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The Graduate School

College of Business Administration

The Post-Cold War Defense Draw Down:

The Defense Industry's Response,
Trends, and Changing Business Direction

A Paper In

Business Administration

by

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ABSTRACT

Purpose of this Study

In the past five years, approximately since the demolition of the Berlin Wall, Americans have witnessed an unprecedented series of political and economic changes take place in the realm of the former Soviet Union. As a result of these changes, military and political analysts declared an end to over forty years of Cold War between the United States and the Soviet Union. With the end of the Cold War, the primary mission of the Armed Forces of the United States changed significantly. The need for a massive U.S military posture to counter the Soviet threat was replaced by the need for a smaller force, capable of protecting U.S interests in regional conflicts and helping to maintain world peace in different ways. For those who work in the defense establishment, this mission change has resulted in military spending reductions of a scale which has not occurred since the end of World War II. While all Americans rejoice in the fact that the United States will be able to devote fewer resources to military spending, it is important to examine the effect of these spending reductions on the U.S economy and individual U.S. companies.

Study Methodology

This paper has been prepared in order to examine the effect of defense spending reductions on individual defense

contractors. Through research of current literature and management theory, this paper is designed to answer the following questions:

What are traditional defense contractors doing to respond to the defense draw down?

What management theories or methodologies can defense contractors use to alter their business practices to cope with the defense draw down?

What changes are taking place in the defense contracting environment that defense contractors should be aware of?

What actions should defense contractors take in order to capitalize on the changes that are taking place in the defense contracting environment?

Conclusions

In conducting research and preparing this paper, three basic conclusions have been reached. First, in the current and projected defense spending environment, smaller companies that are primarily involved in Research and Development (R&D) work will likely fare much better than the traditional defense giants like General Dynamics, McDonnell Douglas, etc. Second, Just In Time (JIT) and Total Quality Management (TQM) procedures can easily be integrated with the MILSPEC/MILSTD procedures required for defense contracting. Third, the adversarial relationship between defense contractors and the federal government will no doubt decrease in intensity in the future as the defense budget continues to shrink.

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CHAPTER I INTRODUCTION

During the 12 year period from 1985 to 1997, the Department of Defense (DoD) expects to experience a budget decrease of 37% in "real" terms (adjusted for inflation).¹ The direct result of this "draw down" is a reduction in the amount of work that will be awarded to defense contractors. This study will analyze the defense draw down in more specific terms than a simple reduction in the amount of work awarded to defense contractors. This study will examine strategies that defense contractors are using to respond to the draw down, and it will enumerate the trends developing in the defense contracting world. Since the draw down is forcing defense contractors to consider altering their traditional business operations, this paper will briefly examine methodologies used by businesses to successfully deal with this environmental change. Additionally, because new pockets of opportunity exist on the defense industry horizon, it will review some avenues of approach which can be used to enter the unique world of defense contracting. Finally, it will offer some insights and predictions about the defense industry and what types of businesses may fare better than others in the defense environment of the future.

BACKGROUND

In January of 1981, when Ronald Reagan was inaugurated as the President of the United States, national defense consumed 23.2% of the federal budget and 5.3% of the U.S. Gross Domestic Product (GDP).² Four years later, in 1985, the U.S. found itself at the peak of its largest peacetime defense buildup since the beginning of the Cold War. During fiscal year 1985, 27% of the federal budget was devoted to defense. This 27% accounted for 6.4% of the U.S. GDP.³ Every year since 1985, defense has been accorded successively smaller pieces of the federal budget pie. By 1996, defense spending is expected to compose 19% of the federal budget and only 3.8% of the U.S. GDP.⁴

For Americans, the defense spending cuts described above represent a culmination of events in world history of which we can be justifiably proud. In large measure, the defense draw down of today is a result of vigilance and national resolve since World War II to see an end to totalitarian regimes, primarily of course, the Soviet Union. Quite simply and logically, the need for a massive U.S. military machine has decreased substantially with the break-up of the former Soviet Union. In 1995, for the first time since the beginning of the Cold War, national defense spending is projected to consume less than 20% of the federal budget and less than 4% of the U.S. GDP.⁵

At the same time that we rejoice in the fact that the U.S. will be able to devote fewer resources to defense spending, it is vital for us to examine what effects these spending cuts are having on the U.S. economy and individual U.S. companies. In the past year for example, the Defense Department's 1992-1997 proposed budget requests included slashing \$63.6 billion primarily by cancelling procurement of new military hardware. The Air Force decided to stop production of the B-2 bomber at 20 aircraft; the Navy scrapped plans for constructing more SSN 21 Seawolf attack submarines; and the Army deferred planned production of the RAH-66 Comanche helicopter.⁶

At first glance, removal of \$63.6 billion over five years from a \$5.5 trillion U.S. economy (approximately .23%/year) doesn't look like much of a problem for a resilient capitalist economy to handle. In a macroeconomic sense, this statement is probably true, but for some individual U.S. companies these cuts are proving to be devastating. The case of Electric Boat (EB) Division of General Dynamics in Groton, CT is an example. Stopping future production of the SSN 21 Seawolf attack submarine leaves EB with a multi-billion dollar submarine construction yard that will be essentially vacant. Moreover, the end of Seawolf production leaves the town of Groton quite literally groping for a new future. President Clinton's recent pledge to maintain America's submarine industrial base provides little solace for former EB workers

standing in Connecticut's unemployment lines.⁷ But, as we will see, some defense contractors are successfully taking actions to survive the draw down. More importantly, the draw down is actually creating pockets of opportunity for some businesses. The key is finding and exploiting these opportunities.

STUDY CONTENT

In order to achieve a comprehensive yet easy to follow analysis, this report is divided into five broad sections. First, I will examine how selected businesses are adapting to the defense draw down. This examination will be based on studies of large defense contractors who are adopting a variety of strategies to deal with the draw down. Second, from current management literature and academic studies, I will present a brief methodology or framework that can be used to guide the changing orientation of a business for entry into or exit from defense contracting. Third, from interviews and my background knowledge of defense contracting as a Navy Supply Corps Officer, this paper will provide a listing of current trends which are taking place in federal defense contracting as a result of the defense draw down. Fourth, I will provide some brief overview information for small businesses contemplating entrance into the defense market. A case study of a small Central Pennsylvania manufacturing company's recent efforts to capture defense business will be

included in this section. Finally, I will present a few conclusions and predictions about the future of the defense industry and the types of businesses that have the best potential to prosper in this new environment.

CHAPTER II RESPONSES TO THE DRAW DOWN

Popular defense industry literature indicates that defense contractors are adopting a wide range of strategies to cope with the loss of business precipitated by defense spending cuts. These strategies vary from one specific sector to the next (i.e., military aviation, shipbuilding, etc.). Even within each sector, individual companies are developing different responses based on each company's current position and management perceptions and expectations of the United States' future defense posture. After reviewing current literature, I believe that defense contractor strategies can be grouped into five different categories: 1) Wait-It-Out; 2) Find New Military Sectors; 3) Find New U.S. Government Sectors; 4) Find New Civilian Sectors; and 5) Combination.

1. WAIT-IT-OUT

The dominant theme in this strategy is that the draw down, although severe, is only temporary and business will eventually pick up. This is no doubt a strategy with little merit. All indications point to the fact that Cold War scenarios of massive land battles involving superpowers fighting head-to-head are not expected in the foreseeable future. All of the major players on the buying side of the defense industry from the State Department to upper military management don't see a need for bulk buys of war machinery.

Up until 1991 General Dynamics was the only defense contractor to be following the wait-it-out strategy. Stanley Pace, General Dynamics former CEO personified this idea with his belief that "his corporation's only recourse in the face of threatened budget cuts is to hunker down, lay off workers, and wait. He had faith that military spending would pick up again."⁸ This reasoning may have something to do with the fact that Pace was replaced by William A. Anders in 1991. With the change in leadership, General Dynamics has adopted a strategy that involves shrinking and sharing the returns with shareholders. Since Anders took over, he has sold off nearly \$3 billion worth of General Dynamics' businesses in an effort to keep only those holdings where General Dynamics has "core competence" over its competitors.⁹

2. FIND NEW MILITARY SECTORS

This strategy involves placing more marketing efforts in the area of fulfilling the military hardware requirements of foreign countries. Of course, this strategy is tightly controlled through licensing by the federal government in order to avoid the undesirable consequences of selling high-tech military hardware in "non-aligned" markets.¹⁰ BMY-Combat Systems Division of Harsco Corporation in York, Pennsylvania is a proponent of this strategy. BMY-Combat Systems markets its tracked combat vehicle products for the Armies of over 20 countries, all through U.S. Government licensing agreements.¹¹

In some situations, if selling to the right ally, defense contractors can even obtain export assistance and quick license approval from the government to develop new military sectors. For example, McDonnell Douglas is currently expecting federal approval to sell 72 F-15 fighter aircraft to Saudi Arabia for \$8 billion.¹²

3. FIND NEW U.S. GOVERNMENT SECTORS

With the Clinton Administration's emphasis on infrastructure, some large U.S. defense contractors are shifting operations out of defense work and into infrastructure projects such as road construction, public transportation, and the environment. Martin Marietta, for instance, hopes to become the "infrastructure company for the infrastructure President" through sales of postal sorting machines to the U.S. Postal Service and construction materials for federally sponsored highway rebuilding. For the past five years, Martin Marietta has been buying up relatively cheap rock quarries in preparation for the coming road construction boom.¹³ Contractors who pursue these avenues should be careful. During previous defense industry slumps some companies have proven to be winners with these strategies, but this traditional defense contractor's strategic approach frequently leads to over-sophistication and cost overruns when pursuing non-defense markets. Boeing's and Grumman's attempts

to profitably enter train-car and bus markets, respectively, are examples of this traditional mind set.¹⁴

4. FIND NEW COMMERCIAL SECTORS

The strategy of finding new commercial sectors is similar to that of finding new government sectors. The single major difference between these strategies is a result of the drastically different procurement systems used by commercial buyers and government buyers. In recent years, commercial buyers have developed procurement systems that emphasize functionality, quality, and value while government procurement has remained based on the "lowest bidder" concept. Logically, to successfully compete in commercial sectors, traditional defense contractors must shift marketing gears away from the "lowest bidder" approach. To help alleviate this problem, at least for smaller defense contractors and subcontractors, some state governments are providing assistance. For example, New York's Defense Diversification Program has achieved some success in helping small and mid-sized traditional defense contractors with formulating and executing diversification strategies.¹⁵ Of course, these types of programs are controversial because they use up limited state and federal tax dollars. In particular, the Committee for Economic Development has opposed government programs to assist defense contractors in pursuing commercial markets as inefficient use of public funds.¹⁶

Frisby Airborne Hydraulics and Bell Industries are examples of traditional defense contractors which have successfully pursued the strategy of finding new commercial customers. In the early 1970's, 40% of Bell's work was defense-related, today only 4% is defense related.¹⁷ Note the timing though; it took Bell Industries 20 years of effort to substantially shift from defense to commercial markets. Any defense contractor that pursues this strategy must be prepared to become very innovative in very short order, but then slow the process down and gradually but deliberately move into only those markets which utilize core competencies.¹⁸

5. COMBINATION

Some defense contractors are pursuing a combination or mixed strategy which emphasizes an approximately equal mix of U.S. defense work and commercial work. The logic with this strategy is analogous to the old saying: "don't put all of your eggs in one basket". Although the old saying makes this strategy sound simple, because of the differences between the government and commercial marketplaces, the combination approach is very difficult to implement. Few defense contractors have claimed success by using a combination strategy. This difficulty is even more pronounced for small and mid-sized defense contractors with limited resources. The problems associated with pursuing a combination strategy of marketing specialized products to both the commercial and

military sectors were well articulated in June 1992 testimony to the U.S. Senate Small Business Committee by Mr. Stephen Rash of BMV-Combat Systems Division of Harsco Corporation:

"While many inside and outside the defense industry are now wrestling with the challenge of converting their businesses and jobs to commercial goods and services, you will not find among our strategies a goal of entering into the commercial side of our industry. We are often asked why not. Obviously, the skills used at BMV in producing steel and aluminum military tracked vehicles are no different than those used at Caterpillar, John Deere, and other commercial heavy equipment manufacturers. Our response is that at our size we cannot be both a successful defense contractor and at the same time cost-competitive in the commercial marketplace. The number of inspections, oversight, and redundancy that are required by regulation and specification in the production of military equipment increase our overheads (sic) to the point that we are simply unable to match or beat the prices of the commercial environment. A case in point. A supplier called me last month and said he didn't want any more of our business. He said he'd made the decision to get out of defense because of the cost accounting procedures and other requirements are simply adding too much to his overheads (sic) and he was having difficulty competing elsewhere."19

Mr. Rash's testimony reveals a basic belief of smaller defense contractors dealing with the draw down: "you cannot pursue both markets at the same time". But, this situation is not always the case. Contrast BMV's situation with that of Bulova Technologies, another small defense contractor located in Pennsylvania. Bulova Technologies is a specialized manufacturer of fuzing and electro-mechanical devices for munitions purchased primarily by the U.S. Army. In response to the fact that their sales and employment levels have been cut to less than half since the mid 1980's defense boom, Bulova is pursuing a combination strategy of marketing to both

the defense industry and commercial customers. A key factor in Bulova's strategy is not "to whom" they are marketing, rather it is "what" they are marketing. Because Bulova's final products, munitions fuzing devices, are not marketable in civilian markets, Bulova is attempting to market its skills or core competencies instead in the commercial marketplace. These skills lie in specialized engineering and manufacturing. Bulova's goal is to achieve a 50/50 mix of government and commercial work within five years. In making its first fledgling attempts to pursue these goals, Bulova Technologies CEO, Mr. James S. Waterwash has made the following observations:

- "1. The transition period is measured in years rather than months.
2. Defense sales must continue at some reduced rate during this transition period.
3. Both production workers and company executives must be retrained to "think commercial".
4. Non-defense companies are somewhat reluctant to do business with a defense company."²⁰

CHANGE - THE COMMON DENOMINATOR

In all the cases and strategy descriptions presented above, the only obvious common denominator is "change". The facts are simple, traditional defense contractors who cannot adequately and quickly change to meet the challenges associated with shrinking markets simply will not survive the defense draw down which is well underway and will continue for

some time to come. In the next section, I will briefly discuss how change and innovation can be cultivated in business.

CHAPTER III CHANGING BUSINESS DIRECTIONS TO FIT NEW ENVIRONMENTS

Construction of the Berlin Wall in 1961 and its subsequent demolition 28 years later in 1989 probably provides the best picture of how long the typical modern defense contractor has been able to ply his trade without having to change markets. It is true that weapons technology has advanced at a relentless pace and manufacturing improvements have allowed defense contractors to bring the new weapons technology to the battlefield faster and in greater quantities during those 28 years, but the buyer has always been the same - the U.S. government. Quite simply, defense manufacturers, especially the small undiversified variety, are finding change very difficult today because defense company management has never had to deal with market change before. For major defense industry giants like General Dynamics, sheer size and previous success are compounding the problems associated with changing markets. Harvard Business School's prolific writer and lecturer, Michael Porter, has adequately captured the major defense contractor's plight in his writing:

"Change is an unnatural act, particularly in successful companies; powerful forces are at work to avoid it at all costs."²¹

Porter's axiom must have been in William Anders' mind when he took over as General Dynamics' CEO and brought in an entirely new management team which, in his words, "could leverage

General Dynamics' many strengths while fostering a new culture".²²

A MODEL OF CHANGE

With these problems in mind, it is appropriate at this point to discuss how change takes place in business. A simple "Model of Requirements for Change in Business" is presented in Appendix A.²³ The model is composed of five elements, the first four of which must occur in sequence in order for successful change to take place in a business:

1. Sense of Urgency
2. Belief that It Is Possible
3. A Small Early Success
4. Vision of How to Push Further
5. Benefit of Change

To use and understand the model, costs must be applied to the first four elements. As is illustrated in the block diagram in Appendix A, if the total cost associated with elements 1 through 4 is less than the value associated with the benefit of change (element 5), then successful change will occur in business. The metrics of this simple model of change are rather easy to understand, but, as we would expect, rather difficult to apply. Let us look at each element of the model in more detail.

1. Sense of Urgency. A sense of urgency is the feeling among both management and workers that pursuing the status quo

is not a profitable course of action and that a rapid alteration in the direction of the business is necessary in order to ensure continued profits. Costs associated with developing a sense of urgency include publishing and distributing internal company memoranda or other documents to "get the word out" about defense cuts and their effect on the business. This element of the model is easily and cheaply met from the shop floor level to the CEO of most defense contractors today. In a very real sense, the national media service, government publications, and trade journals are "subsidizing" the creation of a sense of urgency for defense contractors. The shop floor defense worker doesn't need to hear it from the CEO, she knows it from the nightly news and conversations with her laid-off co-workers that her company needs to alter its direction if it is to survive.

2. Belief that It Is Possible. The second requirement for change in a business is the existence of a common conviction throughout the organization that the proposed change is possible. The change can involve just about any avenue that company management chooses to pursue as long as the change is within the realm of belief by management, workers and external players. Strong, committed, visionary leadership is a prerequisite for instilling a belief that the proposed change is possible. Also, incremental steps toward change tend to foster strength in this belief. For example, Martin Marietta's purchase of rock quarries undoubtedly has a

positive effect on their workers belief that entrance into the highway construction market is possible. The costs associated with instilling a belief that change is possible may vary greatly depending upon the type and degree of change being pursued.

3. A Small Early Success. The third element necessary for change to occur is a small early success into the new field of endeavor that is being pursued. In Bulova Technologies situation, a small contract to provide precision engineering services to another commercial company would be an example of a small early success in its efforts to achieve a 50/50 mix of commercial and defense related work. In this case, the costs incurred to earn the contract for precision engineering services would be the cost associated with a small early success.

4. Vision of How to Push Further. After a small early success, it is imperative that company management develop and convey a vision of how to push further into the chosen field of endeavor. The objective here is similar to instilling a belief that change is possible and the same type of committed, visionary leadership is necessary as well. To be truly effective, this type of vision must be conveyed both inside and outside of the business. Costs associated with developing and conveying this future vision include management time and effort as well as internal and external communications such as

shareholder letters, employee newsletters, press releases, etc.

5. Benefit of Change. In a tangible sense, the benefit of change is the "new" profit brought into the business which would not have otherwise been earned had the change not occurred. If the costs associated with the previous four elements are less than this new profit, then successful change will have occurred.

INNOVATION IS THE KEY

With the "Model of Elements for Change" fully understood, it is now necessary to return to our initial premise in this section: the idea that change is an "unnatural" act for successful defense contractors. Innovation, defined as the process of bringing about change, is the common thread throughout each of the steps in the Model, therefore the next question must be: How does a defense contractor innovate outside of the realm of the defense industry? In what follows, an attempt will be made to provide some information which defense businesses may use to answer this question.

Many would argue that defense contractors have been innovative for years because they have conducted research and development (R&D) programs to support new product development. Undisputable evidence of the success of these innovative R&D programs was seen throughout the Gulf War in the performance of Patriot Anti-Missile Batteries and perfect "smart bomb"

attacks which "surgically" inflicted damage on very specific Iraqi targets. The problem with the traditional "innovative" R&D programs used by defense contractors is that they have always been at the request of and under specific contractual guidelines of the DoD. In researching popular literature concerning business innovation, I have been able to find only one example of a large defense contractor which has unilaterally and actively pursued business innovation with the intent of developing and marketing new products. This example is Raytheon's New Products Center. The New Products Center was started in 1969 to service Raytheon's major appliance sector by inventing and developing products for commercial applications. From 1969 to 1989, the Center was responsible for many new products, \$100 million in new sales, and inception of Raytheon's Industrial Microwave Division.²⁴ To remain viable business entities, it is incumbent upon other defense contractors to develop innovative strategies and programs like the Raytheon New Products Center if they are to survive the post-Cold War defense draw down.

Rosabeth Moss Kanter, noted Harvard Business School writer and lecturer, refers to innovative programs like Raytheon's New Products Center as a vehicle to generate "newstreams". At the same time that companies are pursuing their mainstream business, Kanter advocates development of newstreams in order to allow the business to change as the needs of its market change.²⁵ Kanter's description of the

mainstream - newstream relationship is particularly applicable to defense businesses today who are having problems dealing with a changing defense market:

"The same momentum that gives mainstreams their power also makes it hard for them to change. Yet, as the stream image tells us, the flow is not guaranteed even with the power of establishments. Particularly today, mainstream businesses can easily dry up, stagnate. Thus, companies must explore opportunities to pioneer in new directions, seek innovations that will improve or even transform the mainstream. And in order to do this, they need to tap newstreams."²⁶

Kanter describes eight cases of newstream vehicles she has researched which provide a broad spectrum of methods that defense contractors may use to develop the innovation process. These newstream vehicles range from the traditional new products group to idea stimulation programs that "pull" entrepreneurs from within the business.²⁷ Although these eight cases were found in mid- to large-sized companies with revenues ranging from \$483 million to \$20 billion, the innovation development concepts found in the cases could be replicated by smaller businesses as well.

In recent years, business management researchers like Rosabeth Moss Kanter have spent considerable time studying and writing about how innovation and change takes place in business. Because the thrust of my research is not to add to or restate business innovation theory, I will not delve any further into this subject. Instead, I have provided a brief overview of some helpful writings on business innovation in Appendix B. Defense contractors, large or small, that are

affected by the defense draw down would do well to study these writings in order develop ideas for programs and management structures that will allow development of newstreams.

Thus far we have looked at actions that traditional defense contractions are taking to deal with changes in the defense industry due to cut backs in defense spending. We have also reviewed academic concepts and applications concerning the use of innovation to bring about successful change. In dealing with change, it is important that defense contractors look for industry trends that may have an impact on their business. The following section will provide a brief listing of trends that are taking place in the defense industry today.

CHAPTER IV TRENDS IN DEFENSE CONTRACTING TODAY

In the course of my research I have detected eleven trends that are prevalent in defense contracting today. These trends are not specific to any particular sector within the defense industry (i.e., aerospace, ground systems, etc.). Primarily, the eleven trends have to do with changes in dealings between defense contractors, subcontractors, and U.S. government contract administrators. Some of these trends have been precipitated by actual or proposed changes in the way in which the federal government administers its procurement process, and some have been precipitated by changes in the way that businesses operate. Most of these trends are probably known and understood by larger defense contractors which have the resources to comprehensively and continually monitor their business environment. For smaller defense contractors and those possibly considering getting into defense contracting, some of these trends may be revelations. Hopefully, knowledge of these trends will help any business developing a strategy for seeking work in the defense industry.²⁸

POCKETS OF OPPORTUNITY

Contrary to the persistent gloomy defense industry outlook in the popular press and trade publications, there are some bright spots in the future of defense contracting. For example, funding for the NASA Program, which is generally

considered to be a sector within the defense industry, is expected to increase or at least remain steady in the foreseeable future.²⁹ (This comment is notwithstanding very recent rumors from the Clinton Administration that NASA's \$30 billion Freedom Space Station Project is on the budget chopping block.)

Although space programs look promising for future economic growth, R&D is the defense budget line which is expected to continue growing even in the midst of the draw down. For example, between fiscal years 1992 and 1993, R&D funding actually increased 5.1% while the overall defense budget decreased 5.1%. This trend is expected to continue. Emphasis on R&D stems from the new DoD approach to fielding weapons systems. This approach shies away from bulk buys of war-making machinery and emphasizes high-tech prototype development in order to maintain a technological base from which future weapon systems can be developed.³⁰ In addition, DoD buyers will be contracting for more "R&D only" services which are not connected to any actual hardware procurement. Manufacturing process R&D will be emphasized as well as high-tech weapons R&D. Even for small businesses which have only very limited financial resources, R&D opportunities exist. The Small Business Innovation Research Program (SBIR) is an example. Under the SBIR, small businesses can receive awards of over \$500,000 in a phased process to develop technology in defense-related areas. The small business can then use the

technology in its own commercial or defense markets.³¹ The MANTECH Program is a similar type of arrangement for defense contractors to develop manufacturing process capability.³²

INCREASING ALLIANCES

As the defense portion of the federal budget pie gets smaller and smaller it appears as if there are more and more alliances between defense contractors. These alliances primarily take the form of joint ventures. Alliance forming may be indicative of an overall business trend apart from the defense draw down, but no statistical correlation studies have been done to evaluate this trend. Alliances are evident in a study of the top ten defense contractors of 1990. Nine of the top ten were awarded defense contracts under joint venture terms which accounted for 7.0% of overall business for these nine firms. Rockwell International was the only one of the top ten who did not substantially participate in any joint venture work.³³

FEWER FIXED PRICE CONTRACTS FOR DEVELOPMENTAL WORK

In the early 1990's, defense contractors began complaining that lower industry earnings were due, in part, to excessive use of fixed-price contracts by DoD contracting officers for high risk developmental work. Fixed-price contracts are intended to minimize development cost risk to

the government because cost overruns are the responsibility of the contractor. However, contractors who find themselves losing money in fixed-price agreements generally develop a strong adversarial relationship with the government. In many situations, the adversarial relationship leads to defaulted work and ultimately, unsuccessful programs.³⁴ The strong adversarial relationship between the Navy and General Dynamics at the beginning of the Trident Class Ballistic Missile Submarine Program in the early 1980's is an example of this type of situation. More recently though, to remedy these types of situations, the Office of the Secretary of Defense, in the early 1990's, released guidance to contracting officers to curb the use of fixed-price contracts for developmental type work.³⁵ Although implementation is slow, change is occurring in this area. The previous discussion of R&D work being a pocket of opportunity for defense contractors is evidence of this change. The government seems to have the idea that if you want R&D, you have to pay for R&D in terms that don't make the contractor bear all of the cost of the risk.

LESS WORK IS BEING PASSED TO SUBCONTRACTORS

Many defense contractors that manufacture spare parts and components have been pulling subcontract work back "in-house" in order to keep their capacity fully utilized and avoid employee lay-offs. This natural reaction to the draw down can

hurt defense contractors who don't use proper cost accounting before pulling work back in-house. Specific logic should be used in determining whether or not to bring subcontract work back in-house. Work should be brought back only if there is a true cost savings, specific value added, or performance of the work in-house will allow the defense contractor to maintain a core competence. Before work is brought back in-house the defense contractor should ask: Why did we have the work done on a subcontract basis in the first place? If the reasons to subcontract were originally valid, then they may still be valid even in the midst of the draw down. When this is the case, the defense contractor is better off maintaining the subcontract relationship and laying-off employees than bringing subcontract work back in-house.

JUST IN TIME (JIT)/SMALL BUSINESS RELATIONSHIP

Federal Acquisition Regulations (FAR) require DoD prime contractors to strive to have a minimum of 5% of all subcontract work done by small or small/disadvantaged businesses. Generally speaking, small businesses are those which employ 500 or fewer people and small/disadvantaged businesses are those which meet the 500 or fewer employee requirement plus have majority ownership comprised of minorities or those designated as socially or economically disadvantaged.³⁶ At the same time that this 5% requirement is incumbent upon them, defense contractors, like all

manufacturing businesses today, have been increasing their use of Just In Time (JIT) purchasing relationships with subcontractors. Using JIT techniques, defense contractors have been drastically decreasing the number of individual subcontractors that they must deal with. Combination of the 5% small/small minority goal and movement toward more JIT purchasing arrangements create a unique opportunity for small subcontractors in dealing with larger defense contractors. This opportunity is illustrated by the following sequence of events for a mythical aircraft producer "General Aviation". First, General Aviation decides to purchase all aircraft seats from only two suppliers on a long-term JIT basis. Second, General Aviation's buyers review past records and find that eight qualified subcontractors have previously been used to supply aircraft seats. Third, further review by General Aviation's buyers reveals that two of the eight subcontractors meet small business classification requirements. Fourth, JIT aircraft seat contracts are awarded to the two small businesses, thus allowing General Aviation to contribute toward achieving its 5% goal while cutting suppliers in order to move toward JIT purchasing. Although this sequence of events uses a contrived company and a contrived situation, it illustrates a situation which subcontractors claim is occurring today: when faced with the decision to cut suppliers, defense contractors frequently are choosing to cut

larger subcontractors and maintain the 5% goal by forming JIT supply relationships with small/small minority subcontractors.

SMALLER GOVERNMENT PROCUREMENTS

Employees of the individual service components (Army, Navy, Air Force, and Marines) and the Defense Logistics Agency (DLA) known as "Item Managers" are responsible for spare parts stock management. Each Item Manager normally controls the stock levels of anywhere from 200 to 6,000 individual spare parts within a certain federal supply classification. Funding is periodically (quarterly or semi-annually) allocated to Item Managers so that they can periodically procure spare parts in order to maintain adequate stock levels at DoD inventory control points. Due to budget cut backs, this funding is being passed to Item Managers in smaller "chunks". The end result of this change in funding strategy is that Item Managers are making smaller, more selective buys of spare parts. Because of small business provisions in the FAR, as discussed above, these small quantity procurements of spare parts are frequently awarded to small and small/disadvantaged defense contractors. Smaller defense contractors are also winning more of these small quantity procurements because larger contractors, which require mass quantity work to justify "tooling up", are not bidding for these smaller quantity contracts.

SLOW MOVEMENT TOWARD COMMERCIALIZATION

Many defense contractors have made it clear that commercialization of federal standards would make it much easier to compete in both the defense industry and commercial markets. This is explained in the comments by Mr. Stephen Rash of BMY-Combat Systems Division of Harsco Corporation (see previous section, "Responses to the Draw Down"). Commercialization would require less stringent use of military specifications (MILSPECS) and military standards (MILSTDS) as well as fewer audits and inspections throughout the defense procurement process. Less emphasis on these traditional (some say "antiquated") procedures would allow contractors to market the same "off the shelf" equipment to DoD buyers as well as commercial buyers. Some progress has been made in this area. After an audit of the in-plant procedures and inspections already in place for commercial production at Caterpillar, the U.S. Army Tank Automotive Command began contracting for diesel engines without requiring traditional application of MILSPECS, MILSTDS, and inspections at Caterpillar. Periodic audits are simply conducted to ensure that Caterpillar is conforming to its own system.³⁷ Although "commercial-like" contracts between the federal government and defense contractors (like the Caterpillar diesel engine contract) create "win/win" situations, overall movement toward commercialization is expected to continue at a slow pace. The mind set of logisticians across all military branches and slow process of

changing federal procurement regulations will not allow a swift embracing of the commercialization concept. Finally, commercialization will obviously be limited only to "basic" equipment and hardware like diesel engines and not hardware with specific military applications such as submarine hydraulic valves.

CONSOLIDATION OF DOD SPARE PARTS PROCUREMENT

One of the major changes taking place in DoD logistics has been consolidation of spare parts item management. As a result of downsizing (more frequently being called "rightsizing") and reorganization of all services logistics systems, spare parts item management responsibilities are being consolidated under the Defense Logistics Agency (DLA). Over the past year, individual service (Army, Navy, Air Force, or Marines) management of thousands of spare parts has been transferred to DLA. These transfers of management involve electronic movement of spare parts procurement files from individual service inventory control points to DLA inventory control points. This trend is saving millions of DoD budget dollars and is expected to continue in the future with the goal of individual service components managing only those spare parts which are service unique. For example, unique spare parts for submarine periscopes will be managed only by the Navy. For traditional defense contractors who have marketed spare parts directly to the individual services, this

trend has a different implication. In the electronic transfer of spare parts procurement files from individual services to DLA, some defense contractors believe that their company names have been dropped from procurement history files for individual spare parts. Consequently these defense contractors have not been receiving bid solicitations for these parts. Although I have been unable to confirm the extent of this problem through statistical analysis, it doesn't appear to be common. I would suspect though that this situation is probably the result of glitches with file editing prior to transfer of procurement history files from the individual services to DLA. To protect their best interests, defense contractors who supply spare parts to inventory control points via service specific item managers should keep aware of upcoming item management changes through frequent discussions with their item managers.

CRIMINALIZATION OF THE PROCUREMENT PROCESS³⁸

Since \$600 toilet seats and \$1,000 coffee pots and hammers have been bantered about in the media in the mid- to late-1980's, the DoD has markedly changed their approach toward dealing with defense contractors. Many contract regulation infractions which were previously considered non-criminal were "criminalized" by enactment of new federal contracting statutes. By the late 1980's, 440 statutes and regulations dealing with federal procurement contractor fraud

were enacted by Congress and an outside study showed that more than 300,000 different federal regulations had been criminalized.³⁹ Most regulations and resulting fraud accusations by the federal government deal with the "gray" area of complex accounting practices used to derive prices.⁴⁰ Quite simply, compliance with all federal regulations for DoD contracts is a fact of life which will not go away anytime soon for any defense contractor. The regulatory nature of this business and resulting confrontational relationships have prompted defense contractors to become more proactive in trying to ensure that employees are as responsible as possible in their dealings with the federal government. This proactive approach has resulted in stronger internal audits, establishment of policies and procedures for complying with federal contract regulations, and more comprehensive codes of conduct.⁴¹ Even with renewed contractor emphasis in this area, some still believe that the confrontational trend will continue as the defense budget shrinks.

"QUALITY CONTRACTOR" PROGRAMS

With all of the talk of JIT procedures which has deluged American industry since the mid-1980's I expected to find a great deal of discussion of the DoD moving toward establishing JIT relationships with suppliers of spare parts of components. Primarily, I expected to see DoD logisticians moving toward establishing supply relationships with only one or two defense

contractors for each spare part stocked in the federal supply system. To my surprise, I have not been able to find any significant literature advocating movement toward JIT relationships between DoD buyers and defense industry spare parts suppliers. JIT systems, because they exclude the "equal opportunity" aspect of the competitive bid process, are probably not politically viable for purchase of parts and equipment by the federal government. It appears as if the federal bid solicitation process with awards going to the lowest bidder is firmly in place and will not change to a JIT type of system any time in the foreseeable future. Although the bid solicitation process is firmly in place, some DoD contracting headquarters are establishing "Quality Contractor" programs in order to formally rate defense contractors on their performance in fulfilling contract obligations on time and with required quality. The goal of these programs is to differentiate contractors who perform well, then reward them by providing them with more work. For example, on an A-B-C rating scale, if equal bids are submitted from an "A" contractor and a "B" contractor, the "A" contractor would be awarded new work because of his previous superior performance which earned him an "A" rating. Programs such as this do not violate the FAR. I would expect this trend to continue and possibly even be standardized and formalized throughout the DoD as the closest possible federal government surrogate to JIT procedures.

"ELECTRONIC COMMERCE"

Like all other businesses in the past 20 years, the DoD has increasingly employed the use of electronic networks to conduct its procurement transactions. Today, bid solicitation requests, MILSPECS, MILSTDS,⁴² and DoD procurement office information are all available on real-time electronic networks. These types of networks fall under the blanket heading of "electronic commerce". Because all that is needed to hook into these networks is a personal computer and modem, and subscription fees are normally rated in hourly increments, even the smallest defense contractors can tap into these resources. This trend is expected to continue in the future.

IMPLICATIONS OF THE TRENDS

This preceding list of 11 trends is not to be considered all inclusive. Many other trends in specific sectors of the defense industry can be discerned with a study of popular literature. These 11 trends are simply provided to give a broad overview of what is happening in defense contracting today and what may be expected to happen in the near future.

In reviewing the 11 trends, it is apparent that opportunities exist for some businesses even in today's shrinking U.S. defense market. Of particular note, small R&D concerns may be interested in pursuing work with the DoD in areas of both weapons technology development as well as

manufacturing process technology development. In general, these trends indicate that it is better to be a small or medium-sized manufacturing firm supplying sub-components to a prime defense contractor or spare parts directly to the federal supply system than to be one of the defense giants that directly "feast or famine" with the level of defense spending. We will discuss more specific implications of the defense draw down in greater detail in the final section of this paper ("Conclusions"). For now though, in the next section, we will take a brief look at what is required of any business wishing to enter the defense market.

CHAPTER V GETTING INTO DEFENSE CONTRACTING

Like the existing defense contractor who must attempt to develop newstreams alongside their mainstream defense business in today's environment, the new entrant into defense contracting must develop newstreams as well. Before any serious expenditures are made toward entering the defense market, the new entrant must begin the change process by employing the innovation development strategies previously discussed in this paper under the section entitled: "Changing Business Direction to Fit New Environments".

OPPORTUNITIES AND BURDENS, GET INTO DEFENSE OR NOT?

In a 1989 study of business conducted with all levels of government (federal, state, and local), Susan A. MacManus found that the majority (61.4%) of businesses who sell to the government do so because they are confident that they will be paid. Not surprisingly, MacManus' study found that this "sure payment" reasoning was most prevalent among small firms of 26 or fewer employees (2/3 of the 61.4%) where prompt payment of accounts receivable is crucial to business survival.⁴³ Conversely, in David Lamm's 1986 survey of defense contractors that had voiced complaints about dealing with the federal government, 69% of the contractors in the study cited "burdensome paperwork" as the main reason for refusal to bid on defense contracts.⁴⁴ These study findings very clearly

show that there are both unique opportunities and burdens involved with doing work in the defense industry. Additionally, because there is a "trickle down" relationship between primary defense contractors and their subcontractors, these significant opportunities and burdens are incumbent for subcontractors as well. For example, primary contractors must impose the same MILSPEC testing and qualification reports (i.e. "burdensome paperwork") on their sub-component suppliers as is imposed on them by DoD contract regulations. Obviously, the management of any business which is intent on entering the defense market as either a primary contractor or a subcontractor must guide innovation toward dealing with these unique burdens and taking advantage of the unique opportunities.

DETAILS - HOW TO GET INTO DEFENSE CONTRACTING

In 1907, the U.S. Army Signal Corps issued a one page "Advertisement and Specification No. 486" soliciting bids to buy a heavier-than-air flying machine. The Wright Brothers won the contract and shortly thereafter, the Army owned its first aircraft.⁴⁵ Today, the procurement process which the federal government uses is a solicitation and bid award system similar in concept to that used by the U.S. Army in 1907, but somewhat more cumbersome. A generalized flow chart of the federal acquisition process is provided in Appendix C.

Today, the federal government no doubt has more outreach

programs to encourage business from commercial manufacturers and suppliers than any other buyer of goods and services in the United States. There are countless books and government publications which a potential defense contractor or subcontractor can use to obtain information about entering into the DoD or federal government marketplace. As with innovation theory, my intention in this study is not to add to or restate existing information concerning specific details of entrance into the government marketplace. Instead, I have provided a brief overview of some helpful writings concerning defense contracting in Appendix D. To exemplify the information provided in Appendix D, I will simply review the actions which a small manufacturing company is taking to find a niche in the defense contracting industry.

CASE STUDY - FINDING A DEFENSE INDUSTRY NICHE⁴⁶

Last summer I had the opportunity to assist a small central Pennsylvania manufacturing firm in developing a strategy to market its products in the defense industry. The company specializes in making piezoelectric ceramic elements which are sub-components for a myriad of end products ranging from medical equipment such as nebulizers and vaporizers to test equipment such as engine knock sensors. In terms of military sales, the company previously had provided small quantities of sub-components to prime defense contractors for use in underwater acoustic (SONAR) equipment as well as

cluster bomb detonators, but only for R&D purposes. Although these transactions had been profitable, they comprised only a small amount (about .5%) of the company's 1991 sales. In brief, the president of this manufacturing company felt that there was a significant amount of defense subcontract work available, but he was unsure of how to go about pursuing it. In the following paragraphs, I will recount how a simple subcontract marketing strategy evolved.

MILSPECS/MILSTDS. The first factor we encountered revolved around MILSPECS and MILSTDS. This is an area of federal contracting which frequently hamstrings inexperienced subcontractors. The basic questions which a manufacturing entrant into defense contracting should ask are simple and logical: "What MILSPECS/MILSTDS do my products have to meet?" and "Can I produce to meet these MILSPECS/MILSTDS?". Although the specifications themselves are frequently cumbersome and lengthy, many non-defense manufacturing companies who are surviving in today's Total Quality Management (TQM)/JIT environment should not be surprised to find that their products are suitable for federal acceptance. In the case of our company, after a few calls to the local federal government small business liaison office we had copies of MILSPEC DOD-STD-1376A(SH) and MIL-I-45208A quality assurance guidelines, both of which were applicable to piezoelectric ceramic elements. After reviewing the specifications against the capabilities of the company's manufacturing processes we

determined that meeting MILSPEC DOD-STD-1376A(SH) would not be a problem. Interestingly enough, we also found that a TQM program which was recently put in place at the plant to satisfy one of the company's commercial customers actually exceeded the requirements of MIL-I-45208A quality assurance guidelines.

Overall Strategy and Core Competence. Prior to my internship, the president of the company and his management team had developed the marketing strategy which they wanted to convey to potential prime defense contractors. Due to their small size, high quality reputation among their regular customers, and flexible manufacturing and engineering capabilities, they wanted to position themselves as a specialized producer of piezoelectric elements. Specifically, they wanted to start out working in what they termed a "development mode" with primary defense contractors. In other words, they would work with prime contractors in an iterative, trial-and-error process to come up with piezoelectric elements that would meet the needs of individual contractors very specifically. This type of development work could then be used as a base from which to move into volume production contracts. In the company's previous experience, they had found that this ability to "work with" an end item manufacturer "up front" during development of new hardware and equipment was a unique capability that few piezoelectric ceramic element manufacturers had. Although this was an

expensive and time consuming process during the beginning of the buyer-supplier relationship, follow-on production work and long term ties with customers made this strategy profitable. For example, this type of relationship was quite successful in the manufacturer's dealings with Airmar, Incorporated, a commercial producer of acoustical fish-finders for the sport fishing industry. A final factor which added to this type of buyer-supplier relationship was the close ties that the piezoelectric ceramic element manufacturer had developed with the materials engineering department of a major research university located nearby. The manufacturer frequently used the resources of the research university in solving production and process problems when developing new piezoelectric formulations to meet buyer requirements. Quite simply, by combining all of the above factors together, this small manufacturing company had put together a unique set of core competencies to market in the defense industry.

Defense Marketing Plan. With MILSPECS researched and a core competence marketing strategy defined, we next began developing a marketing plan. Because the manufacturing plant was already working near capacity with commercial orders and supplier relationships with defense contractors were expected to take some time to develop, the efforts toward getting defense subcontract work were not expected nor intended to yield immediate results. The goal with this initiative was simply to develop a systematic method by which the

manufacturer could identify defense subcontract business. When good prospects for subcontracts were identified, the marketing manager would then conduct direct marketing efforts to turn prospects into orders.

The first step in the marketing plan involved assistance from the Susquehanna Economic Development Agency Council of Governments (SEDA-COG) in Lewisburg, PA.⁴⁷ With SEDA-COG's help, we devised a plan to automatically query the Commerce Business Daily to search for prime contract solicitations for defense hardware, equipment, or services which may have piezoelectric ceramic elements as sub-components.⁴⁸ Specifically, using a simple "key word search" with a microcomputer, SEDA-COG electronically scanned the Commerce Business Daily for bid solicitations which contained specific words associated with piezoelectric ceramics or defense equipment which possibly contained piezoelectric ceramic components. These words included:⁴⁹

piezo	transducer
ceramic	acoustic
acoustic	sensor
SONAR	sonobuoy
hydrophone	alarm
ignition	ultrasonic
actuator	vibration
accelerometer	gyro

Using this process, SEDA-COG provided the piezoelectric ceramic manufacturer with approximately 1,500 federal government contract solicitation retrievals over a period of six weeks. The solicitations were sent daily in hard copy

format from SEDA-COG to the piezoelectric ceramic manufacturer via regular mail.

The second step in the marketing plan involved ferreting out good prospects from the daily packet of contract solicitations received from SEDA-COG. This ferreting out process began by reviewing the solicitations for those that appeared to be for hardware, equipment, or services which involved piezoelectric ceramic elements as sub-components. Any solicitations which passed this initial screening were considered "prospects". The next step involved further research on the prospects in order to determine the names of defense contractors who would be bidding on work which may contain piezoelectric ceramic elements as sub-components. This further research consisted of calls to government contracting officers;⁵⁰ searches of databases containing information about previous government procurements of the same hardware or equipment; and numerous other means. For a "good" prospect, this research ended with a call to a prime defense contractor which would possibly be interested in developing a supply relationship for piezoelectric ceramic components. For a "bad" prospect, this research ended with the realization that the solicitation for hardware, equipment, or service did not entail the use of any piezoelectric ceramic sub-components.

Conclusions From the Case Study. This marketing plan proved to be very simple and easy to execute on a daily basis

for the piezoelectric ceramic manufacturer. The process which is now in place involves about 30 minutes to one hour per day of the marketing director's time in screening and following up on prospects for defense subcontract business.⁵¹ On average, 50 solicitation requests are received and reviewed per day. Of the 50, one or two of the solicitations pass the initial screen and require follow-up research. Of the solicitations which merit additional research, about 32% of the time (one in three) the piezoelectric ceramic manufacturer makes contact with a potential customer.

CHAPTER VI CONCLUSIONS

In the process of researching the information contained in this paper I have come to some definite conclusions which I believe may be helpful to businesses involved in the defense industry and those which may want to enter the defense industry. Most of these conclusions are based on research into the trends discussed earlier, but some are based on my background knowledge of the defense establishment.

SMALLER IS BETTER

For many years popular business writers and theorists have told us that smaller, flexible decentralized companies are the wave of the future and that the huge corporate conglomerate is dying. Tom Peters' article in the Fall 1992 California Management Review entitled "Rethinking Scale" recounts many of these theories and provides some insightful comments about the characteristics and virtues of being small. Peters' comments apply in the defense industry today more than ever. As we saw in the "Trends" section of this paper, DoD buyers are making smaller buys and the 5% small/ disadvantaged business goal coupled with JIT supply relationships play right in with the idea that smaller is better in the defense industry. Small R&D facilities will make out well in the defense industry of the future. Large defense contractors who presently have the big, expensive R&D capabilities also have

production scale economy requirements which preclude profitable production of defense equipment in smaller quantities which are expected in the future. Finally, top military brass who can remember ships that couldn't go to sea and tanks that wouldn't move for lack of spare parts during the post-Vietnam draw down will provide business for the small spare parts manufacturers at the expense of the big defense contractors which make only the major hardware, not the spare parts.

TQM AND JIT MEAN YOU CAN BE A PLAYER

As we saw in the case of the piezoelectric ceramic element manufacturer, TQM concepts and records, now commonly used by many manufacturers, fall right in line with the MILSPEC/MILSTD programs prevalent in defense contracting. We even saw that the distinctions between MILSPEC/MILSTD and TQM have become so minor that the U.S. Army Tank Automotive Command has been prompted to buy diesel engines without the use of the traditional "burdensome paperwork" and costly inspections associated with the MILSPEC/MILSTD system. Businesses that are effectively using TQM and are avoiding defense work because they're afraid that they won't "measure up" would do well to think again. Although MILSPEC/MILSTD requirements won't go away soon, commercial manufacturers who successfully employ TQM procedures and maintain TQM records

DoD as the closest possible federal government surrogate to JIT procedures.

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may already be meeting or exceeding the MILSPEC/MILSTD requirements without even knowing it!

BUSINESS AND DEFENSE - NO LONGER ADVERSARIES

Despite the trend of continued "criminalization" of the procurement process, I believe that the adversarial relationship between the DoD and defense contractors is at its zenith and will actually decline somewhat in the future. Limited resources and shrinking budgets will not allow the DoD and defense contractors to be the adversaries that they were during the height of the defense build up. Relationships in the future will be more professional and based on mutual trust. My line of reasoning is somewhat analogous to handing out treats to children at Halloween. If five kids come to the door and you hold out the whole basket of candy, each kid grabs a whole handful; but, if you hold out five pieces of candy, each kid politely takes only one piece. In the defense industry, it was the "whole baskets" of defense funding which bred the excesses and abuses (i.e. \$600 toilet seats) and subsequent adversarial relations which occurred during the build up of the 1980's. Quite simply, the "whole baskets" are giving way to "individual pieces" of defense funding which, my theory goes, will prompt defense contractors to guard and protect their relationships with the DoD. In brief, none of us can any longer live with \$600 toilet seats, yet all of us need national defense.

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44. Ibid. p. 122.
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46. The case study information in this section was taken from a final report for a course which I completed under the instruction of Nirmalya Kumar, PhD, Assistant Professor of Marketing, Pennsylvania State University during the Summer of 1992. The course was titled "Enterprize Consulting", (BA 560), and the final report was completed on 10 August 1992.
47. SEDA-COG is a non-profit organization which provides liaison service and assistance to local businesses in the geographic area where the piezoelectric ceramic manufacturer is located. SEDA-COG essentially acts as a "broad-based" local trade association which brings businesses together with each other as well as with state and federal agencies in order to initiate mutually beneficial business relationships. Organizations similar to SEDA-COG are available to local businesses throughout the country.
48. The Commerce Business Daily (CBD) is published Monday through Saturday by the Department of Commerce. This publication provides bid solicitations and proposals for federal government purchases of \$ 10,000 or more. In addition to hard copy format, the CBD is also available on an electronic network. In this case, SEDA-COG provided the piezoelectric ceramic manufacturer with electronic query of the CBD via a telephone modem and microcomputer. This is an example of "electronic commerce" as discussed in "Trends" Section of this paper. Specific details concerning subscription to the CBD are available in the sources listed in Appendix D.

49. The listing of key words is provided in order to give a sense of the broad range of prospects which a contractor or subcontractor should begin screening for in search of defense business. For example, the piezoelectric ceramic manufacturer knew that any solicitation which contained the word "gyro" would probably not result in a good prospect. Nevertheless, since some gyroscopic navigation equipment was known to have piezoelectric sub-components, taking a look at a solicitation for "gyro" as a key word was considered worth the effort.
50. Some DoD contracting officers and others involved with the federal procurement process have a tendency to make businesses believe that information concerning who is bidding on specific government contracts cannot be legally obtained. Although details concerning bidders specifications and prices, etc. are proprietary for obvious reasons, compliance with the Freedom of Information Act requires government contracting officers to provide the names of bidders on government contracts upon request before the contract is awarded. When requesting information concerning companies that are bidding on a specific contract, Federal Acquisition Regulations, para. 14.205-5 and subpart 24.2 should be cited.
51. Although it may appear odd that the marketing director would be involved in the rather tedious task of reviewing 50 bid solicitations for possible subcontract opportunities, two points will clarify this situation. First, the marketing department of this firm consisted of only two people: the director and his assistant. Second, the marketing director had the proper background in the defense industry to scan solicitations and make quick educated decisions as to applicability of piezoelectric sub-components.

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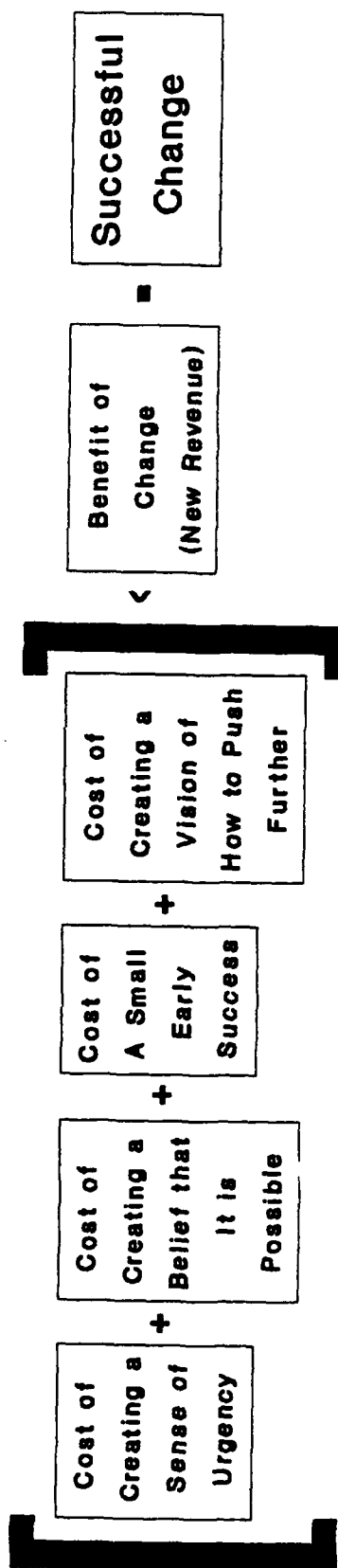
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APPENDIX A

A Model of Requirements for Change in Business



APPENDIX B

A BRIEF OVERVIEW OF HELPFUL WRITINGS ON BUSINESS INNOVATION

Rosabeth Moss Kanter. The Changemasters, Innovation and Entrepreneurship In The American Corporation. New York, NY: Simon and Schuster, 1983, 432 pages.

Available: bookstores and libraries.

Overview: Kanter's book is based on studies of over 100 companies during a five year period. In depth studies are conducted and presented on ten specific companies including Honeywell Defense and Marine Systems Group. Although the book is somewhat dated, Kanter's observations concerning innovation are still timely. Many examples of successful and unsuccessful innovative programs are cited from the studies. Paradigms, suggestions, and models are presented as tools to help managers foster and cultivate innovation.

Rosabeth Moss Kanter, "Swimming in Newstreams: Mastering Innovation Dilemmas," California Management Review, vol. 31, no. 4, Summer 1989, p. 45-69.

Available: university, college, and business school libraries; California Management Review, 350 Barrows Hall, University of California, Berkeley, CA 94720, 415-642-7159 (for reprints). Note: this article is reprinted from Kanter's 1989 book, When Giants Learn to Dance, published by Simon and Schuster.

Overview: The writing is based on studies of eight specific "innovative vehicles" used by companies to develop new products and services. Kanter's article emphasizes how businesses can confront the balancing act of maintaining core business (mainstream) while developing new businesses (newstreams). Examples are provided from the eight cases to help managers develop the right environment to allow newstreams to thrive. Topics such as newstream autonomy, empowerment, and tension between mainstream and newstream are discussed.

protect their relationships with the DoD. In brief, none of us can any longer live with \$600 toilet seats, yet all of us need national defense.

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Tom Peters, "Get Innovative or Get Dead," IEEE Engineering Management Review, vol. 19, no. 4, Winter 1991, p. 4-11 (Part I) and vol. 20, no. 1, Spring 1992, p. 7-14 (Part II).

Available: university, college, and business school libraries; The Tom Peters Group, 555 Hamilton Avenue, Palo Alto, CA 94301, 415-326-4496 (for reprints).

Overview: The article is based on eight elements which Peters believes are "something more" that managers and firms can do to increase entrepreneurial spirit. The information which Peters provides is based on extensive consulting experience by he and members of his consulting group. The work is written in Peters characteristic witty style and has a well structured format of innovative suggestions listed and explained within broad topics (i.e., "attacking markets by the numbers," "measurement and reward," "people strategies," etc.).

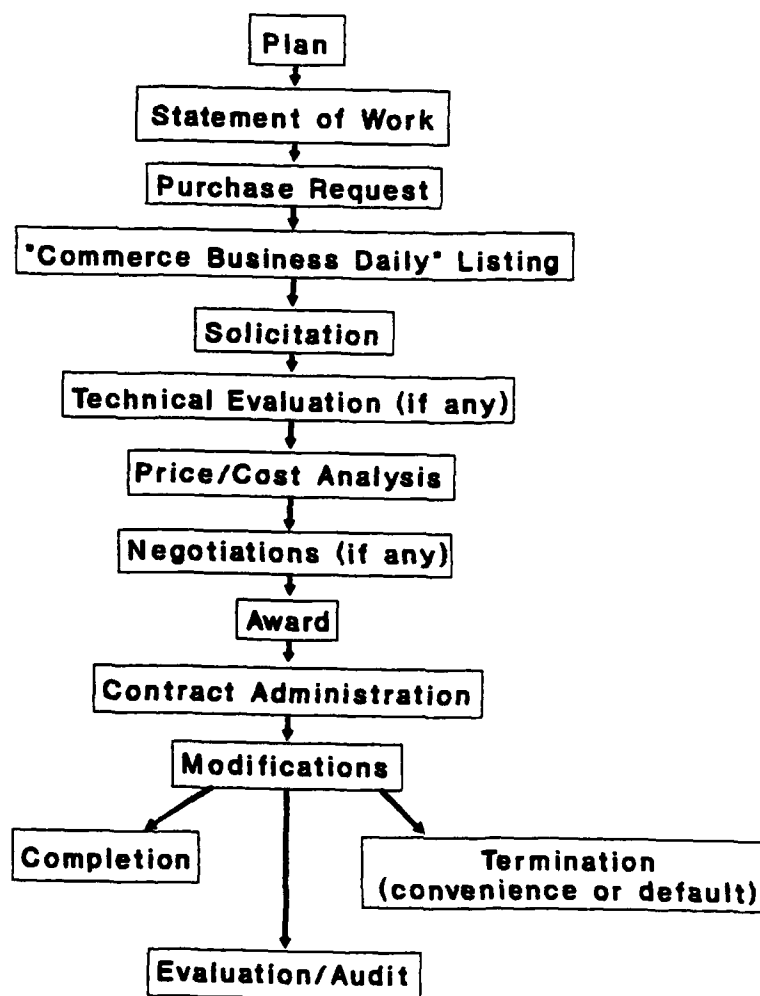
Todd D. Jick. Managing Change, Cases and Concepts. Boston, MA: Richard D. Irwin, Inc., 1993, 489 pages.

Available: university, college, and business school libraries; college bookstores.

Overview: Jick prepared this book as a text to be used in his Managing Change course at the Harvard Business School. The book consists of a series of case studies and readings prepared by Jick and other authors on the subject of change in business. Readings and cases are organized under broad topic headings (i.e., "implementing change," "the recipients of change," "change agents," etc.). Jick's text has been published very recently and provides a comprehensive package of writings on innovation and change across a wide spectrum of businesses.

APPENDIX C

A Generalized Flow Chart of the Federal Procurement Process



Source: Susan A. MacManus, Doing Business with Government, page 66.

APPENDIX D

A BRIEF OVERVIEW OF HELPFUL WRITINGS ON FEDERAL CONTRACTING

William A. Cohen. How to Sell to the Government. New York, NY: John Wiley and Sons, Inc., 1981, 434 pages.

Available: university, college, and business school libraries.

Overview: Although somewhat dated, this book provides some valuable insights concerning bid proposal preparation and government marketing strategy ideas. Some of the federal government forms and listings of government procurement activities provided in the book are outdated and should not be used.

Charles R. Bevers, Linda Gail Christie, and Lynn Rollins Price. The Entrepreneur's Guide to Doing Business With the Federal Government. New York, NY: Prentice Hall Press, 1989, 288 pages.

Available: university, college, and business school libraries; popular bookstores.

Overview: This book is prepared specifically for small businesses looking for a local niche in the defense industry. Emphasis is placed on programs and opportunities provided by the federal government specifically for small business. Appendices provide good "how to" information for a newcomer into the defense industry (i.e., "how to prepare an unsolicited proposal," "how to read a solicitation and contract," "sample quality manuals," etc.).

U.S. Department of Defense, Selling To the Military,
DoD Publication 4205.1M, Washington, DC, U.S.
Government Printing Office, 1992 (latest edition),
102 pages plus appendices.

Available: university, college, and business school
libraries; Superintendent of Documents,
Mail Stop: SSOP, Washington, DC 202402-
9328.

Overview: This is a basic handbook that provides an
introduction to contracting with all
agencies of the DoD. It is intended for
new entrants to the defense industry and
provides general contract information with
specific references to other government
publications which are helpful to defense
contractors. Current federal government
forms and listings of procurement offices
are provided.

U.S. Department of Defense, Small Business Specialists,
DoD Publication 4205.1-H, Washington, DC, U.S.
Government Printing Office, 1992 (latest edition),
74 pages.

Available: university, college, and business school
libraries; Superintendent of Documents,
Mail Stop: SSOP, Washington, DC 202402-
9328.

Overview: This book provides information concerning
small business outreach programs of the
federal government. The majority of the
text consists of current listings of small
business liaison officers and small business
administration offices by geographic
location.

Susan A. MacManus. Doing Business With Government. New York, NY: Paragon House, 1992, 429 pages.

Available: university, college, and business school libraries; popular bookstores.

Overview: This is a very recent and unique text which provides information concerning federal, state, and local contracting practices. MacManus' text is based on an extensive survey of businesses who deal with government at all levels. The survey results and analysis provide background and over 100 pages of appendices provide helpful information for government contractors such as listings of federal and state procurement offices, procurement codes and statutes, and prompt payment act procedures.