Defense Industrial Base Policy: *Revisited*

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In an era of decreasing defense budgets and enemy threats, problems associated with maintaining a healthy defense industrial base have become pronounced. This article discusses defense industrial policy goals and argues that these goals may be collectively unobtainable.

INTRODUCTION

Defense industrial policy goals include maintaining a strong manufacturing base, a production surge capability, a leading edge in defense technology, and viable competition among defense contractors. The major problem, however, is that in the current environment, these four goals are collectively unobtainable.

What is required is a realistic defense industrial policy that accommodates the decreasing budgets, changing enemy threats and marketplace realities. Policy analysts and politicians have put forth a number of options to address the defense industrial base problem. These include investments in dual-use technologies, the conversion of defense industries, steady-state acquisition and prototyping with limited production. Table 1 outlines options which this article will address. Each of these government solutions has advantages. However, each also has *significant* disadvantages.

COMMERCIALIZATION OPTIONS

Two government approaches seek to preserve the defense industrial base using the commercial market. The first is to support the development of dual-use technologies and the second is defense conversion.

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Table 1.
DEFENSE INDUSTRIAL BASE OPTIONS

Commercialization Options
Investments in Dual-Use Technologies
Conversion of Defense Industries
Unique Defense Requirement Options
Selective Upgrades
Prototyping
Steady-State Acquisition
Limited Production

Dual-Use

Dual-use refers to technologies, processes, and products that have both defense and commercial applications. Congress and the Clinton Administration strongly support dual-use programs. Government funding of dual-use is seen as a way to help struggling defense firms find commercial applications for their products. At the same time this opens the defense market to non-defense commercial firms. The objective is to allow defense firms to enter commercial markets more easily and at the same time encourage commercial firms to compete for government work.

Several conditions exist today which support a dual-use strategy. First, the military no longer has a monopoly on state-of-the-art technologies. In a number of areas, the technology advances in the commercial sector out paces that found in the defense sector. The electronic, communication, computer, and software industries illustrate this point. Second, less and less is uniquely military in weapons at the subsystem and component level. Today, new weapon systems are composed of major electronic, computer and software *subsystems* that closely parallel those in commercial use. Finally, in an era of limited budgets, dual-use is seen as a way to contain both the cost and the time it takes to procure major weapon systems.

Firms with a distinct defense orientation will continue to exist. This is especially true at the prime contractor level for such weapon systems as main battle tanks, missiles, fighter aircraft, submarines and aircraft carriers.

> ***I don't think dual use is going to be much of a solution. There's no such thing as a dual-use tank. Or a dual-use submarine.***
>
> **William Anders, Chief Executive Officer (CEO), General Dynamics**

The dual-use strategy seeks to build on the similarities between defense and commercial technology. The problems associated with a decreasing defense industrial base become less acute if there is a strong commercial base to draw upon. In theory, since the technologies of the defense sector and the commercial sectors are converging, there is a benefit from a two-way technology flow.

Unfortunately, two problematic issues surface as the government tries to pursue a dual-use strategy. The first issue: *Who are the principal beneficiaries in a dual-use program?* For the military, the end result of a dual-use strategy will be positive, and will have a much broader industrial base to turn to in meeting future defense requirements. Commercial (non-defense) firms will also benefit, for a new market will open to them. Ironically, as the wall between the commercial and military markets comes down, the traditional defense firms will face greater competition in what was a sheltered market. Their new competitors will be seasoned veterans of both domestic and international markets.

In other words, the defense industry, which is already reeling from reduced procurement budgets, will have its downsizing and restructuring problems compounded as additional competition enters the shrinking defense market. The government dual-use programs will, in the short run, hurt the firms they were designed to help. In the long run (for those that survive), defense firms will be far stronger and more competitive in the converging defense and commercial markets.

The second problem deals with the composition of the wall separating commercial and defense firms. Today, it is composed of esoteric government procurement regulations and statutes, unique accounting standards, military specifications (MILSPECS), requirements for data rights, plus excessive auditing and oversight provisions. The primary barriers to pursuing the dual-use option are regulatory and bureaucratic, rather than technical.

The defense firms have had more than 40 years to master the convoluted government procurement system. Although this has served to exclude competition in the past, it now makes the transition to the commercial market all the more difficult. The adoption of commercial procurement practices by the Department of Defense (DoD) is an absolute and necessary precursor to any dual-use initiative.

According to Bernard Schwartz, CEO of LORAL, proposals for factories that simultaneously serve commercial customers and the DoD, or that can switch from defense to commercial business and back again, are patently absurd under current government regulations. Massive regulatory relief would be required to merge commercial and defense work. In addition, when commercial firms try to do business with DoD, they quickly learn that what is perfectly legal, ethical and prudent in the commercial world may not be in the arcane world of government contracting.

The dual-use strategy becomes even more complicated when we look at the composition of the commercial marketplace, which is a complex mix of both domestic and international participants. In the commercial marketplace, the country of origin for parts and materials is not an issue. They are not governed by the Buy American Act. When choosing a supplier, the really important considerations include quality, cost, and assurance of supply, not the country of origin. The best supplier will be frequently a foreign one.

Consequently, the shift to dual-use will increase our dependence on foreign sources for critical military equipment components, especially at the lower-tier supplier level. The Gulf War brought to light the problem of production surge capacity. Most of the planning focused on the prime contractors. However, the real problems existed at lower levels, because in many cases, there was only one supplier. To make matters even worse, many subcontractors were simultaneously committed to two prime contractors to meet production surge requirements. By adding the additional variable of foreign suppliers to the defense base equation, the problem becomes even more serious.

THE CONVERSION FROM DEFENSE TO COMMERCIAL MARKETS

Another approach to the declining defense industrial base problem is to aid defense firms in their conversion to commercial products and production methods. This also includes adopting a commercial research and development focus.

> ***Sword makers don't make good plowshares.***
>
> **William Anders**

After World War II (WWII), America's industrial base was able to convert successfully from military to commercial products in a very short time. With the end of the Cold War, many feel that, in a similar manner,

today's defense industry can successfully convert their operations from military to commercial products. On the surface this seems like a fair analogy. However, the two post-war environments for conversion were vastly different. During WWII, a substantial number of commercial firms were called upon to support the war effort. This required a switch from producing commercial goods to defense goods, because these firms assumed that the war footing would be temporary. Consequently, they never really stopped "thinking like a commercial firm."

When the war ended in 1945, industry made a smooth transition back to the commercial marketplace. There were several reasons for this. First, there was a large pent up demand for commercial goods. Second, there was no appreciable foreign competition. Both Europe and Japan were devastated by the war and were in no position to challenge U.S. industry.

In contrast, the Cold War lasted 45 years with both the defense and commercial markets existing simultaneously. Those companies that produced military hardware steadily evolved away from the practices found in the commercial marketplace. They forgot about such business areas as marketing and distribution, and catered their efforts entirely to one customer: DoD.

While the consumer market can be characterized in terms of *moderate-performance, low-cost and high-volume production*, the defense market is geared to *high-performance, high-cost and low-volume production*. In addition, even though defense firms produce state-of-the-art technology weapons, their production facilities are not state-of-the-art by commercial standards. To explain this inconsistency, we must realize that while defense firms produce very high quality weapons, they do this very inefficiently (and expensively) using antiquated plants and facilities.

The conversion option is far more difficult today than after WWII. First, there is no pent up demand for consumer products. In fact, flat consumer demand and overcapacity are persistent problems, leading to a mammoth commercial version of downsizing and restructuring similar to that in the defense industry. In addition to a well established domestic market, there has been intense competition from a rebuilt Europe and Japan. In other words, the present timing of the conversion strategy for defense firms could not have been worse.

Even under the best of circumstances, commercial firms view diversifying into new areas outside their core businesses as a very risky undertaking. For defense firms, the odds are even worse. Government initiatives to fund defense conversion projects must weigh the taxpayer expense against the limited chance for success. According to Stephen Budiansky of *U.S. News & World Report*: "Examples of companies that have successfully switched from

military to civilian products are so rare as to be nonexistent." To pursue a conversion strategy, defense firms must first come up with a product to convert to. *Will this be an original product or simply a modified version of an existing commercial one?*

A technically excellent new product will not guarantee commercial success. To succeed, a defense firm must be able to balance performance with cost (which is by no means their strong suit). Equally important to success is the requirement for a world class marketing and distribution system. These are two areas that defense firms have little or no expertise. Attempts to improve on existing commercial products will be even more difficult. This strategy implies that defense firms can outcompete commercial firms at their own business, a tall order since most commercial firms have had decades of experience in very competitive domestic and international markets.

A review of past attempts at defense conversion is not encouraging. Defense contractors have little to show for the billions invested in conversion efforts. Table II lists a number of unsuccessful defense conversion projects.

> ***The defense industry's conversion record is unblemished by success.***
>
> **Norman Augustine, CEO, Martin Marietta**

It's true that a number of firms, such as Boeing, have extensive defense and commercial business. However, their defense business is usually geographically, financially, and technically separate from the commercial side. The only link between their defense and commercial sectors, literally two distinct businesses, is that they both report to the same corporate headquarters.

Like dual-use, conversion initiatives have strong political support and for good reason. Because government assistance, in theory, can avoid plant closings and preserves jobs, the White House intends to make defense conversion a cornerstone of its broad technology policy. The total spent on defense conversion initiatives could exceed $2 billion in 1994.

Government support for defense conversion projects raises some very difficult questions:

- What will be the criteria to determine which defense companies will receive funding and which will not?
- Will the government, in essence, be picking winners and losers?

Table 2.
UNSUCCESSFUL ATTEMPTS AT CONVERSION
BY DEFENSE CONTRACTORS

GRUMMAN:	buses, yachts, and solar panels
AVCO:	film making, motor-home building, and VCRs
BOEING:	buses and electric trains to serve urban transportation markets
NORTHROP:	pollution controls, nuclear plant equipment, medical and business data systems
McDONNELL DOUGLAS:	microelectronic controls, medical systems, real estate and coal conversion
MARTIN MARIETTA:	energy and environmental services
RAYTHEON:	data terminals
TRW and GENERAL DYNAMICS:	telecommunications
ROCKWELL:	electronic calculators and digital watches
GENERAL ELECTRIC:	pre-fabricated housing

- Is this policy fair to those commercial firms which invest their own resources to develop new products, without government funding?

Besides the poor track record of defense conversion, government assistance is too little, too late. The swiftness and magnitude of the defense cutbacks dwarf government defense conversion initiatives by comparison. Conversion initiatives are akin to hastily trying to clear a firebreak in the face of a firestorm.

How can government aid in military conversion? According to Robert Dankanyin, Vice President of Hughes Aircraft:

> All we need from government is to create a favorable business environment. The role of government is to have an industrial policy that helps create investment, helps sponsor research and development and helps create a level playing field for exports. All this can be done through tax credits and tax incentives. We should not form more agencies to funnel money through government bureaucracies. The only way to become commercial is to respond to the market, not to the government.

OPTIONS THAT ADDRESS UNIQUE DEFENSE REQUIREMENTS

We must recognize that the commercialization options will, at best, only provide a partial solution to the defense industrial base problem. Other options recognize that the defense industry bears little resemblance to the commercial marketplace. In many cases, direct government intervention will be necessary to preserve those capabilities that are uniquely defense in nature.

Much of the defense research and development (R&D) effort has no clear commercial application. Therefore, the ability to conduct purely defense related research and development must be preserved. In addition, we must not lose the ability to produce end-item military systems such as fighter aircraft, tanks, missiles and submarines.

Two major categories follow. The first grouping deals with preserving the lead in military technology. Options in this category include technology insertion, principally through upgrades and extensive prototyping. The second grouping addresses preserving a defense production capability. These options include steady-state acquisition and low rate production.

MAINTAINING A LEAD IN DEFENSE TECHNOLOGY

When it comes to weapon systems R&D, the Defense Department frequently reaps a windfall. Until recently, defense contractors spent much of their own money on the R&D of new weapon systems, a perceived necessary investment for the lucrative multibillion dollar follow-on production contracts.

The problem today is that there will be very few large-scale production contracts in the foreseeable future. Defense firms are no longer willing to underwrite defense R&D efforts. This is especially true when there is little prospect for full production. The current conditions suggest that we will see more development and less production of weapon systems. To be attractive to industry, stand alone R&D work must now be profitable.

Selective Upgrading

This alternative to full-scale production inserts new technology into existing weapon systems, and is one of the most cost effective ways to maintain a technological lead. In the current environment of budgetary constraints and the uncertainty of future threats, the upgrading of existing systems is an attractive solution. It can also be profitable for defense contractors if the upgrade program is stable and of sufficient size. Upgrades are likely be the option of choice to maintain a technological lead in the near future, an approach which can also modify existing systems to meet changing threats. The Navy's submarine upgrade program is a good example.

The Navy's nuclear attack submarines were designed to engage Soviet surface ships and submarines. However, in a future war these submarines will be used in a variety of new roles, including strike operations (using cruise missiles), mine warfare, intelligence, electronic warfare and the deployment of special forces. Consequently, the Navy is upgrading its fleet to meet the more likely demands of littoral warfare, rather than blue water operations. It has initiated upgrade programs to develop equipment tailored to future operating requirements.

Continuous Prototyping

The goal of continuous prototyping is to maintain core design and engineering competence. Although, this approach employs extensive computer simulation, it does not demonstrate a full scale production capability. For very promising prototypes, this strategy can lead to a low-rate production phase. The two prototyping strategies that have received the most attention are "Rollover-Plus" and "Prototyping-Plus."

Rollover-Plus Prototyping

This strategy involves "rolling over" technology from one prototype to the next to preserve design and engineering expertise. This continues until the technology is fully proven, or it is required to counter a specific threat. Former Secretary of Defense Les Aspin promoted this concept. It calls for continuous prototyping and development without an up-front commitment to production.

The production of prototypes could provide a fairly continuous workload for contractors when coupled with upgrades. New systems could compete with rollover-plus prototypes or upgraded weapon systems for a chance at production. By competing alternative approaches, the most cost effective systems would be produced. This competition could also promote a diversified industrial base. As a side benefit, the competition would encourage creativity among the various contractors.

Prototyping-Plus

This strategy is frequently described as *"Build prototypes and then put them on the shelf."* Not surprisingly, this approach is very controversial. While it avoids the expense of producing weapon systems after development, it neither preserves a manufacturing base nor the ability to surge production.

MAINTAINING A DEFENSE PRODUCTION CAPABILITY

Steady-State Acquisition

The steady state strategy seeks to minimize the extreme fluctuations in the defense industrial base. Our long term security interest precludes letting

our defense industrial base deteriorate. If the United States is to retain the ability to resume large-scale defense production to meet the kind of emergencies likely to arise, production lines must be kept open. However, production levels will be far smaller than we have seen in the past.

The steady-state acquisition strategy will accomplish three of the objectives listed earlier. First, a continuous procurement of major weapon systems will guarantee the availability of a defense industrial base in an unpredictable world. Second, it will allow for a production surge in times of national emergency. Finally, it will help to maintain a leading edge in defense technology. Like the prototyping option, this approach will preserve a core team of defense design and manufacturing personnel.

> ***We need to keep production going so we do not forget how to build fighter aircraft and submarines.***
>
> **Secretary of Defense Perry**

To maintain the ability to build the high-technology weapons requires the acquisition of defense systems at steady and predictable levels. To illustrate this strategy, consider the M1A2 main battle tank which has a life expectancy of 30 years. Under steady-state acquisition, only ten tanks would be built per month, or 120 per year. The new tanks would be used to replace the oldest tanks in the inventory. This strategy preserves the critical infrastructure needed to maintain the tank production base. A steady-state force has a major advantage beyond keeping the lines open. Since new hardware is always coming off the line, it is relatively easy to incorporate evolving technology.

There is, however, a significant downside to the steady-state strategy. Since major systems will be bought in far smaller numbers than during the Cold War, the cost per unit will be *exorbitant*. We must recognize that the price represents more than just the tank. We should also view the price as an insurance policy that guarantees the availability of a defense industrial base capable of responding to unforeseen threats to our national security.

Low-Rate Production

This differs from the steady-state strategy in that the production is not expected to continue for long periods of time. Only a limited number of systems are produced to maintain the health of the industrial base or until there is a need for surge or mobilization. Low-rate production is appropriate in three cases. First, it shows that production is possible. Second, there is a requirement for only a small number of systems. Finally, low-rate pro-

duction is seen as a way to sustain defense contractors during periods of low demand.

Some revolutionary technology weapons also have been produced using a low-rate production strategy, including the SR-71 and the F-117. With proper planning and execution, small production programs such as these can be profitable for contractors. Lockheed's F-117 production line was designed and tooled for 8-10 planes a year, and was profitable primarily because it was produced according to the plans with few significant deviations.

Silver Bullet Strategy

This is simply a glorified low-rate production. Limited quantities of a high technology weapon system with revolutionary capabilities are produced. Secretary of Defense Perry suggests that a silver bullet-like strategy is possible for the F-22 program. A total buy of only 150 aircraft would provide significant savings over the projected buy of 648 aircraft.

CONCLUSION

Unfortunately, there is no satisfactory solution to the defense industrial base dilemma. Under the current environment, it is no longer possible to simultaneously maintain a "warm" production base with a surge capacity using a diverse pool of defense contractors. Nor can we rely on defense contractors to underwrite our future military research and development efforts.

Between the commercialization options of dual-use and conversion, only dual-use merits attention. It is appropriate at the subsystem and component level. However, before investing in dual-use initiatives, there must be a major overhaul of the present procurement system.

At the major weapon system level, it will be necessary to maintain a production capacity. Here, the options include using either a steady-state or a limited production strategy. Unfortunately, neither of these strategies adequately address the ability to surge production. This suggests that in future wars we must be prepared to conduct operations only with those inventories and systems on hand. The surging of production to meet the threat no longer will be an option.

We must recognize that the high cost associated with low production rates and high inventory levels will be a necessary price to pay for defense. This small investment (when compared to the consequences of not doing so) will preserve our ability to meet all future national security emergencies.

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