

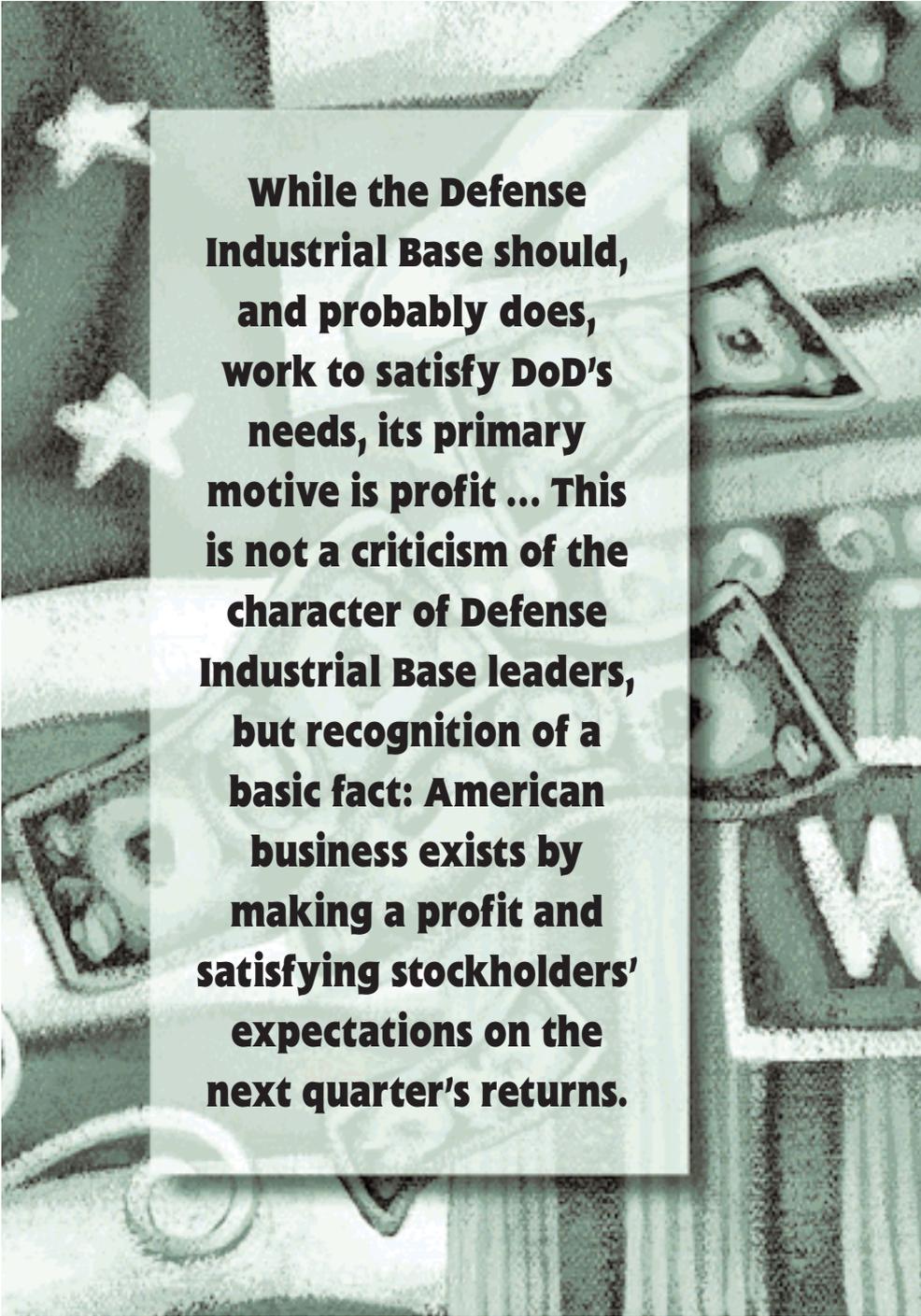
Defense Acquisition Needs to Change Course

Why? Because The Landscape Has Changed — Dramatically!

PHIL W. BOLIN • JAMES S. O'BRASKY

The defense acquisition landscape has changed more than most people think. The Department of Defense (DoD) needs to take additional steps to improve the process of acquiring U.S. defense products. The landscape we refer to includes five interacting components that support U.S. defense forces: funding and leadership; the Defense Industrial Base; the Revolution in Military Affairs; the Revolution in Business Affairs; and people. For this article, we focus on the following five issues:

- Funding decisions over the past decade have put DoD in a “Catch-22” situation. DoD has foregone modernization to fund operational readiness; aging equipment together with other requirements now place an ever-increasing burden on available funding.
- The diffusion of military and economic power creates a difficult environment for U.S. leaders to define a clear strategy and gain sufficient funding to support the military.
- The Defense Industrial Base has changed; consolidation, high company debt, and unstable military purchase plans require that the Defense Industrial Base shift its focus to other business areas and seek stronger influence with Congress. DoD needs to reconsider its approach to this “new” entity.
- DoD’s approach to the new environment — a combination of the Revolution in Business Affairs and the Rev-



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olution in Military Affairs – is only the start of what needs to be done.

- A near-term shortage of senior science and engineering technical personnel should be cause for alarm as the Department continues its efforts to reform the acquisition process.

The Current Situation

After four thousand studies, a dozen major commissions, and hundreds of laws and regulations, efforts are still on-



going to improve the DoD acquisition process. In view of recent changes in the Defense Industrial Base and the current environment, we sought to determine if the current Department of Defense/Department of Navy (DoD/DoN) acquisition policies were really effective in supporting the warfighter. We concluded that, while some success is evident, more could be done.

To reiterate a tired but true refrain heard repeatedly in recent years, funding has decreased dramatically throughout DoD. A review of two major military funding categories highlights the real implications for defense: Operations and Support (O&S) and Modernization. O&S includes funding to support the operating forces and pay for military personnel; modernization funds include procurement and research and development.

In DoN, O&S funding fell 27 percent from \$75.7 billion in 1990 to \$55.3 billion in 1999 (constant 2001 dollars). Investment funding fell 42 percent in the same period, from \$52.7 billion to \$30.5 billion. Not surprisingly, force structure also fell during this period, with the number of battle force ships reduced by 44 percent.

A reduction in forces and funding could be expected after the United States won the Cold War. However, two factors argue that the reduction in O&S funding is even more severe than shown by the raw numbers.

Less O&S Dollars to Operating Forces

First, in a study on O&S funding, the Institute for Defense Analyses (IDA) found that O&S funds spent on items “less-related” to combat forces increased from twenty cents on the dollar to thirty cents on the dollar.¹ For purposes of the study, IDA grouped O&S funding into three categories: those funds applied directly to forces; those funds less related to forces such as environmental compliance, health, and administration; and funds to support other nations. It comes as no surprise that environmental compliance and health costs have increased, as those items are of national interest.

Worthy of note, however, is the fact that less of each O&S dollar is actually allocated to *operating* forces.

Aging Military Force

Second, complicating the funding reductions is an aging military force. One of many examples of this fact is that the average age of U.S. Air Force planes is 20 years, even though they were designed for 15 years of service life. Even with planned procurements, former Under Secretary of Defense (Acquisition, Technology and Logistics) Jacques S. Gansler predicted that the average age would grow to 30 years before modernization could be achieved.

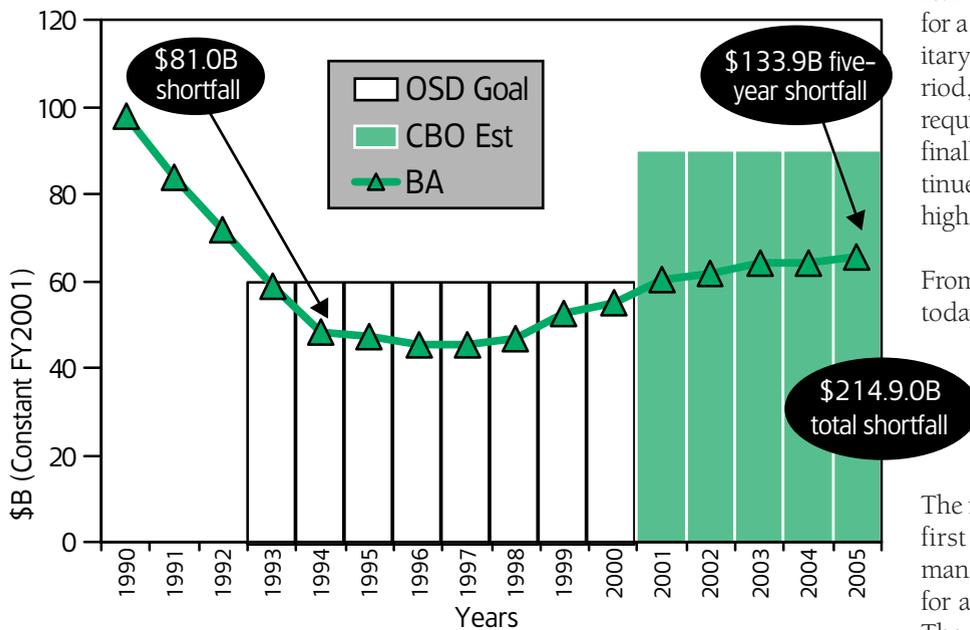
Noting that a lower percentage of O&S funding is reaching an aging operating force, Army Gen. Henry Shelton, Chairman of the Joint Chiefs of Staff, told the Senate Armed Services Committee Sept. 27, 2000, that, “We are collectively robbing Peter to pay Paul, or robbing modernization ... to pay for current readiness.”

How “robbing Peter to pay Paul” affects modernization is highlighted by several facts. In 1997, the *Quadrennial Defense Review* stated that 1996 procurement was \$18 billion less than called for in the *Bottom-Up Review* plan. To compensate, the Office of the Secretary of Defense (OSD) developed a goal to provide \$60 billion per year for military procurement. As time passed and procurement continued to be pushed into the out years, this procurement goal became a target to achieve in the fiscal 2001 budget.

In September 2000, the Chairman of the Joint Chiefs of Staff stated in testimony to Congress that \$60 billion was no longer sufficient. He did not say how much was sufficient; however, the Congressional Budget Office (CBO), a non-political source, did. This group reviewed current forces and concluded that \$90 billion in procurement funds would be required to maintain current force levels.

Figure 1 shows the relationship of these procurement issues. The executed and planned budget authority since 1990 is

FIGURE 1. Budgets — A Historical Perspective



Source: ABC News (www.abcnews.go.com/sections/us/DailyNews/militaryspending), "Mounting Defense Dollars," by David Ruppe, Sept. 27, 2000, and CBO, "Budgeting for Defense: Maintaining Today's Forces," Sept. 2000.

shown in relation to the \$60 billion OSD procurement goal and the CBO's study on maintaining current forces. The CBO figure of \$90 billion supersedes the OSD figure in fiscal 2001, the year the Chairman of the Joint Chiefs of Staff stated \$60 billion per year was not sufficient. The shortfall between actual and planned procurement from 1993 to 2005 totals \$214.9 billion, nearly 75 percent of a full year's budget.

O&S funds are not paying for maintenance without robbing from modernization, thus leaving insufficient funds for modernization. This is a true Catch-22 situation that will require sound analysis and strong leadership.

How does DoD obtain the necessary funding? As will be explained later in this article, DoD claims that the Revolution in Business Affairs will pay for a Revolution in Military Affairs—in effect solving the problem. Before accepting or rejecting this claim, however, a review from a historical perspective is instructive.

Funding and Leadership

Funding for the military is available when its leaders present a clear strategy. Fig-

ure 2 provides a summary of the DoD budgets since 1945, annotated with historical events.

In the aftermath of World War II, U.S. leaders debated our national interests. Shaken by the communist takeover of China and the Soviet's test of the atomic bomb, President Truman requested a comprehensive analysis of Soviet and American capabilities. The result was National Security Council (NSC) 68 that precipitated a massive military buildup and an increase in funding for the armed forces in an effort to contain the communist threat. NSC 68 was a clear strategy for the U.S. military, articulated by our leaders to Congress and the American people. It shaped actions for the next 20 years.

Vietnam was the watershed of this strategy. Budgets dropped, and the military entered a period best described at the time as a "hollow" force. It took another clear strategy to bring the military back. The tragedy of the failed Iranian Hostage crisis visualized to the American people the military's state. Whether or not the event was, in fact, a reflection of a hollow force, it became a symbol of such. Starting with President Carter and fol-

lowed forcefully by President Reagan, a real effort began to rebuild the military for a purpose: to win the Cold War. Military budgets increased during this period, even though deficit spending was required for that funding. Budget deficits finally dampened the appetite for continued increases, but budgets remained high until the end of the Cold War.

From the end of the Cold War through today, the United States has not been able to articulate a clear vision for the military. Evidence of this inability comes from the *Quadrennial Defense Review* in 1997.

The review addressed two options. The first was to prepare for near-term demands, and the second was to prepare for a regional competitor in the future. The end result was a compromise that directed the military down the middle road of the two options. This compromise position was likely a reflection of the diffusion of economic, political, and military power in the world. There were no longer two strong and ideologically opposed countries in the world. It was difficult to prepare a clear vision for U.S. forces. Nevertheless, the fact that a clear vision was hard to articulate does not mean that it was unnecessary.

Using the historical view, one could argue that U.S. military budgets would continue to meander on the road of compromise until a clear strategy for the U.S. military force is presented to the Congress and the American people. While it may be difficult work to articulate a strategy, it clearly is needed, and is the first action necessary to stop "robbing Peter to pay Paul." History says this is so.

Defense Burden

Yet another historical issue bears discussion. What is the defense burden on our Gross Domestic Product (GDP)?

The Commandant of the Marine Corps, in several statements and testimonies to Congress, reported that over the last 60 years, DoD military budgets have averaged 8.8 percent of GDP; during the Cold War, they averaged approximately 5 percent of GDP. Today, the burden is

nearly 2.9 percent. A host of countries with fewer global responsibilities than the United States spend the same or more of their national treasure on defense. The United Kingdom and France spend 2.9 percent, Turkey and Greece spend 4 percent, and several Persian Gulf countries spend 12 percent of their economic output on defense. It may be time to discuss the military's role in national security and not simply defense.

Further, the funding implications of small changes in the percentage of the U.S. economy spent on defense demonstrate the very minor burden a properly funded military would be on the American people.

Figure 3 shows the relationship between level funding for defense (fiscal 2001 constant dollars) and funding defense at 3 percent and 2.8 percent of a GDP that is growing at a 3 percent annual rate. This 3 percent annual growth rate for the GDP is less than the economy has grown for the last decade.

Setting defense funding at 3 percent of GDP would provide an average of \$53 billion a year over level funding, and \$22.7 billion a year over a funding level of 2.8 percent of GDP. Just two-tenths of 1 percent – the difference between 3 and 2.8 percent – provides \$227 billion in 10 years (the approximate procurement backlog). Predictions and estimates are never exact, but the implication is clear. *For a very small portion of our national treasure, the military can be properly funded.*

History tells us that a clear strategy is needed to ensure funds for the military, and that the strength of the U.S. economy makes proper funding a very small burden on the American people. Yet, funding problems persist. Before drawing conclusions, however, a review of the Defense Industrial Base and DoD's approach to the problem is necessary.

The Defense Industrial Base

Whether the United States moves forward with a clear strategy or meanders on the path of compromise, the Defense Industrial Base will continue to play a critical role in providing the warfighters' needs.

Four major changes have occurred with the Defense Industrial Base that redefine the acquisition landscape. These

War II were not on the contractor list for the Korean War.

The United States needed guns and butter after the war, not just guns. The commercial sector needed to supply goods for the U.S. population. The military needed supplies to support plans to deal with the communist threat. The United States shaped the defense industry, a subset of the U.S. commercial industry,

to provide armaments for the military. Rules and regulations from government were legislated so the Defense Industrial Base could be effectively controlled. This controlled environment developed from various reform efforts undertaken due to real and imagined problems with the Defense Industrial Base. (Remember the \$600 toilet seats?)

As the Cold War ended, the shape of the Defense Industrial Base changed. The number of companies in the Defense Industrial Base decreased as major players exited. The U.S. economy was growing, and companies such as GTE, Hughes Electronics, Magnavox, and Phillips decided their best potential was in the commercial world, which had the effect of setting them apart from being a gov-

ernment client "whipped" by DoD's changing requirements and unstable funding.

In the 1990s, DoD policy fostered consolidation to reduce excess capacity for those remaining in the Defense Industrial Base. The consolidation was also used by some companies to retain as large a share as possible of what was left of military procurement orders. The companies were, in essence, buying the orders already on the books of the companies that they were acquiring.

The consolidation was drastic and reported on by John Tirpak in his "Distillation of the Defense Industry." He re-

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changes argue for reconsideration of DoD's approach to the Defense Industrial Base. These changes include: a massive consolidation of the Defense Industrial Base, financial problems for most of the Defense Industrial Base companies, a requirement for new processes to be developed along with product development, and a shift in research and development patterns.

Consolidation — From 1947 to Today

During World War II, the entire U.S. industry was mobilized to provide defense needs. After World War II, a large portion of U.S. industry returned to commercial enterprises. Thirty-seven of the leading 100 defense contractors of World

ported that 51 companies working in the aerospace industry during the mid-1980s were now consolidated into five large defense contractors: Lockheed Martin, Boeing, Raytheon, Litton, and Northrop Grumman. This concern over the consolidation caused the Justice and Defense Departments to thwart the Lockheed Martin and Northrop Grumman merger; they were concerned that the combination would create a virtual monopoly in some areas.

Financial Concerns

The consolidation of the Defense Industrial Base could be argued a reasonable business decision, aside from the near monopolies. The companies could improve efficiency and eliminate excess capacity. However, the financial performance of the Defense Industrial Base during the late 1990s indicates the anticipated efficiencies were not achieved. A Defense Science Board report on the Defense Industrial Base in April 2000, reported that the debt-to-equity ratio rose substantially, surpassing the Standard & Poor's (S&P) industrial average as the heavy merger activity continued. Return on equity averaged 12 percent below the S&P industrial average from 1996 to 1998.

During the latter half of 2000, some would argue that the financials of the Defense Industrial Base companies reflect improvement, even while the stock market indicates a general downturn. However, even though Lockheed Martin had a better-than-expected fourth quarter for 2000, it failed to stop the company from sliding into a full-year deficit of \$519 million.

That the companies perceived a problem is fairly clear from their actions. First, they worked to increase their access to Congress, the source of funding for their military programs. The Center for Responsive Politics reports that from 1991-

97, the Defense Industrial Base spent \$32.3 million in lobbying efforts – more even than the \$26.9 million spent by the troubled Tobacco Industry.

Second, the Defense Industrial Base started looking hard at commercial avenues for their products. In September 2000, Boeing received approval to buy

DoD needs to reconsider the character of the Defense Industrial Base; understand its need for reasonable profit; know that it will react to decisions based on its need to stay in business and satisfy shareholders; and finally, DoD needs to develop incentives and a healthy, realistic attitude toward what the Defense Industrial Base can and cannot do.

Hughes Satellite Division, a \$3.75 billion acquisition. This acquisition, reported by the *Wall Street Journal* on Sept. 27, 2000, relates to commercial applications as much as to defense work. Another example is TRW, which licensed an integrated circuit technology used in military applications to RF Micro Devices Inc., of Greensboro, N.C. RF Micro Devices is using the technology in commercial applications with customers such as Nokia, NEC, and Motorola.²

Seeking outlets for its capabilities is a normal course of action for a business seeking to maintain its value and profitability. These efforts, although steps required for a company's viability, add complications to its work for the government. In gaining approval for the Hughes Satellite Division purchase, Boeing had to create firewalls in the company to protect competition, and Boeing was prohibited from supplying systems engineering to a specific classified Pentagon program.

We would argue that firewalls and procedural rules on how to supply goods to the government are not conducive to a competitive environment. Coupled with a near monopoly in some areas and increased access to Congress, it suggests the ability of the defense industrial base to influence what the government buys has increased considerably.

New Manufacturing Processes

Another dimension of the changing playing field with the Defense Industrial Base is that technology advances now provide the ability, indeed mandate, that new manufacturing processes be designed for development of products. New technology provides the capability to easily study manufacturing processes. In the F/A-18 E/F program, Boeing designed new processes for product development in certain sections of the plane.

The result, reported by the F/A-18 Program Office, was 33 percent fewer parts, 69 percent man-hour savings, and a 42 percent weight savings in those areas where a new process was designed. Additional coordination is now required to ensure the best process is followed for new products. Done correctly, it can save money and time, but it complicates the coordination required between industry and government at a time when Defense

Industrial Base influence is increasing considerably.

Research and Development

As the Defense Industrial Base works for profitability and stability, its Research and Development (R&D) expenditures have fallen. From 1994 to 1999, R&D spending as a percentage of sales has dropped from over 4 percent to just over 3 percent.³

The reduction in R&D is not large, but since R&D spending provides the innovation mandatory to our military, we find it troublesome that the Defense Industrial Base, the main military supplier, is spending less on R&D. And this is occurring at a time when total commercial-base R&D spending is increasing.

DoD is a significant player in R&D, devoting 14 percent of its budget to these activities, but the funds expended are becoming an ever-smaller share of total R&D expenditures. In 1981, the commercial industrial base, not just the subset called Defense Industrial Base, surpassed the Federal Government in R&D spending, and in 1998 fully 82 percent of the \$201 billion expended on R&D in the United States was being accom-

plished by commercial industry. This increase in total commercial R&D spending is a new aspect to R&D, and the results of this effort can be useful to the military if DoD can determine how to gain access to the appropriate results. (Source: National Science Foundation.)

These four changes (consolidation, financial concerns, new manufacturing processes, and R&D) affect the balance among the players in the defense acquisition community and suggest a different approach by DoD is required. While the Defense Industrial Base should, and probably does, work to satisfy DoD's needs, its primary motive is profit. In the current period of financial strain, this bottom-line profit motive can result in actions and appeals to Congress that may not be in line with the best interests of the warfighter. This is not a criticism of the character of Defense Industrial Base leaders, but simply recognition of a basic fact: American business exists by making a profit and satisfying stockholders' expectations on the next quarter's returns.

The changes to the Defense Industrial Base have not been in total isolation. DoD has modified its approach to acquisition and supplying the warfighter.

During his tenure as Under Secretary of Defense (Acquisition, Technology and Logistics), Gansler reported that DoD is using a two-pillar approach to supply the warfighter. The first pillar is a Revolution in Military Affairs (RMA). The second pillar, a Revolution in Business affairs (RBA), is expected to pay for the RMA.

Revolution in Military Affairs (RMA)

An RMA is defined as what occurs when the application of new technologies into a significant number of military systems combines with innovative operations concepts and organizational adaptation in a way that fundamentally alters the character and conduct of conflict.⁴

History records at least nine RMAs, starting with the Infantry Revolution in 1337 and continuing with the Artillery, Sail and Shot, Land Warfare, Naval and Nuclear Power Revolutions, just to name a few. Andrew F. Krepinevich studied these revolutions and found four essential elements of a true revolution, namely:

- Technological change was present.
- The technology was applied to systems.
- Operational innovation occurred to take advantage of the technology.

FIGURE 2. Industry vs. DoD

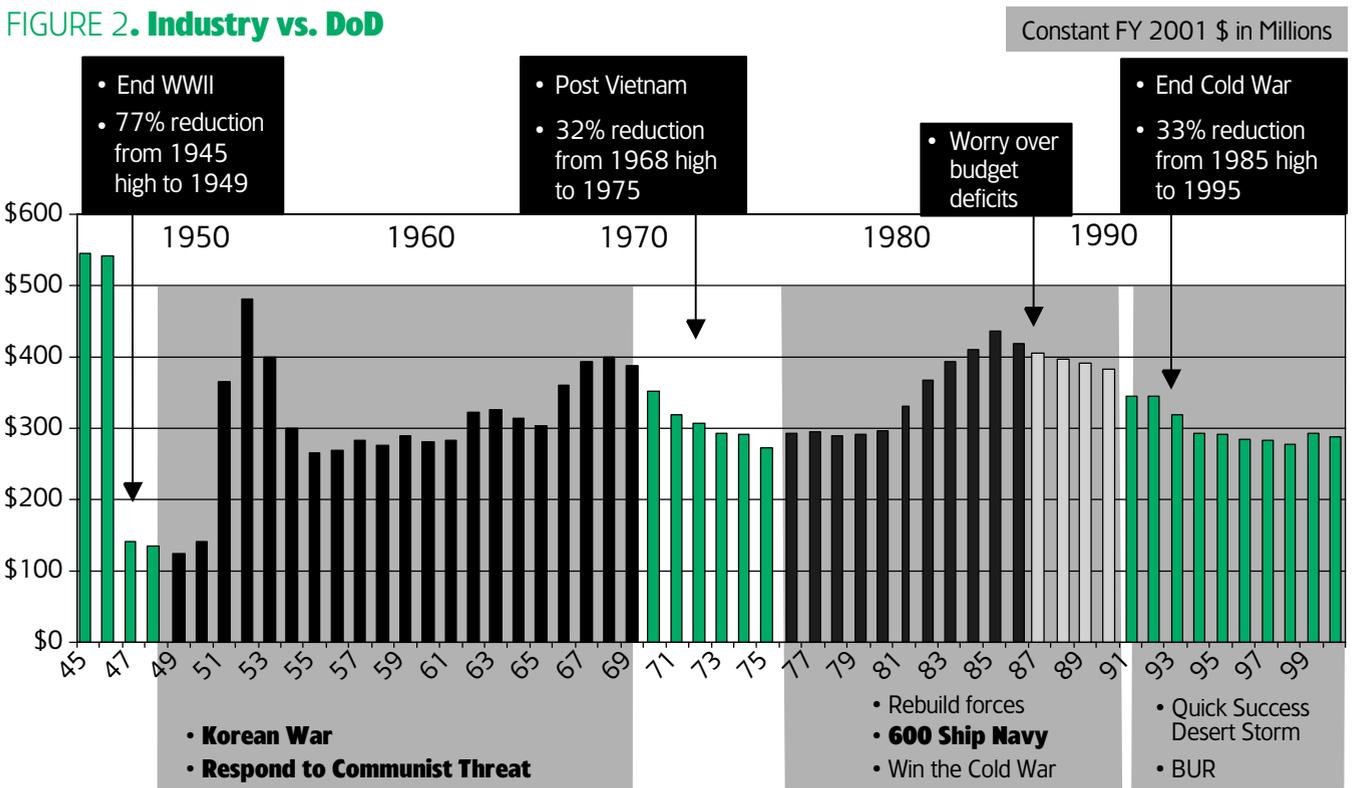


FIGURE 3. Level Defense Funding in Comparison to Funding as a Percentage of GDP

Fiscal Years*											
Item	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	Totals
GDP	\$9,925.7	\$10,223.5	\$10,530.2	\$10,846.1	\$11,171.5	\$11,506.6	\$11,851.8	\$12,207.4	\$12,573.6	\$12,950.8	
Level (constant \$) Funding of Defense	\$287.8	\$287.8	\$287.8	\$287.8	\$287.8	\$287.8	\$287.8	\$287.8	\$287.8	\$287.8	\$2,878.0
2.8% of GDP	\$277.9	\$286.3	\$294.8	\$303.7	\$312.8	\$322.2	\$331.9	\$341.8	\$352.1	\$362.6	\$3,186.0
3% of GDP	\$297.8	\$306.7	\$315.9	\$325.4	\$335.1	\$345.2	\$355.6	\$366.2	\$377.2	\$388.5	\$3,413.6
Difference in 10 years between funding at level constant dollars and 3% of GDP = \$535.6B					Difference in 10 years between funding at 3% of GDP and 2.8% of GDP = \$227.6B						

Source: National Defense Budget FY 2001, March 2000. FY 2000 GDP escalated at 3% per year.
 * FY 2001 Constant Dollars. Level funding amount is the FY 2000 DoD BA in constant FY 2001 dollars.

- The organization adapted to the change.

The lesson here is that technology only makes the RMA possible; the other elements are required to effect a true revolution.

The clearest example of the requirement for operational and organizational adaptation comes from the Artillery Revolution. Krepinevich explains that “although Roger Bacon’s recipe for gunpowder dates to 1267, cannons only began to appear on the European battlefield in significant numbers some 60 years later.” Even after the development of cannons, it was not until the early 1400s that they were used to defeat cities’ defenses and allow victory before the cities’ supplies were depleted, which had been the normal operational plan.

The evidence is clear that DoD is addressing the first two ingredients of an RMA. The new technology and its application to systems gave the United States precision weapons in Desert Storm. However, we could find no clear evidence in DoD of major efforts to consider the last two important aspects of an RMA: operational innovation and organizational adaptation. History has shown that innovations in operational tactics and doctrine – making use of the technology – can improve effectiveness of the technology. Germany’s use of the blitzkrieg tactics in World War II is a clear example of the significance of operational use of new weapons.

Focusing on the last two requirements, to effect an RMA with respect to precision strike technology could be very beneficial. Operational innovation in this area may include more dispersed operations to reduce vulnerability or making the decision to employ precision weapons from fewer types of units. Does every plane and ship in the U.S. inventory that has an older-type weapon need a precision weapon? Organizational adaptation discussions may uncover new or fewer force packages to deliver the weapons, and a restructure and reduction in current staff organizations to control the weapons’ packages. These possibilities are probably not the “answer,” but focusing on all four RMA components will allow warfighters to work toward the correct solution.

With U.S. technological know-how, reliance on an RMA to help supply warfighters’ needs is appropriate. To actually make it happen, however, may require a stronger focus, again, on two necessary aspects of an RMA, namely: operational innovation and organizational adaptation. Beyond that, and vitally important is the funding required to execute an RMA. That brings us to the second pillar of DoD’s approach.

Revolution in Business Affairs (RBA)

As previously mentioned, DoD states that its RBA will pay for the RMA. The RBA is basically the current term for an acquisition reform process. Acquisition reform has been going on in the defense arena ever since George Washington’s day. Today’s reform goals are not differ-

ent than those in Washington’s day: field high-quality defense products quickly; support them responsively; and lower the total ownership cost and reduce the overhead cost of the acquisition and logistics infrastructure. In these last 200 years, 900 General Accounting Office (GAO) reports, 12 major commissions, and 4,000 studies have focused on how to improve military acquisition. All of them recommended improved business practices. None of them have been very effective.

A 1993 reform study that reviewed cost growth in major programs from 1960 to 1990 revealed an average 20 percent cost growth on programs, with no major change over time. In 1998, a study was performed on the results of the Packard Commission initiatives. The studies looked at cost growth before and after the initiatives were in place and found a change – overruns *increased* to 9.5 percent from under 6 percent *after* the initiatives were in place.⁵

Today’s Reform

Today’s reform started in 1993, and as reported in a Defense Systems Management College (DSMC) study by Raymond W. Reig, should have started showing results in mid-1996. Reig reported that today’s reform changed more than 200 sections of law, initiated Process Action Teams, and developed pilot programs to demonstrate results. In 1993, the Government Performance Results Act (GPRA) was passed. This Act holds federal agencies accountable for results and requires them to develop a strategic

plan, a performance plan, and report yearly on their performance. It helped put some teeth in current reform efforts.

Reviewing results of today's reform in reports required by the GPR, we found the greatest success in areas where information technology could be applied to the problem. DoD set a goal of reducing logistics response times from 36 days in fiscal 97 to 18 days by fiscal 00. The Department achieved its goal by fiscal 99. Likewise, DoD increased total asset visibility from 62 percent in fiscal 97 to 94 percent in fiscal 99, after setting a goal to reach 90 percent in fiscal 00. These are but two examples where better information flow and control helped reform aspects of defense acquisition.

However, in DoD's efforts to minimize cost growth in major defense programs, the Department has not been as successful. The goal to achieve a cost growth of less than 1 percent per year produced uneven results from fiscal 95, and in fiscal 99 the cost growth was over 3 percent. The DSMC study mentioned earlier puts these results into perspective. Reviewing over 500 federal programs, 52 of which were DoD programs, Reig found that DoD's cost growth was in the middle of the sample. Fully 294 other federal programs had higher cost growth. This suggests that development of major programs is risky. Engineers do not have perfect future vision. Problems may arise. And this sample supports an argument that DoD is as good as the rest of the Federal Government in producing new equipment and systems.

A final word on today's acquisition reform results can be taken from a July 2000 GAO report, which concluded that acquisition costs are still high, but opportunities abound to adopt techniques used by private industry to continue improving the system.⁶

It appears the DoD approach to acquisition reform – the RBA – is achieving good results in areas where information technology allows better information flow and control of data; but, the RBA is still facing major hurdles in the “big

dollar” areas such as bringing major programs to operational capability.

Many numbers are passed around in the press to show cost savings and cost avoidance. However, the true test of whether the RBA is paying for the RMA is the DoD budget. GAO's study of the fiscal 2001 budget concluded that the expected savings from RBA efforts did not materialize to fund the \$60 billion needed for modernization. GAO states that DoD has underestimated costs of day-to-day operations and did not fully achieve savings projected for efficiency-enhancing initiatives. Therefore, funding for modernization, which did reach \$60 billion in fiscal 2001, came from increased budget authority. In effect, the RBA did not pay for the RMA.

Continuing the Effort

DoD has two options to improve the system with regard to major programs.

Best Business Practices

First, the Department can continue its effort to identify best business practices and start using them. This has been effective in DoD in several areas. DoD applied information technology to asset visibility and logistics response time. This allowed savings yet maintained DoD control. In the Joint Standoff Weapon (JSOW) program, DoD effectively implemented the Cost As an Independent

Variable principle. While maintaining key performance parameters, cost was reduced by 55 percent, while weapon coverage was only reduced by 5 percent. These examples, from various Navy and DoD sources, demonstrate benefits from use of the proper business practices within DoD and DoN.

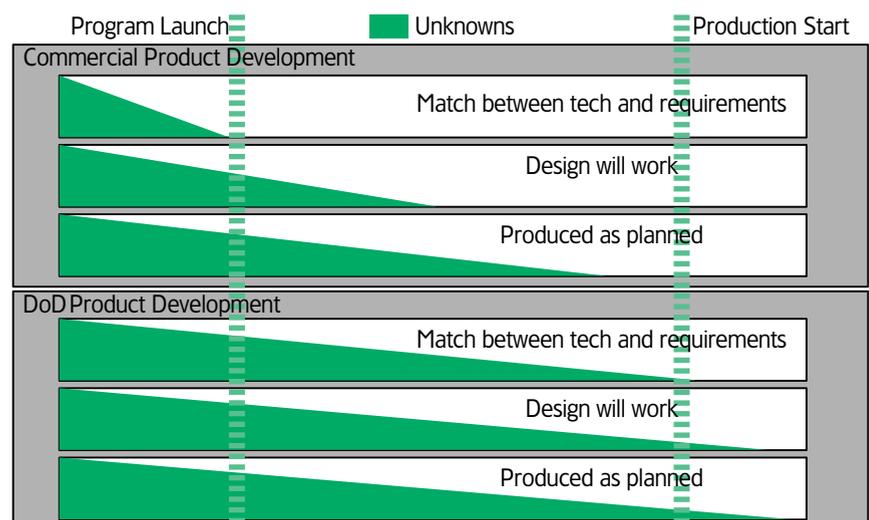
Full Service Contracting

A second approach, currently being enacted by the DoN, is to let industry take over the entire responsibility for a program. In the new DD 21 program, DoN is pursuing a Full Service Contracting approach that allows industry to handle the weapon system from cradle to grave.

Reviewing this approach is reminiscent of the McNamara days when the Total Package Procurement (TPP) program was implemented. Robert E. Gray and Kenneth G. McCollum studied the TPP approach that was used on the C-5A, F-111, LHA, and DD-963. The process was a disaster. They reported that the C-5A doubled in cost, and only 81 of the 167 planes were built; the cost growth for the F-111 was 385 percent; and Initial Operating Capability slipped two years for the LHA, and the cost growth was 172 percent.

The problems stemmed from the inability to completely define requirements and identify the unknowns in new tech-

FIGURE 4. Procurement vs. Requirement



GAO Testimony, “Defense Acquisition: Improved Program Outcomes are Possible,” NSIAD-98-123

nology. When these problems arose, the businesses involved dealt with them from their primary objective of maintaining a viable company; they fought to be paid for effort expended. The opposing view from the government was to obtain the final product at the prearranged price. The end results were the delays and overruns just reported.

Should DoD continue with the DD-21 Full Service Contracting, it remains unclear whether real savings will occur. Basic business goals have not changed, and requirements are still hard to determine. Further, DoD will have to deal with parallel infrastructures: one for the Service to support older ships, and a second where industry supports the DD-21. And today, with a near monopoly in defense suppliers, how will DoD handle multi-year procurements in out years to ensure competition? But the more troublesome problem will be how to deal with problems that crop up in development. Industry will fight to receive funds to cover costs and a reasonable profit, while DoD will fight to provide the weapon systems needed by the warfighter. We do not have 20-20 foresight. Problems in new technology will occur. What is the process to deal with the issues?

Some would argue that Full Service Contracting is worth the gamble to attempt to make DoD more cost-effective. However, we have seen in this article evidence that DoD is doing no worse than other federal agencies, and that when DoD uses and properly controls best business practices, it *can* achieve good results.

A Viable Alternative

Are there other best business practices that may make more sense than the Full Service Contracting for DD-21? GAO suggests a practice that may relate to this question: *separate technology development from product manufacturing*

In a review of major businesses developing new products, GAO found that some businesses (such as Boeing, Ford, and Hewlett Packard) have set standards for technology development that proved successful — standards DoD does *not* use.⁷

As shown in Figure 4, GAO reports that successful businesses do not move forward with a program launch or production start until they have reduced the unknowns in certain areas. They will not start a program until they eliminate all unknowns as to whether the technology will match the requirements. Contrast this to GAO's findings that DoD, at times, *will* do this.

Businesses will not start production until they are sure the design will work, while DoD oftentimes starts production not knowing this. And in the worst possible case, GAO found that DoD, at times, starts production not knowing if the product can even be produced as planned.

This evidence from GAO argues for DoD to consider separating technology development from production, or at a minimum, develop firm guidelines about the unknowns of a technology before using it in a new program. To do this will require different incentives for program managers because today their success depends on getting the program going. To be successful in moving the program ahead, each program manager must argue for funding, and therefore has an incentive to move forward, even with some unknowns.

A clear example of the results of the two different approaches, in the use of aluminum lithium, was available for GAO's review. DoD accepted its use in the C-17, while Boeing rejected it in the 777-200. Boeing determined too many unknowns surrounded the technology. DoD subsequently had problems with the use of aluminum lithium and had to discontinue its use in the C-17. The real bottom line is that the 777-200 program was delivered in 60 months, while DoD averages over 130 months to deliver a major program and is striving to meet its goal of 97 months.

Pushing major defense programs through their development is complicated, and DoD is at least as good as the rest of the Federal Government in working through the process. As the final arbitrator for the products needed by the warfighter, this article has presented the

argument that DoD needs to continue its control of the process and continue its effort to implement best business practices. If the Department is to do so, however, it requires qualified personnel to guide the work. That brings us to the issue of people in the acquisition workforce; specifically, the senior science and engineering talent.

People — Worker Shortage Nearing

While the Defense Industrial Base consolidated, a great many people were laid off, as the government downsized, hiring freezes were the order of the day. It was not unexpected, then that the Defense Science Board reported in early 2000 that 54 percent of the aerospace industry science and technology workforce is over 45 years of age, with fully 33 percent retirement-eligible in five years. Giving more cause for concern is a study by the National Science Foundation that shows employment in science and engineering occupations is expected to increase at almost four times the rate for all occupations. Employment opportunities for science and engineering jobs are expected to increase by about 51 percent, or about 1.9 million jobs.

Employee perceptions provide insight into the potential workforce that will be needed to fill the shortage. Technical bachelor degree holders rank Aerospace and Defense as the seventh most favored industries in which to work today — down from a 1990 ranking of third place. Further, the percentage of technical undergraduates that are not U.S. citizens and are, therefore, unlikely to be eligible for defense contracting work, has increased from 21 percent in 1990 to 37 percent today.

Lower regard for the defense industry, coupled with increasing demand for technology undergraduates, comes at a time when the need for senior science and technology expertise to guide the Department in the new environment has never been greater.

What Will It Take?

This article looked at the current situation in DoD and DoN and considered

the major components of the acquisition landscape. Evidence suggests the landscape has changed substantially, and that more effort is required to achieve increased success. Based on our research of the facts presented in this article and considering the interplay of the various issues raised, the following observations are provided for consideration.

Current Situation

During the past decade, DoD/DoN has foregone modernization to fund operational readiness, leaving the Services with aging equipment. This aging equipment, plus other requirements, places an ever-increasing burden on operating funds. Evidence suggests this is becoming a classic Catch-22 situation that will continue to diminish the funds available for required modernization.

Funding and Leadership

In U.S. history, funding has been made available to support the military when a clear vision and strategy provided a clear rationale and consensus for its use. This was so even when deficit spending was necessary to provide the funding. Today, DoD has no clear view of what the military should be doing, and specifically, how it should be armed. Until a clear vision and strategy are articulated to Congress and the American people, it remains unlikely that sufficient funding will become available for the military.

Defense Industrial Base

The Defense Industrial Base, created to arm the U.S. military for the Cold War, has and is continuing to consolidate, is having trouble gaining efficiencies needed to stay healthy, and has increased its political access to Congress. It exists now as a near monopoly with increased influence.

DoD needs to reconsider the character of the Defense Industrial Base; understand its need for reasonable profit; know that it will react to decisions based on its need to stay in business and satisfy shareholders; and finally, DoD needs to develop incentives and a healthy, realistic attitude toward what

the Defense Industrial Base can and cannot do.

While the Defense Industrial Base should, and probably does, work to satisfy DoD's needs, its primary motive is profit. In the current period of financial constraints, this bottom-line profit motive can result in actions and appeals to Congress that may not be in line with the best interests of the warfighter. This is not a criticism of the character of Defense Industrial Base leaders, but recognition of a basic fact: American business exists by making a profit and satisfying stockholders' expectations on the next quarter's returns.

Understanding that the Defense Industrial Base is a near monopoly, DoD should push harder to develop incentives for more of the U.S. industry to consider becoming suppliers. That means developing strong, firm requirements that are supported on a long-term basis and eliminating the restrictive burdens on those who may want to participate.

Revolution in Military Affairs (RMA)

DoD is focusing on the technology of the RMA. However, to effect a true revolution, the Department needs to increase its focus on innovations in operations and organizational adaptation. This can only be done with a true connection and work effort on the part of warfighters, science and technology engineers, and program managers. At the very minimum, a working integrated process team, consisting of these key players, is required to usher in a true RMA.

As the team looks at the process, in all likelihood they will find that the rules by which Program Managers and Program Executive Officers operate are not sufficient to handle the new environment. Functional and financial tradeoffs between and among systems may be required by Program Executive Officers to improve their effectiveness.

Revolution in Business Affairs (RBA)

While successes have been obtained, the RBA is not paying for the RMA effort.

Continued effort is suggested where successes have been found. From the research conducted by GAO, DoD needs to review its approach to technology development. With its responsibility to supply the warfighter, DoD needs to retain control of acquisition and support processes, and continue its search for the best processes available.

People

DoD needs to review its own workforce and consider what is happening with the Defense Industrial Base workforce. DoD must develop plans to overcome the near-term shortage of senior science and technology personnel – a shortage that can reduce the effectiveness of work that needs to be accomplished to acquire equipment and systems needed by the warfighter.

Editor's Note: Bolin welcomes questions or comments on this article. Contact him at phil_bolin@teambci.com.

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