Chapter Two

ACQUISITION REFORM AND THE EVOLUTION OF THE U.S. WEAPONS MARKET

OVERVIEW: WEAPONS MARKET VS. COMMERCIAL MARKET STRUCTURE

In the United States, the market for defense-related goods and services is not like most commercial markets.[1] To understand the promise—and the risks—associated with CMI, it is useful to understand how the current military acquisition system and the separation between the defense and civilian industrial bases evolved.

The modern U.S. "market" for weapons and weapon systems has two dominating features. First, it is characterized by a single buyer, DoD, which defines the product and controls the sales opportunities of weapon system providers.[2] Unlike most commercial product markets, the weapons market is centralized, historically driven by the detailed performance and technical requirements provided by DoD.[3] Even where commercial markets for military technologies—or, per-

[1]There are, of course, many types of commercial markets, including markets for highly customized products. As we suggest in our case study of the commercial transport aircraft industry, these markets—not mass consumer product markets—are likely to provide the best model for a successful CMI strategy.

[2]Historically, the individual services have exercised considerable influence over acquisition decisions. As a result, one can plausibly argue that DoD is not monolithic, so that multiple buyers do exist in some circumstances.

[3]As will be seen later, a major thrust of acquisition reform is to reduce the level of detail in requirements and to move from technical specifications to broader performance requirements.

haps more likely, foreign military sales—may be possible, access to these markets is controlled by DoD and other U.S. government agencies. In contrast, for practically all mass consumer products, private firms have considerable control over both the R&D process and the configuration of the ultimate product. Sellers take the initiative in deciding what to produce, how much to spend on development, how to carry out R&D, how to test the finished product, and what price to charge. Diverse and autonomous buyers choose products offered by competitive sellers on the basis of their price and performance characteristics.

The second distinguishing feature of the weapons market is that it is characterized by a higher degree of technical complexity and innovation than most commercial product markets. To achieve DoD performance requirements, developers of new weapon systems not infrequently push the limits of known technology, incorporating both designs and materials that are largely unproven. Many if not most commercial product developers, in contrast, tend to improve incrementally on existing technologies. As a result, new commercial products do not usually differ in substantive technical ways from those already tried and tested in the marketplace.[4]

These two features of the weapons market imply two ways in which firms may find it riskier—and thus, without government support, less attractive—than commercial markets. First, the "market" risk associated with the weapons market may be higher. That is, defense contractors face a high risk that, after development and/or production costs have been incurred, the U.S. government will not choose to buy their product. Second, weapon system development and production may involve higher "technical" risk. That is, defense contractors face a high risk that the product will fail to achieve cost, performance, or delivery time objectives required by the U.S. government, and so fail to sell. Given that the expenditures on human as well as physical capital required for successful weapons development and production are substantial, the combination of these risks

[4]Exceptions, of course, exist. And while R&D expenditures as a percentage of sales in weapon systems are still much higher than for commercial products on average, the gap between commercial and defense-related expenditures on R&D is almost certainly less pronounced today than it was 30 years ago. See, for example, Peck and Scherer (1962).

may discourage firms from participating in the weapons business—at least, not without a guarantee of an adequate rate of return on investment.[5]

To ensure that the U.S. arsenal achieves high levels of technology, the U.S. government has chosen to assume most of the risk of weapon system development. DoD directly finances the bulk of the R&D for most major weapons programs, its contracts are still primarily cost-based, and it tends to award sole-source production contracts (effectively monopolies) to weapon system developers.[6] To counter the potential for abuse of this sort of system, over time the government has constructed an exceedingly complicated web of acquisition-related laws, regulations, and practices that are incompatible with most standard commercial business practices. The U.S. weapons market of the late 20th century is a far cry from the decentralized, full-information, price-based competitive market assumed in simple economic theory—and assumed as well by some proponents of CMI.[7] Further, past efforts at reforming the acquisition process have merely raised the barriers between the civilian and military worlds.

ACQUISITION REFORM IN HISTORICAL CONTEXT

Recurrent problems with inadequate, underperforming, and overly expensive weapon systems have led to calls for reform of the U.S. military procurement system throughout its 200+ year history. Van Opstal (1995) relates that one of the earliest attempts to revamp the system occurred in 1777, when General George Washington was forced to commission his own cannon-casting facilities because

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[5]It is difficult to determine whether firms' stated reluctance to enter the defense market arises from perceptions of excessive risk or excessive regulation. Gansler (1995) claims that excessive regulation is responsible for most firms' unwillingness to accept standard defense contracts with DoD; among the firms he cites are Hewlett Packard and Digital Equipment Corporation.

[6]Of course, these monopolies are for specific weapon systems (the F-15, for example), and other firms produce other weapon systems that are at least partially substitutable for them (the F-16, for example).

[7]At least as early as 1962, the essentially nonmarket character of the weapons acquisition process was recognized and carefully analyzed by economists. Peck and Scherer (1962) remains one of the best analyses of the U.S. weapons market.

private manufacturers were unwilling to accept the contract—an early example of the problems created by perceptions of excessive market risk. During the United States' first 100 years or so, however, there were few changes to U.S. military technology, so that technical risk was low. Inventories were small and remained in service for long periods,[8] making possible a highly decentralized weapons procurement process, with little formal coordination between the services. The individual technical branches of the services took "an approach to technological advance that emphasized the strict separation of R&D from production, elaborate test procedures, competitive bidding for defense contracts, and quality control during production" (McNaugher, 1989, p. 21).[9] Although not a recipe for handling either the pressures of wartime or rapid technological change, it did serve to minimize the potential for misuse of the taxpayers' money.

The inadequacies of this approach became painfully evident at the outbreak of World War I, especially with respect to rapidly evolving aircraft technologies. In the time it took to write a detailed fixed-price contract and conduct a competition on its terms, the technology had often become obsolete.[10] For aircraft, the problem was temporarily solved by circumventing the services' formal procurement procedures altogether and turning to the private sector for both design and manufacture. Private companies took on the major responsibility for the technical management and integration of military aircraft programs, with only rather loose direction provided by formal military contracts.

By the end of World War I, political problems with reliance on the private sector for military aircraft development had begun to surface.

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[8]For example, Holley (1953) describes in great detail the U.S. Army's reluctance to convert from muzzle-loading to breech-loading rifles. Although patented breechloaders existed as early as 1842, they were not widely available as standard issue until 1865—just *after* the end of the Civil War.

[9]For the decentralization of the procurement process prior to World War I, see Peck and Scherer (1962).

[10]Holley (1953) points out that the original 225-horsepower design for the Liberty aircraft engine, which was recommended for production in April 1917, became obsolete just three months later. By the end of World War I, the Liberty engine had been transformed from 8 cylinders to 12 cylinders, and from a 225- to a 440-horsepower rating.

In response to reports of wartime profiteering, Congress demanded that all military design work once again be competitively awarded using detailed fixed-price contracts. Further, Congress insisted that the services acquire technical data rights from the winner of the original design competition to put production contracts out for competitive bid. The net result was that some aircraft and engine firms refused to bid on contracts that gave the government proprietary rights to the finished design. Nevertheless, Congress refused to reconsider its requirement for competitive bidding on military contracts, even though technical progress for military aircraft was considered unsatisfactorily slow.[11]

This situation continued until after the European outbreak of World War II in 1939, when Congress signed emergency legislation granting the services wide latitude to negotiate contracts, including cost-plus, sole-source contracts "if the emergency demanded" (McNaugher, 1989, p. 29). After the war, Congress gave primary responsibility for military acquisition to the newly created Department of Defense, but it was the also newly created U.S. Air Force that drove the budget and to a large extent determined acquisition policy.[12] For the next forty-odd years the Air Force, and DoD as a whole, continued to rely primarily upon the cost-plus, often sole-source weapons contracting system that had proven so effective during the war. The system, however, became increasingly burdened by regulations designed to prevent the smallest violation of the public trust. Over time there evolved an almost complete separation between commercial markets and the military acquisition process, from the most sophisticated weapon systems to the smallest parts and components. Where it has been possible to compare the two, the achievements of commercial markets often appear to have been superior in terms of product cost, timeliness, and sometimes even performance.

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[11]McNaugher (1989, p. 28) argues that throughout the decade of the 1920s, private contractors were forced to absorb an increasing share of the risks associated with military aircraft design and production without sufficient offsetting compensation. As a result, "many aircraft firms lost interest in military business and shifted instead to the commercial side of their operation."

[12]Peck and Scherer (1962) suggest there may have been doubts about the Secretary of Defense's authority over the procurement process as late as 1958. During the latter half of the 1950s, the Air Force accounted for 47 percent of the overall defense budget, with spending on aerospace R&D and production rising throughout the decade (McNaugher, 1989).

The tension between DoD's desire to uphold the public trust and the need for fast, effective provision of military systems has continued throughout the Cold War period and beyond. As a result, efforts to reform the acquisition process have tended to split along conceptual lines: those designed to fix problems attributable to self-interested and even criminal behavior on the part of public officials and defense contractors, and those designed to fix problems attributable to inflexibilities imposed by governmental regulations. These two types of "reform" have worked mostly at cross-purposes. For example, in the immediate pre- and post-Sputnik years, many would-be reformers argued that substantial improvements would result if accepted business practices were to replace government regulation as a guide to U.S. weapons acquisition (Peck and Scherer, 1962).[13] On the other hand, perceived contractor "waste, fraud, and abuse" led to the passage of the Truth in Negotiations Act (TINA) in 1962, the creation of the Defense Contract Audit Agency in 1965, and the establishment of Cost Accounting Standards (CAS) in 1970. In the 1980s, the President's Blue Ribbon Commission on Defense Management (the Packard Commission) recommended that DoD expand its use of commercial products and institute "commercial-style" competition on the basis of past performance as well as price. This recommendation, however, was at least partially offset by other reforms such as the 1984 Competition in Contracting Act (CICA), which sought to ensure equal access to defense contracts for all firms regardless of size or experience.

RECENT EFFORTS TO REFORM THE DEFENSE ACQUISITION PROCESS

Beginning in the late 1980s, as pressure to reduce the federal budget deficit began to mount, an increasing number of observers both inside and outside the Pentagon concluded that the pendulum had swung too far in the direction of regulatory oversight, creating an increasingly unnecessary separation between the civilian and defense industrial bases. For example, in a series of influential books and ar-

[13]Interestingly, both Peck and Scherer (1962) and Scherer (1964) concluded that the adoption of "commercial practices" would do little to improve the weapons acquisition process because of what they considered to be the fundamentally different characteristics of the weapons market, as discussed above.

ticles, Under Secretary of Defense for Acquisition and Technology Jacques Gansler—who was at that time working in the private sector—argued that the heavily regulated military acquisition system not only discouraged efficient defense-related production but actually failed the public trust by encouraging defense contractors to produce unnecessary and unnecessarily expensive items.[14] Gansler and other reformers identified two serious and related problems with the U.S. defense acquisition process.

First, the reformers pointed out that many commercial firms were consciously avoiding Pentagon business because of government-mandated procedures and standards that were not in conformity with routine business practices in the commercial world. Those firms that did work on DoD contracts tended to either specialize in military work or establish separate divisions fenced off from their commercial divisions so that government regulations and oversight would not impinge on their commercial operations. Thus, reformers argued, the maze of government-unique requirements and standards acted as a barrier to DoD acquisition of relatively inexpensive yet state-of-the-art commercial product and process technologies. They asserted that this problem was especially acute in information technology, which has the potential to radically increase military effectiveness even without increases in weapon system platform performance, but which is almost entirely driven by developments in the commercial sector.

Second, the reformers argued that firms' compliance with the various laws and regulations related to government procurement, combined with the extra cost of mandated government monitoring and oversight, caused a significant cost premium to be added to items procured by the government. According to studies conducted in the late 1980s and early 1990s, government regulation increases costs to the government for various weapons programs by 5 to 50 percent.[15]

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[14]See, for example, Gansler (1989, 1995).

[15]Some of the leading studies of that period, along with their estimates of the DoD cost premium, are Smith et al. (1988), 5–10 percent; OTA (1989, Vol. II, appendix), 10–50 percent; CSIS (1991), 30 percent; Carnegie Commission on Science, Technology and Government (1992), 40 percent; American Defense Preparedness Association (1992), 30–50 percent.

The solution to these problems, according to reformers, was for DoD to encourage greater integration of the defense and civilian industrial bases. Appropriate steps include dismantling the regulatory and informational barriers to the use of dual-use process and product technologies, and replacing those regulations with appropriate commercial business practices designed to keep costs down and product quality and performance up.

In response to these and other criticisms and suggestions, Congress passed Section 800 of the National Defense Authorization Act of 1990. This Act required DoD to establish a panel of experts from government, industry, and academia to evaluate changes to DoD acquisition regulations. Consistent with the CMI reformers' recommendations, the Section 800 Panel proposed eliminating or changing about one half of the 600 statutes it identified as affecting DoD acquisition. Its findings were submitted to Congress in January 1993 for legislative action.[16]

The findings of the Section 800 Panel, together with the work of Vice President Gore's National Performance Review, convinced top DoD leaders of the need for rigorous reform of the defense acquisition process and influenced their strategy for achieving it. In particular, Secretary Perry's February 1994 vision statement, *Acquisition Reform: A Mandate for Change*, called for a flexible, commercial-like approach to defense acquisition emphasizing increased use of commercial products, technologies, and processes and greater integration of the civilian and military industrial bases. Many of these ideas were subsequently incorporated in the Federal Acquisition Streamlining Act of 1994 (FASA), which greatly simplified DoD procedures for purchasing relatively low-cost, low-risk commercial products and services. Among other things, FASA

1. Expanded the definition of commercial items
2. Automatically exempted the purchase of commercial items from more than 30 government-unique statutes
3. Removed the requirement for cost and price data on commercial contracts

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[16]See U.S. Congress (19 March 1997).

4. Raised the threshold for the application of TINA to $500,000
5. Expanded the information provided to all competitors after contract awards to reduce formal protests.

FASA also authorized the establishment of Defense Acquisition Pilot Programs (DAPPs), enabling the services and defense agencies to test out the more radical modes of acquisition reform.[17]

1994 also saw the initiation of another key component of DoD's acquisition reform policy—requirements reform. The first element of requirements reform, Military Standards and Specifications (Mil-Spec) reform, was motivated by the argument that the wholesale application of Mil-Specs to military programs was inhibiting the incorporation of advanced commercial technologies and processes into military products. Mil-Specs were also believed to discourage commercial firms that used only commercial specifications and standards from participating in military acquisition programs. To remedy this perceived problem, in June 1994 Secretary Perry issued a memorandum entitled *Specifications and Standards—A New Way of Doing Business*. This memorandum turned existing DoD policy on its head: Instead of requiring Mil-Specs, as had been the case in past policy, it called for the use of commercial and performance standards wherever possible, and required defense programs to provide special justifications if Mil-Specs were used.

A central aspect of Mil-Spec reform is that the service buyer should not dictate specific or detailed technical and design solutions to contractors. Instead, contractors should be provided with general system and performance requirements necessary to accomplish the military mission. As in the commercial world, defense contractors should be given more opportunity to develop new and innovative design and technical solutions at lower cost in order to meet the mission requirements.

Cost is also central to the second element of requirements reform, "Cost As an Independent Variable," or CAIV. CAIV requires DoD ac-

[17]The Federal Acquisition Reform Act of 1996 (FARA) made additional changes to promote even greater government access to the commercial marketplace, by further simplifying procedures for purchasing certain categories of commercial items. See OUSD/A&T (1996, Appendix B).

quisition managers to raise cost considerations to a priority level at least equal to, and often even higher than, the traditional military program requirements relating to system performance and development schedule.[18] CAIV is intended to mimic conditions in the commercial world, where cost is always an independent variable. It has two primary features.

First, CAIV requires that the government buyer—the services and DoD—have a clear and precise understanding of the mission for the system and what system outcome is needed on the battlefield. The buyer then must carefully prioritize the mission performance needs and broad capability requirements that the system should possess to accomplish the mission.[19] Prioritization is critical so that intelligent tradeoffs can be made between cost and capability. A principal objective of this approach is to avoid "gold-plating" weapon systems with extensive capabilities that are not truly necessary to perform the mission, but that often drive up costs by necessitating the use of unique military-only parts and technologies.

Second, for the CAIV process to achieve its full potential, reformers believe that contractor configuration control is necessary, at least below the overall system level. Configuration control combined with Mil-Spec reform permits the contractor to seek out and experiment with any technologies and parts available in the marketplace, whether commercial or military, in order to meet the government buyer's mission requirements at the lowest possible cost.

In sum, FASA, Mil-Spec reform, CAIV, and the other acquisition reform initiatives that have proliferated over the past ten or so years reflect the CMI advocates' belief that the civilian industrial base can

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[18]As defined by Noel Longuemare, the Principal Deputy Under Secretary of Defense for Acquisition and Technology, "CAIV means that we will intentionally hold cost constant and accept the schedule and performance that results—within limits of course." Quoted in OUSD/AR (May 1996). The basic concept of CAIV is not dramatically different from the "Design to Cost" concept applied with mixed results in the early 1970s. The difference, according to advocates, is that CAIV is being implemented in an environment of much more profound change to the traditional acquisition system and culture. They believe that this gives it a much greater chance of success.

[19]These may include factors such as reliability, sortie rate, survivability, and robustness, along with more traditional measures of performance such as speed, range, and payload.

provide DoD with relatively inexpensive yet high-performance product and process technologies suitable for defense applications. Such measures also promise to reduce or eliminate the cost premium associated with military-unique regulations and standards. But why should these reform efforts succeed when so many before them have failed? Advocates have two answers: The growth of the dual-use technology sector and the effectiveness of commercial-world mechanisms for minimizing risk.

The Growth of the Dual-Use Sector

CMI advocates believe that technological developments in both the military and (especially) commercial worlds mean that process and/or product technologies used for commercial and defense-related design and manufacture are now similar, or in some cases identical. This means that the same people, machines, and facilities can be shared between defense and commercial applications. CMI thus not only offers economies of scale and scope in dual-use development and production, but also effectively reduces the market risk of weapons production by allowing firms to recover their fixed costs from many more potential buyers. In theory, this should make the weapons business more attractive to more firms, reducing DoD's need to pay for all of weapon system R&D.

But is there sufficient dual-use overlap to achieve the effective integration of the defense and commercial industrial bases? Much depends, first, on the nature of recent developments in commercial technologies, and second, on the complexity and requirements of the system under consideration. It is true that developments in commercial technologies, and to a lesser extent in defense technologies, have made certain commercial and defense applications more similar than was the case 15, 20, or even 40 years ago. But it may also be true that CMI is still relevant only to a subset of systems that DoD buys and yet can still achieve many of the benefits claimed for it by its supporters.

Although there are substantial overlaps between them, DoD purchases can be divided conceptually into three categories:

- pure commercial
- commercial but substantively modified for military use ("commercial-modified")
- military unique.

Pure commercial items include items the military buys that are identical to those bought in commercial markets. Examples include food, office space, clothing, gasoline, office furniture, medical care and supplies, and so forth. A few of these types of items are incorporated into weapon systems (some commercially available microchips, for instance), but even the parts and components of weapon systems generally require some type of modification.[20] The high costs to the military of pure commercial items relative to what they sell for in commercial markets can be attributed to burdensome government regulations and oversight, so the argument that CMI can save DoD money with respect to pure commercial items has been accepted by both DoD and Congress for some time. Increased use of pure commercial items became a formal element of DoD policy as early as 1976, and in 1984 Congress mandated DoD's procurement of pure commercial items "whenever such use is technically acceptable and cost-effective" (OTA, 1994, p. 64).[21] Significant steps have already been taken to rapidly integrate the defense and commercial markets for many of these items, and we do not consider them here.[22]

Of more current interest are items that have clear similarities to those produced in commercial markets but are modified for military use. Examples include most computers, global positioning system (GPS) receivers, space launchers, utility helicopters, and transport aircraft and trucks. Military modifications often involve ruggediza-

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[20]Nondevelopmental items (NDIs), DoD's purchase of which has been strongly encouraged by Congress, include pure commercial items as well as previously developed military items, with allowance for some modification. The distinction between a modification and a redesign is the subject of much debate, and is discussed at greater length in Chapters Three through Five below.

[21]In 1993, DoD reported that commercial items accounted for approximately 7 percent of the funds spent on "high dollar value items." The estimated commercial shares of total procurement of parts relevant to weapons systems, reported by the Defense Logistics Agency (DLA) and the Air Force, were approximately 18 and 10–15 percent, respectively (DoD, 1993).

[22]Much less integration has occurred in the area of services.

tion so that the equipment will survive in combat environments, but generally do not involve major technical challenges. Items in this category may be alleged to cost more than commercially available alternatives, but it is difficult to separate those costs attributable to government regulations and oversight from those attributable to the customization. Because commercial markets for similar types of products already exist, however, it is probably here that CMI's greatest potential lies. Many if not most weapon system parts and components potentially belong in the commercial-modified category.

The most problematic area for CMI supporters lies in the category of military-unique items, items that, at least in the past, have had no close commercial analog. These items are designed and developed for military purposes, and include most weapon systems and many weapon subsystems. Examples include combat aircraft (especially stealthy supersonic ones), fire-control radar, guided missiles, nuclear weapons, and nuclear submarines. To some extent, military-unique items can be differentiated from commercial-modified items by their level of technical difficulty and complexity: Unlike commercial-modified items, military-unique items generally involve a technically challenging development process. Of more direct relevance to CMI, military-unique items

1. have no obvious commercial counterpart
2. largely use noncommercial processes
3. involve highly classified and controlled technologies.[23]

At least in the past, they have had little obvious potential for dual-use application.

Recent developments in commercial technologies are blurring the line between the commercial-modified and military-unique categories of items that DoD buys. The technological superiority of military relative to commercial technologies that was widespread in the 1950s, 1960s, and even 1970s is no longer so clear in the 1990s. The post-war paradigm of "spin-off" is turning into "spin-on": More and more, defense technologies are driven by developments in the com-

[23]This definition is taken from OTA (1994, p. 139).

mercial world. In particular, commercial developments in information technology can potentially increase DoD's ability to find, fix, and locate targets, allow rapid transmission of data, and make munitions more autonomous and precise. Thus statements (1) and (2) above are increasingly suspect, especially with respect to subsystems, parts, and components.

Early Evidence of the Benefits of Dual-Use

To date, little formal evidence has been provided to prove or disprove the assumption that many if not most military products and processes have become dual-use. Although a few studies have made careful empirical analyses of the potential gains to DoD from particular dual-use technologies (for example, OUSD/A&T, October 1996), the more general claims are still based on collections of anecdotes.

Probably the most familiar argument presented in favor of CMI is that commercially developed and produced items ("commercial items" for short) cost less than their military counterparts. Where such items are identical, or nearly identical, the military should be able to take advantage of commercial economies of scale by buying commercial off-the-shelf (COTS) items. Even where they are not, the dual-use aspects of design and manufacturing process technologies may make it possible to achieve economies of scope through modification of commercial items. This point is made by CMI advocates in a widely cited anecdote about the price of military computer chips. Reportedly, in recent years the military has paid ten dollars apiece for computer chips similar to ones costing just a dollar on commercial markets.[24] Another example is secure telephony. According to the Defense Science Board (1993), DoD's commercially derived STU-III secure telephone costs about one-tenth as much as a conventional Mil-Spec item and took Motorola just three years to develop as compared to an average 7–11 year DoD cycle. From this type of evidence, the Defense Science Board estimated that DoD procurement of

[24]The reference may be to the CMOS (Complementary Metal Oxide Semiconductor) chip developed commercially in Japan for wristwatch batteries and now widely used in military applications. See National Economic Council et al. (1995) and Alic et al. (1992, p. 73).

commercial items in electronics, software, and spare parts could result in savings of 3–20 percent.

A second and potentially even more important argument, given the reliance of U.S. national security strategy on qualitatively superior military systems, is that the commercial sector is technologically ahead of the military sector in those areas where both use broadly similar technologies. Once again, microchips are a widely cited example. The Packard Commission concluded in 1986 that "military microchips typically lag a generation (three to five years) behind commercial microchips."[25] Thus, it is argued that a newly acquired commercial computer today embodies more recent and thus more powerful technology than a newly acquired computer designed and developed for the military. This is generally attributed to the greater flexibility of commercial markets in incorporating technology into new products, compared with the time-consuming, costly, and generally burdensome process that military developers (and government monitoring authorities) must go through to get new technologies approved for government purchase.

CMI advocates also claim that, under the current acquisition process, the technology in legacy weapon systems tends to be frozen for long periods between occasional major upgrades. By contrast, many commercial systems have their technological components upgraded throughout system life, a process called "continuous insertion" of new technology. For example, Gansler (1995, p. 136) states that the mobile electric power unit used in many weapon systems is a 25-year old design that is less efficient, more polluting, and less reliable than available commercial units. More dramatically, it appears that certain parts for the yet-to-be-produced F-22 are already out of production.[26]

According to CMI advocates, the reasons why military systems tend not to have new technology continuously inserted include rigid adherence to outdated Mil-Specs, reluctance to surrender configuration control to contractors, and a lack of incentives for military R&D budget allocators to invest in upgrades. Investments in upgrades are

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[25]As cited in Alic et al. (1992, p. 153).

[26]See the discussion in Chapter Five.

unpopular because the savings in operating costs cannot be retained by the military to enhance other capabilities the way they can in private firms.[27] It is argued, however, that military programs will soon be forced to adopt continuous insertion because of the lack of availability of original parts and components. We discuss this further in Chapter Five.

A third potential benefit claimed by CMI advocates is that commercial products usually have much shorter development cycles than do military systems. Commercial markets, spurred by competition, are said to develop new products more efficiently, so that new generations of products appear approximately every five years as opposed to every 15 for military systems. This may be partly because commercial development cycles are more incremental, and thus naturally more frequent, than are military development cycles. In contrast, in military development practice, a few new products, each of which incorporates major technical change, are introduced at infrequent intervals. "Block upgrades" to military systems are analogous to the commercial world's "new generation" of products, however, so this argument should be viewed with caution.

Furthermore, it is claimed that some commercial industries achieve significant schedule reductions—and avoid extremely costly redesigns—through close integration of the design, engineering, and production phases of the manufacturing process. For example, by requiring manufacturing and design engineers to work together at an early stage in the development process—as well as by extensive use of computer-aided design—the Boeing team responsible for the passenger doors on the 777 achieved close to a 95-percent reduction in manufacturing design errors (Sabbagh, 1996, p. 91). A similar lesson can be drawn from the McDonnell-Douglas TAV-8B, which had 68 percent fewer drawing changes and 58 percent scrap reduction as a result of integrating design and manufacture (Gansler, 1995, p. 184). As a result of these kinds of arguments and anecdotes, all new military acquisition programs incorporate the "Integrated Product Team" (IPT) approach.

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[27]It is sometimes argued that the small fleet size of some military systems deployed also makes it difficult to amortize technical upgrade investments.

A final argument made by CMI advocates is that buyers of products in commercial markets do not face the sorts of "industrial base" problems that the military does. Because the military is often the most important customer for its supplier firms, temporary reductions in military purchases can cause supplier firms to fail. When this happens, it can leave the military with few or even no suppliers. If the military were part of a diversified commercial customer base, according to CMI advocates, a hiatus in military orders would pose less of a problem for its suppliers. Like glass or rubber manufacturers facing a downturn in the auto industry, military suppliers could weather the storm by turning to alternative product lines. Further, the danger of creating a supplier monopoly would be much less, because there are far fewer barriers to entry into the commercial market than into the current highly regulated defense market. Finally, with respect to an issue of considerable concern to military planners, CMI supporters claim that an integrated civil-military industrial base would provide the necessary flexibility to support a wartime surge situation. Just as commercial customers with urgent needs can pay for priority deliveries, in a surge situation the military could offer a premium for products to guarantee their delivery.[28]

Risk-Minimization and Commercial Business Practices

If the first assumption of CMI advocates is that many commercial product and process technologies are effectively dual-use, their second crucial assumption is that commercial business practices can be an effective replacement for government regulations. They believe that commercial market mechanisms for minimizing both technical and market risk will also keep costs down and quality and performance up in the context of defense acquisition. Their argument is that, while it still may be necessary to produce some (or even many) military items on purely military production lines, DoD could still benefit from taking a less bureaucratic approach to weapon system acquisition. In particular, some reformers have argued that DoD must become a "world-class" customer—and its suppliers "world-

[28]That this practice might be labeled war profiteering may make it a less-attractive strategy for the military *and* for industry.

class" suppliers—by adopting business practices characteristic of the very best commercial firms.[29]

Unfortunately, advocates as well as critics of CMI tend to differ in what they mean by "commercial business practices." There is therefore considerable confusion about what exactly DoD ought to do to achieve the benefits from such practices. We identify four major interpretations of commercial practice:

- Traditional—DoD's formal definition of all activities that can be provided by a nongovernment source as "commercial activities." Under this interpretation, defense contractor behavior that occurs only because a highly regulated approach to government contracting allows, encourages, or requires it is sometimes attributed to the commercial world in general.
- Textbook—the introductory economics textbook definition of commercial practice, in which firms rely on arm's-length competition based on firm-fixed-price (FFP) contracts to exchange products.[30] Such practices are most commonly found in markets involving generic goods and services, traded broadly and deeply, in which little specific investment or customization on either side of a transaction is required.
- Best—the commercial practices that characterize the firms recognized by their peers as being the best-managed firms in the world. A key element of this definition of commercial practice is flexibility, with the nature of business relationships and contract types adjusted to the complexity of the particular market. For complex, customized products, for example, such firms tend to emphasize strategic partnership rather than arm's-length contracting, with an emphasis on benchmarking, reputation building, and information exchange between buyer and seller.
- Official—commercial practice as defined in recent federal legislation, DoD acquisition reform initiatives, and changes in the FAR, particularly the introduction of FAR Part 12. This definition emphasizes expanded use of firm-fixed prices and best-value

[29]See, for example, Perry (1994).

[30]In the simplest textbook models, no contracts are involved; all transactions take place in spot markets.

competitions, as well as increased contractor management and control over design configuration and commercial-style warranties. A key element here is the idea that FFP contract structures allow commercial firms to stop collecting cost data from their suppliers, thus apparently eliminating a primary contributor to the regulatory cost premium.

Of these four interpretations of commercial practice, the "traditional" interpretation is clearly least relevant to CMI advocates—if not necessarily to their critics. Whatever it is that reformers wish to see, it is not the practices that defense contractors have developed over time in response to a highly regulated acquisition system, and we will not consider this interpretation further here. The "textbook" and "best" interpretations, however—each of which contains elements that are formally incorporated in the "official" interpretation—are both legitimate points of departure for devising DoD acquisition policies. Unfortunately, these two interpretations of commercial practice can have quite different implications for policy. Practices that may work well for highly liquid markets involving generic goods and services are much less likely to work well for markets in which products are highly customized and technical risks are high.

An example is pricing and the structure of supplier contracts. For those "textbook" commercial product markets in which contracts are common, FFP structures tend to dominate, for two reasons. First, because these markets feature products that are well defined and relatively homogeneous, with many possible buyers and sellers, relevant price information is readily available. FFP contracts work best when buyers and sellers can easily agree on appropriate price targets. Second, since both market and technical risks are minimal in this type of market, sellers are generally willing to cover cost overruns—because they have more information about and technological control over product development and production than do buyers.

On the other hand, in commercial product markets where technical and/or market risks are high and little price information is available, a multiplicity of fixed-price-type and cost-type contracts exists, allowing for various degrees of risk-sharing between buyers and sellers. In some markets, cost-plus-incentive-fee contracts similar to those still prevalent in DoD weapon system development programs are

common, requiring the buyer rather than the seller to pay for most if not all unexpected cost increases.[31] In other markets, partnering relationships substitute for arm's-length contracts, with buyer and seller working together to achieve mutually agreed-on price, quality, and performance targets. Within such arrangements, both risks and returns are often shared equally, with failure to continue the relationship as the ultimate penalty for missing desired targets.

Research suggests that the "best" commercial firms pay close attention to the characteristics of both products and markets.[32] Instead of a blanket insistence on particular contract forms, these firms flexibly adjust their sourcing strategies according to their perceptions of both the risk and value of the product concerned. Their arrangements with suppliers run the gamut from purchase order and credit card arrangements, to price-based and cost-based contracts, to long-term partnering agreements. For products deemed to be very high value as well as very high risk, a lack of relevant data may preclude contract types requiring the ability to determine prices based on market- or model-based information. To better manage their costs in these situations, the "best" firms often choose to establish close corporate relationships with a limited number of suppliers. Buyer and seller agree to share sensitive cost, technology, and resource data and to greatly reduce the degree of competition relevant to each of them. Mutual commitment—the symmetry of the deal—is important to the persistence of trust, and so key to the success of the relationship.

In sum, CMI advocates agree that commercial business practices can help keep costs down and product quality and performance up, whether or not the economies of scope and scale associated with dual-use production are achievable. However, differences in interpretation of "commercial practice" imply quite different policy rec-

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[31]In general, FFP contracts require suppliers to bear 100 percent of cost overruns, in contrast to cost-plus-fixed-fee–type contracts, which require buyers to bear 100 percent of cost overruns. In between these two polar cases lie a range of contract types with various arrangements for sharing risk. See, for example, the discussion in Rogerson (1992, pp. 11–12).

[32]See, for example, the undated corporate documents provided by John Deere, a commercial firm widely regarded for its innovative and effective supply management and purchasing policies. Recent RAND studies that explore DoD-relevant aspects of "best" commercial practices include Camm (1996) and Pint and Baldwin (1997). A non-RAND exploration of this topic can be found in Tang (1999).

ommendations. For example, CMI advocates who take a "textbook" view of the commercial world tend to assume there are a variety of price analysis techniques capable of revealing fair and reasonable prices for products of similar quality. They therefore advocate DoD adoption of FFP contract structures to help ensure that DoD obtains military items at those prices. In contrast, CMI advocates who want DoD to become a "world class" customer tend to encourage adoption of commercial practices that are "best" in the required context. They believe DoD can successfully establish relationships with some contractors that are based on mutual trust and benefit. They do not believe in the need for blanket adoption of FFP-type contracts to ensure protection against profiteering by unscrupulous suppliers.

EVIDENCE OF THE BENEFITS OF DEREGULATION

As mentioned above, several studies in the late 1980s and early 1990s indicated the existence of a large cost premium associated with the regulations governing defense acquisition. None of these studies rigorously quantified the premium, however, and none offered more than qualitative suggestions as to the biggest regulatory cost drivers. From a cost-benefit standpoint, there was no hard evidence to support decisions for or against throwing out either particular regulations or particular categories of regulations.

To get at this evidence, in 1994 former Secretary of Defense William Perry tasked a private consulting firm, Coopers & Lybrand (C&L), to undertake a detailed analysis of industry compliance costs. C&L joined with TASC, a systems engineering group with expertise in government procurement issues, to collect data at ten defense contractor sites.[33] Focusing on 130 DoD regulations and standards identified by the Section 800 Panel and others as major cost drivers,

[33]TASC became a fully owned subsidiary of Litton Industries in 1998. The ten contractors were Allison Transmission (General Motors), Beech Aircraft (Raytheon), Boeing Defense & Space Group, Rockwell Collins Avionics and Communications Division, Hughes Space and Communications Company (General Motors), Motorola Systems Solutions Group, Oshkosh Truck–Chassis Division, The Timken Company, Teledyne Ryan Continental Aviation Engine group, and Texas Instruments Defense Systems & Electronics Group (Raytheon). Some of these companies have since merged or been acquired by other entities; the new parent companies are in parentheses.

C&L/TASC concluded that on average DoD paid a regulatory cost premium of 18 percent.[34] The top ten cost drivers were found to account for about half of this cost premium; the top 24 accounted for 75 percent.

The official C&L/TASC findings were reported to DoD in December 1994 (C&L/TASC, 1994). In a series of follow-up studies, most of the DoD regulations and standards identified by C&L/TASC as driving up contractor compliance costs were also identified as major impediments to greater participation of commercial firms in DoD procurement, including dual-use procurement. In addition to commercial firms' apparent unwillingness to accept the extra costs associated with defense regulations, they were apparently reluctant to accept the governmental controls on profits and governmental access to proprietary technical and cost data required by DoD contracts.

The biggest contributors to the regulatory cost premium as well as the highest regulatory barriers to commercial participation appeared to fall within the following categories:

- Government access to commercially sensitive product cost and pricing data such as required by TINA
- Government-imposed accounting and reporting standards and systems such as CAS, Cost/Schedule Control System (C/SCS), and Material Management Accounting System
- Audit and oversight requirements such as Defense Contract Management Command program reviews, Defense Contract Audit Agency audits, and Contractor Purchasing System reviews
- Complex contract requirements and Statements of Work (SOWs)
- Mandatory socioeconomic source requirements
- Government ownership and control of technical data.

Most of these relate to contract structures or accounting and oversight procedures.

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[34] In several subsequent studies, estimates of the regulatory cost premium are much smaller. See Lorell (forthcoming) for a discussion of these estimates.

But C&L/TASC and the others were not asked to compare or quantify the possible effects of adopting alternative commercial-like approaches to the regulations they identified as budget-busters. As a result, there was no attempt to show, for example, whether fixed-price–type contracts—with no cost reporting requirements—would be better able than more traditional cost-type contract structures to control problems such as program cost overruns and performance shortfalls. Nor was there any attempt to analyze whether DoD would benefit from broadening its competitions to include more nontraditional suppliers or from restricting them to a select group of "preferred suppliers." Any of these arrangements is possible; all exist in the commercial world.

Further, while C&L/TASC and other groups studying the regulatory cost premium found large potential cost savings from deregulation of defense acquisition, they all conducted what economists call "partial equilibrium" analyses. That is, they assumed that the factors affecting cost elements such as materials costs and contractor profits would remain unchanged if government regulations were eliminated. The implications of deregulation for competition and market structure were ignored. Perhaps more important, their studies do not address the question of how deregulation might affect the quality or performance of military items. As discussed below, many critics of CMI believe regulation is essential for DoD to maintain qualitative superiority in any future war.

THE CRITICS' RESPONSE

CMI critics are skeptical of both the dual-use and deregulation claims put forward by advocates. With respect to dual-use technology, they argue that items such as computer chips and secure telephones are special cases that cannot be extrapolated to the broader military acquisition environment. In general, they do not believe DoD can become just one more customer within a large and diversified customer base. They believe that differences between the kinds of products required by military as opposed to commercial customers are inherently unbridgeable. With respect to deregulation, they reason that DoD's unique mission requirements and substantial political constraints make "commercial business practices," whether interpreted as "textbook" or "best," unsuitable for DoD. Finally,

some critics find that some aspects of CMI may be beneficial in theory, but they doubt the effectiveness of CMI implementation in practice either by DoD or by private-sector defense contractors.

Critics identify four sets of factors likely to cause CMI-based reforms to fail: factors affecting cost; factors affecting performance; factors affecting DoD implementation of CMI reforms; and factors affecting private-sector implementation of reforms.

Factors affecting cost. Factors identified by CMI critics as potential contributors to excessive cost under commercial-like acquisition programs include:

- Insufficient competition for DoD contracts
- Limited non-DoD sales opportunities for military items
- Parts proliferation resulting from elimination of Mil-Specs and increased contractor configuration management.

The possibility that a more commercial-like approach to acquisition will create opportunities for "excessive" contractor profits is a concern expressed by CMI critics. It is certainly true that, if DoD eliminates current restrictions, some contractors could earn much higher profits. In purely budgetary terms, these contractor profits should be irrelevant to DoD as long as they reflect declining costs rather than rising prices. But in political terms, large contractor profits could be difficult to explain to Congress and the tax-paying public. CMI critics worry that the elimination of DoD's profit policy could put the military services back in the situation they faced at the end of World War I, when Congress responded strongly and negatively to reports of wartime profiteering.

At some level, the key to this problem is competition: With sufficient competition, neither prices for weapons systems nor contractor profits will be "excessive."[35] But critics point out that DoD's current policy of paying for 100 percent of weapon system R&D effectively limits competition because the government cannot afford to pay the

[35]That is, defense contractors will earn a rate of return on investment that is comparable to returns earned in other competitive industries.

R&D for very many firms.[36] To increase the level of competition for DoD production contracts, therefore, one strategy would be to encourage contractors to finance a greater share of military R&D.[37]

Unfortunately, a second concern critics raise about a commercial-like acquisition strategy is that firms will refuse to do business with DoD unless either R&D cost recovery is guaranteed or the winners of production competitions are heavily compensated for their investment risk. The argument here is that, because military products and processes are not dual-use, DoD effectively acts as a single buyer. The replacement of 100-percent cost-plus R&D contracts with contracts incorporating greater degrees of risk-sharing will therefore prove unacceptable to firms because DoD cannot commit itself to future purchases. The financial incentives necessary to get firms to participate in weapon system contract competitions, CMI critics argue, will effectively wipe out any cost savings achieved by eliminating 100-percent cost recovery on military R&D. The more limited the potential for non-DoD sales, the higher the risk for which contractors must be compensated.[38]

Finally, a longer-term concern is that a commercial-like approach in which contractors are responsible for configuration management and control will result in parts proliferation. Specifically, critics argue that form-fit-function-test integration guidelines described in requests for proposals (RFPs) may be unable to prevent parts from becoming increasingly unique, so that the support and maintenance of weapon systems will become more and more expensive over time. In fact, some critics argue that parts proliferation could raise support costs even in the short term because small-lot production tends to lower production efficiency, increase maintenance training requirements, and increase record-keeping burdens. The counter to this argument is that the effect of diminishing manufacturing sources

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[36]The problem of insufficient competition becomes particularly pronounced at the engineering and manufacturing development (EMD) and production phases.

[37]A related concern is that if firms overrun costs under a fixed-price contract, DoD will be compelled to accept a price increase as political forces mobilize to prevent major financial losses to the company (i.e., a bailout).

[38]Non-DoD sales could include both foreign military sales and commercial sales associated with dual-use products and technologies.

(DMS) on Mil-Spec parts and components even more severely affects short- and long-term support costs.[39]

Factors affecting performance. According to CMI critics, factors that may contribute to inadequate weapon system performance under commercial-like acquisition programs include:

- Large differences between commercial versus military usage and/or environments
- Commercial quality assurance and testing practices that are too tolerant of product variability
- Insufficient government oversight of programs
- Too great an emphasis on system cost as opposed to performance.

Critics believe that all four of these factors may be exacerbated if private-sector contractors are allowed to manage and control the configuration of weapon systems.

Perhaps the primary concern about the commercial approach to weapon system acquisition is that it could result in systems that cannot perform their intended missions. In particular, CMI critics worry that the insertion of off-the-shelf commercial products—or even nondevelopmental items based on commercial designs—into military systems could cause those systems to fail in military environments. If the environment and usage for which commercial items are designed are much less demanding than their expected military environment and usage, performance problems are likely to occur.

Critics worry that the adoption of certain commercial quality assurance and testing practices may also cause performance problems, particularly for military applications that require very low product variability. Because of the large output volumes involved in mass commercial manufacturing, quality assurance in these types of settings tends to involve probabilistic approaches such as simulated reliability prediction models. Although much cheaper than DoD-style individual product inspections, these practices are not as thorough.

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[39]See the discussion in Chapter Five.

Therefore, for weapon system parts and components that have low error tolerances, probabilistic testing practices may not be appropriate. In response, advocates point out that total quality management (TQM) places primary emphasis on eliminating variability in production through total process control. TQM is now standard practice among the "best" commercial firms, and it is not clear that the traditional DoD approach to quality assurance works better.[40]

According to critics, unsatisfactory weapon system performance may occur more often in a commercial-like acquisition environment where, once qualified, there is comparatively little oversight of suppliers.[41] Suppliers may misunderstand DoD's requirements in the absence of Mil-Specs, or they may even attempt deliberate fraud. In the case of deliberate fraud, most commercial firms operate on the premise that extreme vigilance is more costly than the fraud deterred. In a military environment, however, the smallest degree of fraud may be unacceptable, not only because of the enormous human and military consequences of military equipment failure, but also because of the negative political repercussions from revelations of fraud, which may put future congressional appropriations for weapons programs in doubt.[42]

Finally, a somewhat more subtle concern about the commercial approach to weapon system acquisition has to do with the nature of commercial-world tradeoffs between cost and performance. It is not yet clear whether commercial approaches with their heavy emphasis

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[40]As pointed out by one of our reviewers, TQM and DoD quality assurance systems typically have different goals for reducing variability. DoD seeks to reduce variability to ensure future performance in demanding operating environments. The primary goal of most commercial TQM procedures is to reduce total ownership cost. Nevertheless, our reviewer argues that TQM programs can be developed that will reduce variability in any attributes of any part or system that DoD cares about.

[41]Oversight of suppliers can be far reaching in some commercial industries, but still tends to be less than that demanded by the U.S. government. In contrast to government, commercial buyers generally put a great deal of effort into choosing their suppliers. They then presume that the suppliers they have chosen will fulfill their contracts to the best of their ability. See, for example, the discussion of Boeing's relations with its suppliers in Sabbagh (1996).

[42]There are significant exceptions to this characterization of the "commercial world," including the civil aviation industry, the nuclear power industry, and various others. The importance of performance and safety requirements for civil aircraft is one reason why we chose the large transport aircraft industry for our case study in Chapter Six.

on reducing total ownership cost can produce the highly innovative, extremely high-performance technologies embodied in U.S. weapon systems such as jet fighters. The issue here is not so much failure to perform but rather failure to excel at warfighting. In certain military situations, having the best warfighting equipment, rather than merely good warfighting equipment, can make the difference between victory and defeat. In certain key weapon system programs, an overemphasis on cost could result in systems that are good but not good enough, thereby nullifying any cost savings achieved by adoption of a commercial-like acquisition approach. Another way of saying this is that, when implementing a CAIV approach to weapon system acquisition, DoD acquisition managers must realize that, in the commercial world, modest decreases in technical performance generally lead to only modest decreases in utility. In the military world, on the other hand, modest decreases in technical performance may lead to large decreases in military utility, with serious consequences for war-winning capability.[43]

Factors affecting implementation by DoD. CMI critics identify the several factors that may make it difficult for DoD acquisition managers to transition to a commercial-like acquisition strategy, including:

- Unclear statement of mission requirements by DoD leadership leading to poor understanding of performance, schedule, and cost priorities by acquisition managers
- Lack of familiarity with new and existing commercial technologies and standards and practices, and inadequate training to become familiar

[43]In a world of perfect certainty, in which the tradeoff between cost and performance were known exactly, this would not be a problem. In the certainty case, the processes of minimizing cost for given performance, maximizing performance for given cost, or balancing cost and performance to get the most cost-effective weapon system would be equivalent. The problem is that, in a world of uncertainty, the eventual outcome of a development program can be crucially affected by the emphasis placed on the different goals of the program. A program in which developers are urged to worry about cost will likely result in a lower-cost, lower-performance product than one in which developers are urged to worry about performance. If modest changes in performance lead to major changes in utility, commercial approaches to acquisition, which tend to have a strong emphasis on reducing cost, may be problematic.

- Inadequate mechanisms for DoD acquisition managers to communicate preferences and priorities to contractors
- Poor managerial incentives for DoD acquisition personnel.

A commercial approach to weapon system acquisition would put considerable responsibility on the shoulders of DoD program managers and acquisition personnel. In contrast to the system based on Mil-Specs, for example, the commercial approach gives contractors latitude to design a variety of engineering solutions to a particular performance requirement. Therefore, instead of merely verifying that proposals meet Mil-Specs and are the lowest bid, in a more commercial-like setting acquisition personnel must be able to judge both the cost-performance value of the contract and the adequacy and plausibility of particular technical solutions.

These judgments require that DoD managers have a thorough understanding of each system's intended missions at an early stage in the process in order to prioritize and communicate them to contractors. This is particularly true given DoD's renewed emphasis on CAIV. Performance requirements must be widely disseminated to ensure the participation of firms that could provide potentially superior solutions.

But the tradeoffs between various performance requirements are many-dimensional, and their implications for design and engineering decisions may be difficult to determine. Commercial technologies and standards may not translate easily to military applications. At least initially, a severe handicap for acquisition managers will be that, for any particular program, the probability distribution of outcomes based on commercial solutions is unknown. Further, there may be requirements embedded in existing Mil-Specs that do not get effectively included in performance requirements documents, because of a lack of institutional memory or simple oversight. Critics believe that, despite the best efforts of acquisition personnel and contractors, the selected solutions may not be optimal.

The risk of choosing the wrong technical solution increases greatly if DoD is not able or willing to bear the costs of adequate training. For example, if DoD personnel do not participate in the formulation and maintenance of international commercial standards, they may not know how to interpret or apply them in evaluating proposals. If DoD

is unwilling to pay the upfront costs of participation in mechanisms for communicating its preferences, such as IPTs, it increases the risk that such communication will be inadequate. In addition, a lack of personnel trained to devise requirements tradeoffs, prepare RFPs, and select sources is at minimum likely to delay desired weapon system purchases.

Finally, critics believe that one of the most difficult problems facing DoD is how to create incentives that will encourage acquisition managers to support the new commercial approach wholeheartedly. Under the old system, managers were rarely rewarded if they chose low-cost solutions or solutions unfamiliar to DoD. Further, the adversarial acquisition environment taught DoD managers to distrust contractors. Learned behaviors such as these may be difficult to unlearn. Functional specialists such as contract managers, who have invested heavily in the old system, may require new training programs at considerable resource cost.[44]

Factors affecting private-sector implementation. Factors that may make it difficult for private contractors to transition to a commercial-like acquisition strategy include

- High and unrecoverable transition costs
- Resistance to increased competition and fear of losing specialized advantages
- Distrust of the political process.

The implementation risks associated with the private-sector transition to a commercial approach may also be considerable. Established defense contractors may be unwilling to spend the resources necessary to make a successful transition, particularly if they believe the costs of transition to be unrecoverable. For example, the

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[44]As pointed out by a reviewer, these sorts of implementation-related concerns are probably always present in situations involving large institutional changes. The issue is therefore, not whether change is necessary, but rather whether DoD has properly prepared for it. Policy questions include

- What needs to change to make the new method work?
- How can we know when it is ready?
- Can we test it incrementally to limit the risk of moving into it?

transition to process quality control assurance, activity-based accounting methods, and full participation with DoD personnel in standards groups will require considerable private investment. Industry may also be resistant to participation in arrangements such as IPTs and Cooperative Research and Development Agreements (CRADAs) because they fear loss of trade secrets or other competitive advantages.

In fact, many private military contractors may have good reasons to prefer the old acquisition system to a commercial approach. Established contractors have experience in dealing with the old Mil-Spec system and have invested in large bureaucracies trained in the intricacies of government contract procedures. Why should they level the playing field and give new entrants equal access to the weapons business? Further, after so many years in a heavily regulated environment, defense contractors may not wish to incur the "organizational stress" of a fundamental change in the way they operate. In a commercial environment, their own lack of experience might put them at a disadvantage relative to aggressive newcomers.[45]

Finally, there may be historical reasons for contractors to prefer the protection of an arm's-length relationship with DoD. As mentioned above, in the 1920s and again in the 1960s and 1970s there was a strong political backlash against the perceived "cozy" relationship between DoD and its major defense contractors. It is entirely possible that commercial-world practices such as source selection based on "best value" criteria could once again lead to the anti-contractor political animus of earlier periods.

CONCLUSION

Efforts to reform the U.S. military acquisition system are almost as old as the system itself. As indicated in our brief historical review, many if not most past efforts have either failed to achieve their intended objectives or have achieved their objectives (such as discour-

[45]Again, some of the implementation risks outlined above are inherent to any transition process. To the extent that commercial firms have had to face similar sorts of restructuring in the past, they may have already developed mechanisms to deal with them.

aging fraud) at the expense of themselves introducing new problems (such as costly oversight regulations) into the system.

But the new group of acquisition reformers, who base their reform strategies on CMI, believe that their efforts will succeed where previous efforts have not. Their arguments rely heavily on the assumptions that, first, there is a large dual-use technology base waiting to be tapped by DoD, and second, that commercial business practices can effectively replace the current superstructure of acquisition regulations.

So far, however, there is little systematic empirical support for or evidence against these assumptions. In the chapters that follow we help to fill this gap with a series of relevant case studies.