transactions that are more complex in nature. For example, when factors such as quality and service are involved, buyers like to pre-screen sellers. Auctions for goods that provide a competitive advantage, goods that may involve liability or security issues, or goods that are specialized enough that the seller has a good idea of the likely bidders, call for invitation-only auctions. [Ref. 6]

Auctions may take months or minutes. One of the oldest varieties of auctions involved a circle of people gathered around a burning candle. The winner put in the highest bid before the flame went out. B2B and B2G auctions generally last a few hours or less. The most important thing to consider regarding time frames today is whether it is a one-time event or recurring auction, or involves dynamic pricing. [Ref. 6] Auctions can even be used for goods and services that require a long-term contract. Recurring auctions are more like short-term contracts. They are typically used for ongoing transaction purchases. Recurring auctions can occur at pre-determined intervals throughout the year. If you use dynamic pricing, you make more of an on the spot decision. In other words, you buy it when you need it. Dynamic pricing is transactional as opposed to contractual, and it is based on price-only as opposed to total cost. [Ref. 6]

In the traditional English or "open-outcry" auction found at an auction house like Sotheby's, bidders generally know both who they are bidding against and the exact bids of their competitors. In today's online auctions, however, bidders generally do not know who the other bidders are, but they do know how their own bids compare to the best bid. Online bidding ensures a certain "faceless" form of competition. Using the World Wide

Web, bidders can place bids anonymously, from anywhere in the world, anytime they participate in an auction. [Ref. 6]

D. ONLINE REVERSE AUCTION TECHNOLOGY

1. Introduction

In the past 35 years, computer technology has gone from the sacred chambers of colleges and universities to common place tools in most homes, offices and schools across the country. Computer technology has become a part of our everyday lives, making our car engines more efficient (e.g., control spark, fuel flow, emissions), entertainment more enjoyable (e.g., CD players/ video games) and our communications easier and more efficient (e.g., telephone service, answering machines, email). This technology has opened up a whole new world of opportunities that is, for many, beyond comprehension.

Although many people using this technology may not fully understand how computers function, they do understand that this technology has the ability to make our lives easier. Computers have become valuable tools that we work with to increase our efficiency. We exploit their capabilities to reduce time and labor intensive tasks in the work place.

Computers continue to evolve to perform jobs that could previously only be performed by humans, and they are performing these tasks with greater precision and efficiency than ever before. Relatively new computer software technology has gone so far as to implement a form of bargaining, called online auction software, that enables people to use computers to create a marketplace.

Despite the fact that this technology is in its infancy, Government KOs can see the huge potential in what the Internet can bring to purchasing. The Internet will change how Government does it's buying and it must reap the full potential of e-procurement [Ref. 8]

2. Downward Auctions

RAs, or Downward Price Auctions, are commonly used for B2B auctions. Price moves down over time, until one of many sellers (who are the bidders in this case) wins the contract from one buyer. The means of communication is generally a computer – via the Internet or a software application. RAs and supplier lists are a marriage made in heaven. RAs bring suppliers into a real-time head-to-head competition. Prices fluctuate according to supply and demand, producing a Perfectly Competitive marketplace. [Ref. 9]

RA software must address the needs of large industrial buyers. RA service providers work directly with, and are constantly learning from, their customers. As a result, they continue to adapt their software to the customer's needs. When quality and technical factors are equal in importance, they can conduct multi-parameter auctions. When prices fluctuate during the life of a contract, they can create differential index auctions. To support global bidding, a multi-currency RA can be conducted.

Most providers have an easy-to-use graphical interface that allows buyers to watch auctions and suppliers to submit bids. These technologies provide near-instantaneous response, displaying bids to both buyers and competing suppliers within seconds of their submission, creating a dynamic marketplace.

E. PROCESS REENGINEERING

1. Overview

Reengineering has been a popular mantra in acquisition reform. Top Defense officials made it clear that the Government needs to make major improvements. The Quadrennial Defense Review (QDR) of 1997 reviewed the Defense posture, policies and programs which identified threats, areas of risk and opportunities through the year 2015. This comprehensive review formed the foundation for the Defense Reform Initiative (DRI), which stated that the DoD needs to practice:

> ...the key business principles that American industry has successfully used to become leaner and more flexible in order to remain competitive. The resulting savings will help fund the 'Revolution in Military Affairs,' to ensure American military superiority in the future. Equally important, the DRI is aimed at ensuring that DoD support elements are agile and responsive to support the warfighters, who are rapidly applying new technologies to change the way they fight. [Ref. 10]

It is important to discuss the fundamental nature of reengineering before continuing to innovating pricing methodology. The following sections discuss the difference between improvement and reengineering, Davenport's innovation process, knowledge-based system redesign and the findings of McCarthy's thesis on innovating the standard procurement process, all of which are foundational to this study.

2. Improvement versus Reengineering

The terms improvement, innovation, and reengineering have similar meanings which need clarification. First of all, Webster's Dictionary defines the process as "a natural phenomenon marked by gradual changes that leads toward a particular result or a natural continuing activity or function." [Ref. 5] It defines improvement as "the act or process of improving, the state of being improved, enhancing value or excellence." [Ref. 5] The combination of these two concepts gives us the foundation for the concept of

process improvement. Davenport states that "process improvement involves performing the same business process with slightly increased efficiency or effectiveness." It is a change made gradually or in steps, which takes an attentive look from the bottom at the lowest action of an existing process and focuses on improving a specific process. [Ref. 1]

Innovation is a step beyond improvement, as Davenport differentiates the two processes in Table 1.1. Innovation is "the introduction of something new, a new idea, method, or device." [Ref. 5] Process innovation involves introducing a new studied process into the larger business process. It is an analysis of not only the entire process, but of how that process meets the overall objective of the business. It is intended to increase efficiency of the entire business formula. This approach does not have a defined conclusion, but looks at identifying and eliminating redundant or worthless processes, in pursuit of continued improvement. By making a studied, yet radical change, process innovation has the potential to significantly reduce cost and improve efficiency. Davenport defines process innovation as

> ...stepping back from a process to inquire into its overall business objective, and then effecting creative and radical change to realize order-of-magnitude improvements in the way that objective is actually accomplished. [Ref. 1]

Process innovation and reengineering are also referred to as Business Process Redesign (BPR), but reengineering, in the context of this thesis, takes on more specific

Function	Improvement	Innovation
Level of Change	Incremental	Radical
Starting Point	Existing Process	Clean Slate
Frequency of Change	One Time/Continuous	One Time
Time Required	Short	Bottom Up
Participation	Bottom Up	Top Down
Typical Scope	Narrow within Functions	Broad Cross Functional
Risk	Moderate	High
Primary Enabler	Statistical Control	Information Technology
Type of Change	Cultural	Cultural/ Structural

Table 1.1. Process Improvement versus Process Innovation. [Ref. 1]

meaning. Reengineering is "... the fundamental rethinking and radical redesign of business processes to achieve dramatic improvements in critical, contemporary measures such as cost, quality, service and speed." [Ref. 11] Reengineering is fundamental in the sense that nothing is considered as fixed or unchangeable, giving the notion that there are no real barriers to effect change at each level of an organization. It is radical in that it can transform even the most enduring, stable and core aspects of a process without limitations or constraints. And it is dramatic in that improvement implies that the level of

performance can be increased at a quantum level, as in twofold or more, rather than marginal improvements of five or ten percent. [Ref. 11]

Reengineering embodies what is needed most to create the required changes to enhance Government acquisition, and the Davenport process innovation model is the ideal tool. It is critical to understand this process, as it is fundamental to the previous research upon which this thesis builds.

3. Davenport Methodology

Davenport's framework for process innovation contains five major phases: identifying processes for innovation, identifying change levers, developing process visions, understanding existing processes, designing and prototyping the new process.

a. Phase 1: Identifying Processes for Innovation

The first step in the innovation process is to enumerate major processes. This enables the organization to identify process definitions and their impact on the organization as a whole. It also ensures that the process scope is manageable. The second step is to determine process boundaries so that process owners can comprehend where the process begins and ends, and the relationships between other processes and inner sub-processes. The third step is to assess the strategic relevance of each process to innovate those processes that are most in line with the organization's mission.

Innovation is a radical process that requires a great deal of coordination. (See Table 2.1) Therefore, in cases of simultaneous innovation projects, the organization must also ensure that it completely understands the change and potential for upheaval. Once the strategy is assessed, then one must render high-level judgments of the "health of

each process," to prioritize processes that are problematic and need obvious improvement.

Phase I. Identify Process for Innovation
Enumerate major processes
Determine process boundaries
Qualify the culture and politics
Phase II. Identify Change Levers
Identify technological/human opportunities for process change
Identify potential constraining technology and human factors
Research opportunities
Determine which constraints will be accepted
Phase III. Develop Process Vision
Access existing strategy for direction
Consult with customers for performance objectives
Benchmark for targets and examples of innovation
Formulate process performance objectives
Develop specific process attributes
Phase IV. Understand Existing Processes
Describe process flow
Measure in terms of new process objectives
Assess the process in terms of new process
Identify problems with the process
Identify short-term improvements
Qualify the culture and politics
Phase V. Design and Prototype of the new process
Brainstorm design alternatives
Assess feasibility/risk and select the new process design
Prototype the new process
Develop a migration strategy
Implement new organizational structure

Table 2.1. Davenport's Process Innovation Framework. [Ref. 1]

Innovation should be targeted toward the processes that receive the highest priorities. Finally, steps are taken to qualify the culture and politics of each process. This context is important because the organization needs a champion for process innovation and a strong commitment to follow through with the innovation, appropriately set within this context, if it is going to be a long-term success.

b. Phase 2: Identify Change Levers

The second phase of process innovation involves identifying change levers. The first step is to identify potential technological and human opportunities for process change. Organizations must ensure that they focus on achieving a change through more than just one change lever, like information technology (IT) alone. IT must be viewed as one of several enablers of process innovation. [Ref. 1] Once these levers are identified, then one must identify potentially constraining technological and human factors to decide which constraining factors are accepted and which the organization will attempt to overcome. One also needs to analyze potential opportunities that would achieve organizational goals and innovate the process. The organization must look at enablers from all sides to ensure they reveal quantum improvements. The final step is to take the constraints identified at the top level and determine those that the organization attempts to overcome and, secondly, those that are to be left for later consideration.

c. Phase 3: Developing Process Vision

A clear purpose and vision are key if the process innovation is to succeed and become part of the organizational process and structure. Process vision must produce a champion with a clear direction to guide and inspire process innovation. The first step is to assess the existing business strategy for process directions. The organization's strategy should have an equal mix of measurable, specific, inspirational and long-term qualities. Consulting with customers during this step is paramount in implementing a highly successful process innovation change. The recipe for successful process innovation is completely understanding the customer's requirements and viewpoint. The organization should measure outputs such as performance, flow and other encompassing process recommendations.

The organization then selects one or more companies to benchmark its performance. The organization must consider other firms that have similar processes, not necessarily those within the same industry. The organization then takes the process vision that is developed from the organization's strategy and develops process objectives. These objectives include the process goal, improvement desired, measurable benchmark and time to be completed. The final step is developing descriptive and non-quantitative factors that satisfy both the process objectives and characterize the vision, generally categorized into characteristics such as technology, people and process outputs. Once this vision is fully developed, then the vision can move forward and properly innovate the existing system.

d. Phase 4: Understand Existing Processes

The key to success in the fourth phase is understanding the current process flow before designing a new one. The first step of understanding existing processes is to map the current process flow on paper; this map sets the stage for additional analysis. Understanding the current process flow requires quick but in-depth analysis, generally completed within a few weeks. This timely and visual description allows members of the process innovation team to understand all of their functions and how they interrelate.

The next two steps involve measuring the current process in terms of performance objectives and assessing the quantitative objectives and attributes laid out in the process vision. These steps give the process innovation team a quantitative description of the current process and indicate "trouble" areas. This information assists in developing a new process that meets the attributes of the process vision. Any deficiencies associated with the current process are identified with the applicable short-

term solutions. By the end of this analysis, the current process should be clearly understood, including any supporting IT or other cultural and political aspects to the problem. [Ref. 1]

e. Phase 5: Design and Prototype the New Process

The final phase of the process innovation cycle relies upon the process innovation team's creativity, and its ability to analyze and synthesize the information gathered in the previous phases, into a new and better process. The process innovation team should include key members of the organization--the stakeholders in the process. The first step is to have the members of the design team freely share and brainstorm their ideas and propose design alternatives. Each brainstorming solution should be analyzed for feasibility, risks and potential benefits. Next, a small-scale prototype design of the new process should be tested within the organization. The designers focus on how the new process fits the organization's structure and information technology. Once the designers test the process fit within the organization, the new process is refined and polished. This cycle of testing and polishing usually takes several iterations, but it helps ensure a proper fit in the organization and allows for user feedback. [Ref. 1]

The next step is developing a migration strategy depending on the size and overall impact of the new process. The organization may choose to phase in the program if full implementation is evaluated as too risky. A useful migration strategy may first implement the easiest redesigns with the largest payoffs. Alternatively, changes in organizational structures and culture are fundamentally more difficult to achieve, but with phenomenal potential payoffs. The final step in Davenport's process innovation framework is initiating the migration strategy and process innovations. Once again,

continuous process improvement (CPI) is a necessary ingredient in the recipe to success as it allows feedback and implements necessary changes in evolving toward maturation. [Ref. 1]

THIS PAGE INTENTIONALLY LEFT BLANK

III. REVERSE AUCTIONS

A. RESEARCH FOCUS AND APPROACH

1. Overview

Increased competition, new technologies, and rapidly changing global markets are forcing businesses to continually improve productivity and cost management. Such pressures have encouraged many companies to reexamine how they manage, control, and acquire the operating resources required to maintain daily business activities.

Today, the pursuit of aggressive streamlining strategies and cost-effective management techniques are as common in the Government as the commercial sector. As both sectors look to technological advances for streamlining solutions, advances in procurement management, like RA, are providing significant savings in both time and money. RAs are rapidly being assimilated into the business sector; by the year 2004, analysts project 1 million annual business and industry RAs will be conducted at a value of over $1 trillion. [Ref. 12]

This chapter looks at the DoD's RA and pricing initiatives. It also presents an overview of eBreviate, a commercial company that provides RA services, to illustrate a commercial application. Each section begins with an historical description, followed by the technology's current status, its future vision, and its perceived advantages and disadvantages.

B. REVERSE AUCTIONS

1. History

Dynamic RA marketplaces are the buying and selling zones of the future. No longer will buyers be stuck with fixed prices and fixed suppliers. Instead, bartering and

flexible pricing will be the name of the game. Online RAs have created an electronic Darwinian rivalry. In dynamic marketplaces, like Internet-based downward auctions and on-line exchanges, prices are negotiable and fluctuate according to supply and demand. [Ref. 12]

a. Commercial RAs

Thanks to the mass adoption of the Internet/World Wide Web, goods can be bought and sold-even haggled over-in real time, while actual transactions take place electronically over the global communications network. Both buyers and sellers benefit from this rapidly emerging trend. [Ref. 12]

Today, businesses spend trillions of dollars on goods and services, exceeding $5 trillion annually in the United States, and $20 trillion globally. [Ref. 8] These expenditures represent innumerable goods and services changing hands and countless hours spent negotiating, buying, and handling administrative tasks associated with the procurement process. [Ref. 12] Companies will increasingly employ the Internet and on-line intermediaries (auctions, exchanges, and catalogs) to improve the efficiencies of these transactions. [Ref. 12] Downward Internet auctions, where suppliers bid against each other, streamline the entire procurement process. As a result, buyers can access worldwide supply markets more quickly, efficiently, and cost-effectively. [Ref. 12]

b. Government RAs

Prior to RAs, thousands of hours were wasted on time consuming market research and negotiations; in the Federal Government, this cost millions of dollars annually. To reduce the cost of contract pricing, different DoD agencies and buying organizations are independently spending millions of dollars to exploit the latest in RA

technology. They hope to shorten the procurement process, and take advantage of the latest advances in procurement.

Because DoD is the largest buying organization in the world, developing an RA system for all DoD would appear to be a difficult task. In fact, developing such a tool would revolutionize the defense procurement world. With such an unprecedented undertaking, an incremental deployment is required to minimize user impact and to incorporate the latest technological capabilities as they emerge.

(1) Navy Pilot program. The vision for the Navy RA pilot program was to solicit and award competitive long term contracts utilizing the latest in Commercial Off-the-Shelf (COTS) RA software. [Ref. 13] To date, there have been 5 major procurements under the Navy's pilot RA program, utilizing FreeMarkets software. The first Navy RA reported an improved pricing process that resulted in faster acquisition lead times and great cost savings over historical buys. Additionally, as each new auction was conducted, confidence in the system gradually increased. The results of the first two RAs are shown in Figure 3.1.

RA Pilot Program Results

Recovery Sequencers:	**T56 Engine Blades:**
Date: 5/5/00	Date: 8/3/00
Historic Price: $3,307,500	Historic Price: $6,870,721
# of Bids: 36	# of Bids: 38
Time Duration: 53 minutes	Time Duration: 36 minutes
Scheduled Duration: 30 minutes	Scheduled Duration: 15 minutes
Final Bid: $2,375,000	Final Bid: $5,688,765
Savings %: 28.19%	Savings %: 17.2%
Bidders that Participated: 3	Bidders that Participated: 2

Figure 3.1. RA Pilot Program Results. [From Ref. 14]

In the pilot program, RAs have proven to be an effective pricing tool that should be used when it makes sense. Savings are similar to that experienced in the commercial sector. [Ref. 14]

When fully implemented, DoD RAs will serve thousands of users at negotiation sites worldwide. The intent is to design a standardized, automated, and streamlined Government pricing process to create greater efficiency and effectiveness. In fact, one could say that the Navy's RA service is a developmental work in progress that is continually evolving, while in use, in order to meet the current and future needs of the largest and most complicated buying organization in the world.

As can be expected, problems and challenges emerge with any significant process change. Early versions of RAs were plagued with bug related problems, causing system crashes and excessive time delays. One complaint maintained that RAs were a very complex system, that were not user-friendly and took tremendous training in order to employ. To address the training requirement issue, companies conducted thorough user process classes before they are provided access to actual auctions.

c. The Government RA Pricing Process

The RA process follows normal Federal procurement procedures. The buyer starts with a pre-selected list of suppliers. The buying agency conducts a vendor evaluation process to decide which suppliers will be invited to submit bids and offered a chance to join the RA for the contract. [Ref. 7] This is called determining the competitive range.

After receiving initial proposals and establishing the competitive range, the KO conducts a competitive, anonymous, on-line RA. [Ref. 13] When negotiations are conducted in a competitive acquisition, they take place after establishing the competitive range and are referred to as discussions. [Ref. 3] FreeMarkets refers to this auction process as a Competitive Bidding Event (CBE). This CBE shall constitute discussions with the offerors. [Ref. 13]

The participants then contact the RA service provider to acquire training and access to the bidding event. Once the terms and fees are agreed to, an auction date/time is established, the participants are cleared for access, and training is conducted to reduce the possibility of error or protest. [Ref. 13] Every seller's auction display contains a "Bid" button, which when activated, leads to a bid submission screen. The specific bid form may vary depending on the auction parameters, but it always includes a field to specify the price offered to sell the good or service.

Although the bidders most likely know who they were competing against, only the buyer and the RA service provider knows the identity of individual bidders. [Ref. 13] To the bidders, each company appears on the computer monitor as Company, 1, Company 2, Company 3, etc., or some other generic identification. Bids are displayed as the RA progresses, showing the downward slope in pricing.

The Buyer controls all aspects of how the auction is run, including the defaults of almost every setting, including bidding increments and auction duration. RAs begin at the pre-determined and published Zulu time. This ensures that all global participants are acting synchronously.

As each company submits an additional offer, it must underbid the current low price by a specified increment per proposal, as determined by the buyer. During the anonymous CBE, offerors may revise their initial pricing proposal by submitting electronic offers. [Ref. 13]

RAs are scheduled to end at the buyer's pre-determined termination time. However, extensions are authorized in some CBEs. If a new low offer is submitted within the last minute of the time period, the time period is extended for an additional minute beyond the time of that offer. The ending time continues to extend until bidding halts and the final over-time period expires. This one-minute overtime rule was utilized during the Navy pilot program. The end of the last minute is considered the close of discussions. [Ref. 13] The final revision during the CBE is considered the offeror's Final Proposal Revision (FPR).

When the auction ends, the buyer and seller are contacted by the auctioneer, confirming the transaction. However, it is the responsibility of the buyer and seller to arrange for the final transaction. When the final bid is received, a contract can be signed, sealed and delivered within a few minutes after RA completion. However, this is not a requirement. The buying agency can utilize best-value procurement procedures. The winner is not necessarily the low bidder in a "Best Value Decision." [Ref. 15]

At the conclusion of discussions in a normal Government contract negotiation, each offeror in the competitive range can submit a final proposal revision. The contracting officer establishes a common cut-off date for receiving final proposal revisions. [Ref. 3] In an RA, the KO neither requests a final proposal revision nor states a specific cut-off time. The offerors make their final proposal revisions during the heat of

the reverse auction. Since RAs constitute discussions, the final proposal revision is deemed to have been received during these discussions and RA termination is the common cut-off. A Best Value determination can be made prior to contract award, using prices obtained by RA. [Ref. 13]

2. Current Status

Currently, RAs are deployed on a trial basis in DoD. RA users generally experience a Windows-based desktop system with menus to navigate through the auction related preparation and operational process. Access to the auction provider's system and the auction itself is gained through a hub server or web-based system. A web-based RA system allows participants to input data and view status information via the Internet. Remote contracting sites link to the server via dial-up connections or the internet. Although functional, a hub server based system severely limits the system's global access capability.

With an Internet auction, buyers are not tied to one supplier, one pricing structure, or one inventory forecast. Besides enabling global reach and round-the-clock access, Internet auctions offer a larger market for suppliers and more choices for buyers. Since auctions can be held as needs arise, firms need not commit to inventory forecasts that can readily become outdated.

The current global volume of goods and services flowing through downward auctions exceeds $79 billion. This represents approximately 50,000 auctions, with US firms accounting for approximately 68 percent of that volume.

Internet auction usage varies across industries. The two key variables in auction volume are downward auction adoption rates and the existing expenditure base. [Ref. 12]

Both variables differ across industries. B2B electronic commerce adoption, intermediary adoption and the percentage spent on auctionable goods can all differ across industries, leading to differences in downward auction adoption rates, as illustrated in Table 3.1. [Ref. 12] Total industry expenditures on goods and services vary across industries, as does the percent of expenditures by large companies. Large companies will hold the majority of downward auctions over the next few years. [Ref. 12]

3. Future Vision

RAs are expected to expand rapidly. RA volume will follow a pattern of exponential growth similar to general B2B electronic commerce. [Ref. 12]

US Industry Profile for 2000

$ billions	Auctionable Large Co. Spend	B2B Adoption	Auction Volume
Basic Industries	178.9	High	5.6
Constr, Eng, Real Estate	83	Low	2.6
Energy & Utilities	44.7	High	1.4
Finance	118.2	High	3.7
Health	109.5	Low	3.4
Media & Leisure	74.1	Low	2.3
Nondurables	154.6	Low	4.8
Retail & Distribution	120.1	High	3.8
Services	70	Low	2.2
Technology	197.1	High	6.2
Transportation	57.3	High	1.8
Manufacturing	257.2	High	8.1
Government	247.3	High	7.8
	1,712.10		53.7

Table 3.1. US Industry Profiles for 2000. [Ref. 12]

Initially, a majority of volume will flow through large auctions hosted by auctioneers. Later, smaller, unhosted auctions will eventually dominate the auction

landscape. [Ref. 12] Most companies ultimately will want to run their own auctions. This shift will decrease the average auction size and increase the total number of auctions. Total auctionable dollars will spread across a smaller average auction amount. [Ref. 12]

The expected volume of auctions will grow to dominate the unlimited B2B market. 13% of US companies are expected to use RAs by 2004, as shown in Figure 3.2. [Ref. 12] Globally only 7% of the goods and services bought by large companies in 2004 will involve a RA. [Ref. 12] Even so, this 7% equates to $1 trillion in auctions. As companies realize the benefits derived through auctions, it is likely that RA volume will surpass all estimates and become an integral way of procurement. [Ref. 12]

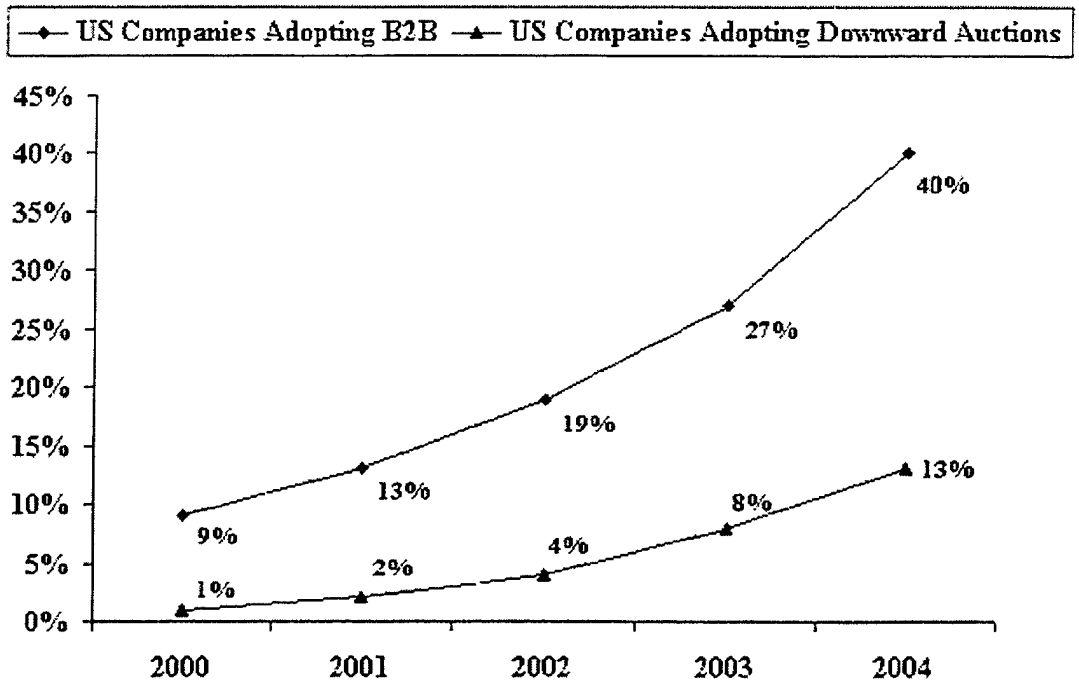


Figure 3.2. US Companies Adopting B2B and Downward Auctions. [From Ref. 12]

Implementing RA in Federal procurement will be challenging, particularly over the next four years. Both DoD and its contractors are committed to addressing RA

pricing issues in a timely manner through education, two-way communication, and training. The result will be best business practices that will effectively prepare and guide the DoD into the next century.

4. System Advantages

RAs are continually improving, so only higher level advantages are listed that will not be quickly outdated.

a. Automated System

Automating the pricing process is the first major step in innovating the process. The pilot RA program has provided a base that has and will implement organizational and technological advances as they emerge.

b. Implementation Plan

Gradually implementing RAs provides a realistic time-frame to meet the pricing requirements for the largest buying organization in the world. This should also allow some system flexibility for implementing emerging technologies.

c. Broad Range of Functionality

The pricing process must meet the needs of diverse customers. RA's flexibility to address this requirement is remarkable.

5. System Disadvantages

Like advantages, only higher level disadvantages, as perceived by the author, are listed here.

a. User Interface

Most RA systems are reportedly not user friendly. They require extensive initial and follow on user training. In some cases, companies have purchased additional

training to improve user efficiency with their programs. The cost in lost work-hours lost to extensive training must be considered.

b. Not Web-Based

By using a hub server system, the RA's capability is significantly limited. It prevents the smooth transfer of world-wide bidding information from procurement offices to customers, and vendors. Additionally, it restricts contracting personnel from fully utilizing the resources, connectivity and capabilities offered by a web-based system. These attributes could significantly increase efficiency.

C. EBREVIATE

1. History

eBreviate was founded in September 1999 by Tom Slaight and Niul Burton (Founders), and Sarah Pfaff (Co-Founder). It is a wholly-owned subsidiary of EDS - an $18 Billion global IT company. eBreviate was initially part of A.T. Kearney, an EDS subsidiary company, and leader in strategic sourcing consulting. In January 2000, eBreviate was officially launched; it became an official EDS subsidiary in June 2000. [Ref. 16]

eBreviate, a general auction service provider, is a global leader in eSourcing solutions, including Internet negotiations for business-to-enterprise (B2E) buying. They focus on buyer-centric value-added eSourcing negotiating strategies involving what to buy, from whom and under what terms. [Ref. 17] eBreviate believes that if companies manage their contracting resources more efficiently, they can obtain resources at a reduced price. They believe that automating the contracting process with a web-based RA system reduces costs and time delays, decreases cycle time to obtain resources, improves control of resource purchases, and increases customer satisfaction. [Ref. 17]

eBreviate began targeting Fortune 500 companies, like Proctor and Gamble, Sprint, and Delta Airlines, primarily because these companies represent the greatest savings. eBreviate gradually gained the advantage over its competitors in this growing market and assumed their accounts. This reflects both superior product function and superior user interface. The corporate giants preferred a simple, browser-based interface that could be employed by any individual in the organization, and not just the purchasing department experts.

eBreviate's walk-up interface and philosophy proved to be just what the corporate giants were looking for. They created reliable and comprehensive Internet negotiation tools designed to take the time, cost, and inefficiencies out of corporate purchasing. Their proprietary technology enables buyers to make purchase decisions based not only on price, but also on criteria such as quality, delivery time, and customer service

Customers regularly negotiate purchasing agreements ranging from $1 million to $320 million or more in a matter of minutes or hours, rather than days or months. EBreviate's customers involve several major industries, including automotive, aerospace, oil and gas, energy, manufacturing, retail, consumer goods, telecommunications and high technology.

eBreviate combines content, technology and in-field delivery services to provide trusted and valued eSourcing solutions to global businesses, governments and the exchanges that serve them. This enables large organizations to become razor sharp, rigorous and standardized in what they buy, from whom and under what terms.

2. Current Status

eBreviate's software and services automate the RA processes linking buyers, suppliers and value-added service providers through a global e-commerce infrastructure to provide cost savings and revenue opportunities for businesses of all size. Their RA system reduces paperwork, speeds transactions, and allows a buyer to reduce money spent. A purchase made with eBreviate's software saves money by reducing prices through a real-time marketplace, which eliminates the cost of face to face negotiation, and saves processing time.

As demand for eBreviate's capabilities has grown, and more small and medium sized businesses seek to reap the savings realized by larger companies, eBreviate's program upgrades have allowed it to offer more functionality to a broader range of users.

eBreviate is the first-to-market, with a patent-pending technology. It offers total cost functionality that allows buyers to negotiate numerous price and non-price parameters, like incumbency, quality, delivery time, and customer service, to determine the true cost of a product or service. This technology shaves time from the negotiation process, making it a one to two hour invitation-only timed event. eBreviate's customers have averaged 15-20% in contract savings and an ROI in excess of 13,000%.

eBreviate uses the Internet to connect the rapidly growing number of buying organizations with their even more rapidly growing set of suppliers. eBreviate enables buyers to quickly build online markets for their suppliers. Buyers gain the benefit of reduced-cost to goods without creating their own RA. This allows organizations to extend the benefits of the Internet economy to new businesses of all sizes and technical capabilities.

Since eBreviate's architecture is based upon connecting marketplaces, it is easy to provide Government RA e-commerce users with the technology, infrastructure and expertise to build online, real-time, highly branded, scalable, and flexible B2G RAs. eBreviate's $3.3 billion total auction sales generated customer savings of over $500 million. eBreviate is undoubtedly the frontrunner in the business to business RA market. [Ref. 18]

3. Future Vision

eBreviate is well positioned to take full advantage of the phenomenal RA growth. Their full-service solutions focus on meeting specific RA needs. This is combined with a full spectrum of services and an enterprise class technical architecture.

This combination will continue to provide businesses with the tools to implement powerful RA solutions. In today's fast-paced Internet marketplace, Government buyers cannot afford anything less. RA solutions must be scalable, extendable and customizable, if buyers want to promote competition. [Ref. 19] eBreviate's competitive advantages continue to be driven by its world-class technology, deep sourcing content, and extremely knowledgeable in-field delivery team.

4. System Advantages

a. User-friendly Interface

eBreviate purposefully created a user-friendly interface that does not take extensive training for occasional users. This feature enabled eBreviate to surpass its competition and become a leading company in its market. It also allowed empowered end-users to make simple purchases using eBreviate. This has saved processing time, increased customer satisfaction and allowed KOs to focus on more important issues.

b. Web-Based Network System

eBreviate's integrated and automated web-based processes take some of the time, cost, and inefficiency out of the procurement cycle. This system ties all participants into a common network infrastructure and allows the transfer of bidding information from buyer to vendor and back, without regard to geographic location. This brings greater productivity, performance and accountability to purchasing, while optimizing the way buyers and suppliers qualify, negotiate, close and evaluate their business relationships.

5. System Disadvantages

a. Doesn't Deal with Regulations

eBreviate does not currently have the functionality to deal with unique acquisition regulations and procedures, like the FAR. This is not a disadvantage for the civilian sector, it is a disadvantage if employed by Government agencies that are required to abide by a plethora of regulations.

b. New Technology

Though eBreviate's technology has been utilized in e-commerce for the past several years, it is still considered to be in an early stage of technological development. With any new development, there will be unknown bugs that need to be worked out. Bugs initially equate to a disadvantage.

D. RA INDUSTRY COMPETITORS

1. FreeMarkets

FreeMarkets, Inc. is a leading B2B eMarketplace, with online markets for industrial parts, raw materials, commodities and services. Since 1995, FreeMarkets has created online auctions for products in more than 100 supply verticals, including injection

molded plastic parts, commercial machinings, metal fabrications, chemicals, printed circuit boards, corrugated packaging and coal. More than 4,000 suppliers from over 50 countries have participated in the FreeMarkets B2B eMarketplace. FreeMarkets is the only B2B eMarketplace that includes online auction technology, technical operations, industrial market making services, access to a global database of suppliers and call center support to buyers and suppliers in over 30 languages. Customers include Visteon Corporation, United Technologies Corporation, The Quaker Oats Company, Owens Corning, Eaton Corporation, Emerson Electric Company, FirstEnergy Corp., SmithKline Beecham, Navistar International and Delphi Automotive Systems Corporation. [Ref. 20]

2. Frictionless Commerce

Founded in June 1998, Frictionless Commerce is a leading provider of innovative strategic sourcing software solutions. Frictionless' corporate vision is to transform market inefficiency into market value. They create applications that enable buyers to purchase quicker, smarter and more confidently, and drive best-value commerce transactions. Frictionless offers a sourcing software product for e-Markets called e-Market Suite, and is developing a strategic sourcing software solution for large enterprise companies. [Ref. 21] Frictionless offers the ability to quickly create reverse auctions by automatically pre-filling forms based on catalog data. This allows buyers to ensure accuracy and save time on repeating steps. Frictionless RAs are enabled for remote bidding & alerts, use real-time currency exchange, and provide user identification and authentication. [Ref. 22]

3. ACS Government Solutions Group (ACS GSG)

ACS GSG was founded in 1968, and is wholly-owned subsidiary of Affiliated Computer Services, Inc (ACS), a nationwide provider of information technology

solutions for commercial, financial, and governmental markets. ACS GSG is based in Dallas, Texas, and provides information technology solutions for its Government customers. They are one of the foremost systems integrators and developers in the United States, providing innovative applications for enhancing their customers' cost efficiencies, service, and new capabilities. [Ref. 23]

E. SUMMARY

As the Internet continues to grow, it is becoming possible to create a worldwide marketplace. In the areas of e-commerce, the increasing presence of RAs has empowered buyers to knowingly get the best price and best value, often on the buyer's terms.

RAs have come a long way since their inception, and they still have a way to go to enable a complete market driven pricing process. With the evolving functionality of this program, the opportunity exists for RAs to provide new and innovative capabilities as they emerge.

With 95% of businesses expected to use e-commerce in the next three years, there will be a flood of new entrants into the online RA industry. Companies like eBreviate outperform and rise above their competition by offering unique features, including user-friendly interfaces and internet networking capability. These companies may hold the keys to successfully implementing RA in DoD procurement.

Because DoD is the largest buying organization in the world, no other organization has as much to gain from innovating, streamlining and managing its procurement pricing process. As RA technology continues to become increasingly advantageous to buyers, it seems prudent that DoD should closely monitor advances in

RA technology. By doing so, DoD will be able to effectively implement RA technologies into their procurement pricing program.

IV. PROCESS INNOVATION

A. PHASE V: DESIGN AND PROTOTYPE THE NEW PROCESS

The purpose of this thesis is to establish a new pricing process using Davenport's innovation framework. We will not cover phases I – IV in any great detail as additional information would provide no further enlightenment in these areas.

Instead, we assume that the pricing process has been thoroughly enumerated, scope boundaries are manageable, and that the organization truly needs the process in accordance as defined in phase I. It has been established that the pricing process' phase II relevant change lever is information technology. NAVICP has recognized the RA pricing vision and continues to champion its development in accordance with phase III. The pricing process is widely known throughout the contracting community, therefore further elaboration for phase IV is ineffectual.

Process innovation is meaningful only if it improves a business in ways that are consistent with the business' strategy. [Ref. 1] RA develops a new pricing system that will revolutionize DoD pricing functions. This system can be used by adapting to fulfill diverse DoD procurement and contracting activities, from purchasing office supplies, uniforms, and sundry items to acquiring weapons systems, helicopters and tanks.

The intent of an RA is to increase DoD wide procurement efficiency, reduce procurement costs, and streamline the procurement process. Considering these objectives in conjunction with the insight gained from the previous chapters, we now begin designing and prototyping a new pricing process. Our analysis will focus on the following steps from phase V of Davenport's Process Innovation Framework as

illustrated in Table 2.1 with the exception of step 4, which is fully dependent upon the acceptance level that the RA pricing process gains within the Federal Government.

- **Step 1:** Brainstorm Design Alternatives
- **Step 2:** Assess Feasibility, Risk, and Benefit of Design Alternatives and Select the Preferred Process Design
- **Step 3:** Prototype the New Process Design
- **Step 4:** Develop a Migration Strategy
- **Step 5:** Implement New Organizational Structures and Systems

1. Brainstorming

The objective of brainstorming is to develop creative, but pragmatic new process designs, taking as input the process vision, change enabler and additional knowledge developed in the earlier phases of process innovation. [Ref. 1] In order to address this brainstorming activity, system needs will be discussed and summarized.

a. System Needs

To determine the system needs, RA disadvantages outlined in Chapter III are listed here, and serve to guide the brainstorming effort to provide the greatest process benefits. The current disadvantages of RA pricing include 1) Unfriendly User Interface, 2) Not Web-Based, 3) Limited Use of RA Technology. The goal now is to develop two sets of options, Option 1 and Option 2, which represent potential solutions to these disadvantages to significantly improve the pricing systems. (See Table 4.1)

Option 1
1. User Interface
2. Web-Based System
3. End-User Access

Option 2
1. User Interface
2. Web-Based System

Table 4.1. Options 1 and 2.

Although similar, Option 1 represents a more aggressive approach to innovating pricing than Option 2. In developing the options, we turn to the advantages of eBreviate discussed in Chapter III and the attributes of RA applications in Chapters II and III.

Recall two of the major advantages of eBreviate are the user interface and a web-based network system. The user interface is one of the primary features that has enabled eBreviate to surpass its competitors and become the market leader. eBreviate's main competitor requires extensive training, and is so complex that even trained personnel found it difficult to operate. As this depiction of eBreviate's competitors resembles descriptions of other RA applications in Chapter III, eBreviate's concept of a user-friendly interface is selected as the first element of the two options.

eBreviate's successful web-based network system facilitates RA actions over the Internet, increases procurement efficiency and decreases procurement negotiation costs. Additionally, a web-based system facilitates adding system functionality at a later date. Therefore, a web-based system is considered essential to bringing innovative change to the RA pricing process and is added to both Options 1 and 2.

At this point, Options 1 and 2 diverge, as only Option 1 includes future e-commerce RA technologies. As the Internet continues to grow, those who are able to harness its capabilities with RAs will be able to maximize their performance. Recall Option 1 is designed to be the more aggressive of the two, and future RA technologies represent greater risk than current technologies, because they have received only minimum marketplace testing. Another successful feature that empowers end-users to

conduct their own RAs is the user access feature. This capability is the last feature added to Option 1, as it has the potential for significant cost savings in the procurement process. Thus, the addition of RA technologies and user access represents the essential difference between Options 1 and 2. Each option feature and sub-feature is now discussed in turn.

(1) User-friendly Interface. The first step in innovating the pricing process is to develop a user interface similar to that used by eBreviate. This interface should allow users to employ the system efficiently and without excessive initial or remedial training. If a system provides extensive functionality, but the user interface makes the system difficult to use, operational efficiency cannot be maximized. Before adding additional functionality to the system, operability should be considered.

(2) Web-Based. The next step in innovating the RA pricing process is to move from a server-based system to a web-based system. Although there are reportedly plans for a web-based system at FreeMarkets, the Navy's pilot program RA provider, a web-based system is already in operation at eBreviate. A web-based system will enable RA users to take full advantage of the Internet. It will help smoothly transfer documentation and bidding information from buyer to vendor and back again, as described in Chapter III. Additionally, a web-based system opens the doors to increased RA functionality services that have the ability to innovate the procurement pricing process for contracting personnel.

(3) User Access: User access will allow end-users to conduct reverse auctions from their own desktop computers, subject to certain dollar threshold and process constraints. What the threshold level and constraints should be is a topic for further research and goes beyond the scope of this thesis.

b. Brainstorm Summary

A system that is user friendly, web-based and incorporates the RA technology listed above holds the potential to significantly change the way contract pricing is performed in the DoD. This change does not intend to substitute contracting personnel judgment. Rather, it is designed to assist them with performing contracting tasks, where change makes sense to do so, and not change those tasks where change does not make sense.

2. Assess Feasibility, Risk and Benefit

As part of step 2 in this section, we assess the feasibility, risk and benefit of each feature for Option 1 (listed in Table 4.1), keeping in mind that features for Option 2 (from Table 4.1 also) represent a subset of Option 1. Upon completion of the assessment, the preferred option is selected as the new process design.

a. Feasibility

As we assess feasibility, the goal is to determine the reasonable likelihood of the selected features being implemented into the RA pricing process. Each of the features from Table 4.1 is discussed in turn.

(1) User-friendly Interface: In determining if a user interface is feasible for RA, we look to what eBreviate has been able to achieve with its RA system. People at eBreviate have created an interface that is intuitive enough to be used by full-time contracting personnel and by occasional end-users. This capability has enabled eBreviate to surpass its primary competitor. The competing software offered similar functionality, but was more difficult to operate. As the Government requires more functionality in its system to meet the inherent Government contracting requirements, eBreviate's system may not provide a perfect fit for Government RAs. But,

eBreviate has successfully implemented its system, suggesting this feature would also be feasible for the Government.

(2) Web-based System: The feasibility of a web-based system is again established by the success of eBreviate. FreeMarkets, who provides the Navy's pilot RAs, echoes the feasibility of a web-based system; FreeMarkets is revamping its current system to provide this capability. This further supports the feasibility for the web-based system.

(3) End-User Access: End-users in hundreds of Fortune 500 companies are currently able to procure products and services from their desktop computers via RA systems. This suggests it is feasible to develop similar capability for DoD end-users, though application may be limited to certain types of RA purchases under specified thresholds, until FAR policies and procedures can be fully incorporated.

b. Risk

The notion of risk is the probability or likelihood of some resulting harm. [Ref. 24] Although admittedly subjective, the features listed in Table 4.1 are now assessed for risk and the likelihood of resulting harm as displayed also in Table 4.1. Risk is categorized as minimal, medium, or high for each feature.

(1) User-friendly Interface: As eBreviate provides an existing and successful model, the risk involved in staying with the current structure exceeds the risk of improving it. Risk of implementing an improved interface system is therefore rated as minimal.

(2) Web-based System: The primary risk associated with implementing a web-based RA system involves security. Existing commercial e-commerce applications have been accepted and used by a multitude of consumers,

demonstrating the ability to safely conduct millions of daily Internet data and purchase transactions in a secure mode. Online security does not represent a high risk in RAs. Although hackers will always be a threat, the use of existing security system software should be sufficient for most RA transactions. Risk is therefore regarded as minimal.

(3) End-User Access: As with any delegation of authority, there is inherent risk associated with performing that task to the appropriate standard. Decentralizing authority to conduct certain RAs that were previously restricted to KOs will create procurement risk.

A user-friendly interface that requires minimal training is a pre-requisite to implementing this feature. It is not cost effective to provide extensive training to occasional users. As current RA features will aid in decision-making and legal compliance, this should also be considered a prerequisite to end-user access. Until these assets are approved and in place, the risk involved in end-user access is considered high. (See Table 4.2)

Option Risk Assessment		
Categories	**Option 1**	**Option 2**
User Friendly Interface	Low	Low
Web-based System	Low	Low
End-User Access	High	N/A
AGGREGATE RISK	**High**	**Low**

Table 4.2. Option Risk Assessment.

c. Benefit

As we assess the benefits of these same features, the goal here is to determine what advantage is to be gained by implementing each feature. Again, we start with user-friendly interface and continue through end-user access.

(1) User-friendly Interface: This feature will allow for greater operator efficiency and productivity in performing procurement duties. Operators will be comfortable and confident using the system. It may reduce procurement process time, which could save process costs. As the interface becomes easier to employ, it is reasonable to expect that end-users may benefit as well. For example, end-users could employ the system to purchase authorized RA items (just as eBreviate users are able to do). This too may reduce procurement cost via competitive vendor pricing, and reductions in processing time and expense.

(2) Web-based System: This feature will smoothly transfer information to all participants involved in the RA process. It also opens the doors to increased functionality, like applications that innovate the RA process by working as inputs to the KO. Reduced process time and reduced processing costs, along with increased efficiency and user satisfaction, are the expected benefits.

(3) End-User Access: Most end-users understand what they want in a product or service. These users would reasonably benefit from conducting their own RAs; they could directly acquire what they need. Additionally, end-user access would save time and money; there is additional processing time and cost associated with a KO completing a procurement action. KOs may also benefit from end-user purchases, as they could then be employed on more significant and less repetitive procurements.

d. Design Selection

The issue now becomes, what is really needed by Government customers as RA designers further develop their vision for world class auctions? There are hundreds of features that could be employed in such a pricing program. eBreviate and other commercial providers have long been dealing with this very issue. Only those features that add the greatest value to program usability and functionality should be employed. Otherwise, the system becomes overburdened with too many features. Based on the analysis, Option 1 is the least favorable choice at this time, due to end-user access risks. Although certain levels of risk are encouraged for innovative change, the potential benefits end-user access provides is not compelling enough to implement this feature at this time. There is, however, sufficient rationale to study this feature for future employment.

As Option 2 excludes end-user access, the features listed in this option offer the greatest value for current innovative change to the pricing process. The features contained in Option 2 (listed in Table 4.1) will allow RAs to increase DoD wide procurement efficiency, reduce procurement costs, and streamline the procurement process.

3. Prototype the New Process

The term prototype, in the DoD Dictionary of Military Terms, is defined as: a model suitable for evaluation of design, performance, or production potential. [Ref. 24] The selected features to be implemented into this prototype are those contained in Option 2. For reference, they are a) user-friendly interface, and b) web-based system. Each is

presented in turn, and a conceptual model is presented for a web-based system that depicts the added functionality.

a. User-friendly Interface

As RAs prepare to meet the user requirements of contracting in the 21st century, this feature will be key for reducing training requirements and increasing usability. Although a graphical user-friendly model is not presented in this work, access to additional information on eBreviate's user-friendly interface solution is available from eBreviate's web-site at www.ebreviate.com.

b. Web-based System

A web-based system will allow instant access and smooth information transfer between all participants involved in the pricing process. Thanks to the mass adoption of the internet, goods can be bought and sold through electronic transactions over the global communications network. This additional capability empowers the KOs with significantly greater market pricing information than ever before. This will allow operators to make purchases that provide the best Government value.

This prototype depicted above represents an innovative change to the pricing system. It embodies some of the best features of emerging e-commerce technologies and applies them to the Federal acquisition pricing process. As the pricing process continues to evolve, features listed in this limited prototype serve as prime candidates for future system versions. It is also the type of innovation the 106th Congress is pursuing in section 812 of the FY 1999 National Defense Authorization Act. This legislation requires DoD to increase business innovation in Defense acquisition programs. [Ref. 25]

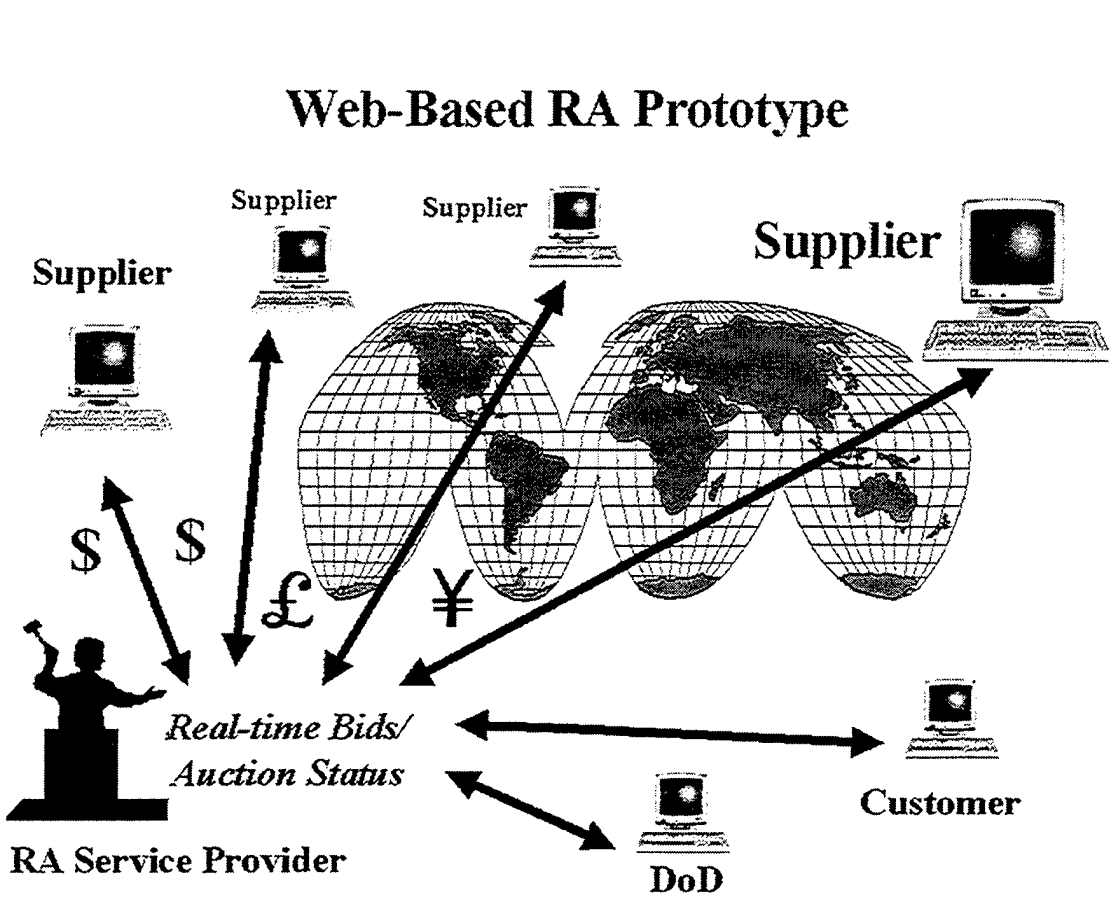


Figure 4.1. Web-based RA Prototype.

4. Implementing New Organizational Structures and Systems

As RAs are the system that represents the innovative lever for change to the manual pricing system, no changes to the organization are recommended at this time. Based on the feasibility analysis, benefit analysis, and risk assessment in Table 4.2, the new system recommended is a web-based system with user-friendly interface of Option 2. This system will allow fast and easy implementation, with the advantage of a quantum leap in market price competition.

B. SUMMARY

This chapter begins with phase V of Davenport's process innovation framework, designing and prototyping the new process. With the understanding that RAs are the lever for changing the face of Government pricing, this analysis focused on possible

innovative changes to the pricing process. As Government contacting enters the next century, bold and innovative changes to the system may be required for DoD procurement to keep pace with the commercial sector. More important, however, is the need to take exploit the information, resources, and functionality available in RA e-commerce solutions. These solutions promise to minimize Government cost and maximize procurement efficiency. A user-friendly interface and a web-based system are proven, feasible solutions to meet this need.

V. CONCLUSIONS AND RECOMMENDATIONS

A. CONCLUSIONS

As discussed in Chapter I, this thesis analyzes DoD's procurement pricing system and determines if e-commerce RA applications, like eBreviate, could hold the potential for innovative change in the Government pricing process.

The literature review conducted in Chapter III identified advantages and disadvantages to eBreviate and e-commerce RA applications. Many of the advantages found in eBreviate stem from current technologies that are credited with driving the RA industry to new heights; the value of these advantages is realized in the business-to-business and business-to-consumer markets.

Through this research and analysis, three major areas are considered for innovating Government pricing. These include the following: 1) user-friendly interface, 2) web-based system, 3) end-user access to RAs. Area 3 represents the greatest risk at this time. Area 3 is risky in part due to the inherent problems associated with delegation, but also because areas 1 and 2 are prerequisites to its implementation. Alternatively, areas 1 and 2 represent current technologies that pose relatively less risk to the pricing system. Additionally, they represent feasible technologies and have the potential to benefit the Government by simplifying and streamlining the pricing process, thereby reducing costs and empowering contracting personnel.

If analysts are correct, B2B RA e-commerce will grow to $1.3 trillion by 2003, involving 95% of business industry. [Ref. 7] Only an aggressive implementation of innovative technologies today will prepare the Government for the procurement needs of

tomorrow. The areas listed above are key to developing the next generation of RA software designed to link acquisition reform and common DoD procurement pricing processes with commercial best practices and advances in electronic commerce.

This work does not intend to detract from the tremendous effort that has been invested in RA pilot programs. Today's RAs are the base from which future DoD pricing processes will emerge. The insightful pioneers in this area, and those who championed its implementation, successfully opened the doors to the future of Government pricing. It is this same insightful energy that must be carried forward as future versions of RA systems are considered. Indeed, this has been the case. Future RA implementation plans are filled with greater functionality and leading edge technology.

These plans also list several features that are similar to some of those recommended in this thesis (i.e., Web-based system). Therefore, this analysis augments these efforts by adding support to existing ideas, and it recommends additional areas for consideration.

Just days before this thesis was submitted for final signature, the Navy announced an RA contract award to eBreviate and Procuri.com. [Ref. 26] Together they plan to create the first comprehensive, Navy Government-to-business RA e-commerce solution. Although eBreviate's software was determined to be the best Commercial Off-the-Shelf (COTS) RA package, it is important to note that their program was selected to be the program foundation. Navy spokespeople indicate the Navy plans to offer the Navy RA solution to all Federal agencies. [Ref. 26] This is indeed good news for Government procurement.

B. ANSWERS TO RESEARCH QUESTIONS

1. How can Reverse Auction Technologies Innovate the Government Pricing Process?

As a result of the analysis in Chapter IV, the presently emerging e-commerce technologies that can best innovate the pricing system are 1) a user-friendly interface, and 2) a web-based system.

2. Answers to Secondary Research Questions

Brief answers to the secondary questions are presented here; full explanations were presented in Chapter III.

a. What is the Government Pricing Process and What are DoD's e-Commerce Requirements?

RAs are the future of the Government pricing process. RAs link DoD acquisition reform with commercial best practices and the latest advances in electronic commerce. The requirement is to develop an automated system for procuring goods and services for all DoD and Federal agencies. When fully implemented, it will serve thousands of contracting professionals located worldwide.

b. What are the Advantages and Disadvantages of Reverse Auctions?

RAs a) increase efficiency, b) save time, c) save money, and d) are likely to be a future requirement. However, RAs also a) introduce liability associated with FAR compliance, and b) rely on new technology with unknown potential problems/issues.

c. Who is eBreviate and why is Their Reverse Auction System So Successful?

eBreviate is a frontrunner in the B2B RA market. eBreviate software and services automate the RA process linking buyer and supplier through a global e-

commerce marketplace infrastructure to provide cost savings and revenue opportunities for businesses of all sizes.

d. What are the Advantages and Disadvantages of eBreviate?

eBreviate a) has a user-friendly interface, and b) uses a web-based network system. However, eBreviate a) doesn't incorporate the FAR, and b) is a new technology.

C. RECOMMENDATIONS

Based on the conclusions above, the thesis offers four recommendations for action: 1) explore the possibility of a user-friendly interface capability for RAs; 2) make implementing a web-based system into RAs a top priority; 3) develop an implementation strategy for the integrating RA technologies into Government pricing; 4) develop an RA capability. Each recommendation is outlined in turn.

1. Explore the Feasibility of a User-Friendly Interface Capability for RAs

With thousands of Government and commercial users in locations around the globe, the possibility of reducing some of the expense of instruction requirements would rationalize the effort of exploring whether an eBreviate type user-friendly RA interface is feasible.

2. Make Implementing a Web-Based RA System a Top Priority

RAs should shift to a web-based system as soon as is reasonably possible; so that additional functionality and integration can be realized (e.g., as described in Chapter IV). This should increase user satisfaction, by completing processes more efficiently, reducing workload and empowering users with increased information resources.

3. Develop an Implementation Strategy for Integrating RAs into Government Pricing

As a web-based system is required to obtain optimal performance, a strategy should be developed to integrate RA applications into Government pricing after the web-based process is established.

4. Pursue Development of RA Capability

With regard to RAs in government contracting, it is not a matter of whether RAs will be employed in government pricing, but a matter of when and to what level. Dynamic marketplaces are the buying and selling zones of the future. Although work on RAs is progressing throughout the Federal government, a focused and funded effort is recommended to fully develop this capability.

D. SUGGESTED FURTHER STUDIES

This thesis has addressed a number of important issues pertaining to pricing and RAs, but substantial research remains to be done. Building on the results of this thesis, recommendations for future research are outlined below.

1. End-user RA Access

Future research should investigate RA developments to expand the base of acquisition personnel benefiting from the system. For example, the system could be used by all DoD authorized purchasers, including supply personnel and end-users. As RA capability continues to grow, opportunities will increase to exploit economies of scale through a worldwide cataloged procurement system will increase.

The key to such expansion may depend on the system, so that more Government purchases can be made from vendors at market prices. All authorized vendors would be encouraged to bid and become more involved, so that DoD can realize lower prices due

to enhanced competition. Government buyers would be able to receive the best price on the items they need. Research is required to explore these issues further.

2. Effect of RAs on Small Business

In addition to the issues addressed above, additional research should be devoted to the effects and consequence of RAs on small and disadvantaged businesses.

LIST OF REFERENCES

1. Davenport, Thomas H., *Process Innovation*, Harvard Business School Press, 1993.

2. Air Force Institute of Technology and Federal Acquisition Institute, *Contract Pricing Reference Guide Volumes I-V,* April 1999.

3. Federal Acquisition Regulation System, *Federal Acquisition Regulation*, 07 August 2000.

4. Mankiw, N. Gregory, *Principles of Economics*, The Dryden Press, 1998.

5. Merriam-Webster's Collegiate Dictionary, Prentice Hall Press, New York, NY, 1998.

6. Chelekis, George C., *The Official Government Auction Guide*, Crown Publishers, 1992.

7. Kafka, Steven J., "eMarketplace Boosts B2B Trade", *The Forrester Report*, February 2000.

8. Anonymous, "E-Procurement Strategies," *Purchasing Online,* 23 March 2000.

9. Dean, Joshua, "Procurement Execs Consider Reverse Auctions", *Government Executive*, 04 August 2000.

10. Hamre, John J., Deputy Secretary of Defense, "The Defense Reform Initiative, Statement Before the House National Security Committee," 11 March 1998.

11. Nissen, Mark E., "Reengineering the RFP Process Through Knowledge-Based Systems," *Acquisition Quarterly Review*, Winter 1997.

12. eBreviate, "The Downward Auction Marketplace," URL: http://www.ebreviate.com/esourcingcentral/research-papers-downward.html, 2000.

13. Ellis, Richard, "Reverse Auction Case Study," *Naval Inventory Control Point Mechanicsburg*, 29 May 2000.

14. Interview between Murphy, Michael, Reverse Auction Coordinator, NAVICP, Mechanicsburg, PA, and the researcher, 11 September 2000.

15. Antonio, Robert, "Do Reverse Auctions Violate FAR 15.307(b)?," URL: http://www.wifcon.com/anallegal.htm, 2000.

16. Interview between Anaya, Renee, Sales Support, eBreviate, Walnut Creek, CA, and the researcher, 06 December 2000.

17. eBreviate, "eBreviate-eSourcing, eProcurement, and B2B Auctions," URL: http://www.ebreviate.com/products/downward.html, 2000.

18. eBreviate, "Corporate Newsletter Snapshot November," URL: http://www.ebreviate.com/newsletter/snapshot.html, 2000.

19. eBreviate, "Downward eAuctions," URL: http://www.ebreviate.com/esourcingcentral/research-papers-downward.html, 2000.

20. Anonymous, "Market Guide Business Summary," http://biz.yahoo.com/p/f/fmkt.html, 06 December 2000.

21. Anonymous, "Frictionless Commerce Quick Facts," http://www.frictionless.com/company/company-quickfacts.html, 06 December 2000.

22. Anonymous, "Frictionless Auctions," http://www.frictionless.com/products/modules.html , 06 December 2000.

23. Anonymous, "ACS Powers Federal Government's Largest-Ever Online Reverse Auction," http://www.prnewswire.com/cgi-bin/stories.pl?ACCT=105&STORY=/www/story/09-28-2000/0001324589, 06 December 2000.

24. Anonymous, Prototype, DoD Dictionary of Military and Associated Terms, http://www.dtic.mil/doctrine/jel/doddict/data/p/04986.html, Dec 2000.

25. 106th Congress, *National Defense Authorization Act for FY 2000*, Oct 1999.

26. NAVSUP PAO, "NAVSUP Awards Reverse Auction Services Contract," http://192.211.116.35/pao/pao.nsf/364b401ac46fe097852566410053f412/0fd20085f18f012e852569ab00506169?OpenDocument, 04 December 2000.

INITIAL DISTRIBUTION LIST

1. Defense Technical Information Center 2
   8725 John J. Kingman Road, Suite 0944
   Ft. Belvoir, VA 22060-6218

2. Dudley Knox Library 2
   Naval Postgraduate School
   411 Dyer Road
   Monterey, CA 93943-5101

3. Mark E. Nissen SM/Ni 2
   Department of Systems Management
   Naval Postgraduate School
   Monterey, CA 93943-5101

4. William R. Gates SM/Gt 2
   Department of Systems Management
   Naval Postgraduate School
   Monterey, CA 93943-5101

5. David V. Lamm SM/Lt 2
   Department of Systems Management
   Naval Postgraduate School
   Monterey, CA 93943-5101