EVOLUTION OF THE U.S. DEFENSE INDUSTRY

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The dramatic developments of the past couple of years have filled many with hope and optimism, as the dangerous and costly elements of the Cold War are replaced with negotiation, cooperation, and expectations that defense funds might be diverted to other social priorities. However, as menacing as the Cold War was, it was at least predictable from year to year. Now, of course, straight-lined views of the future are as anachronistic as the Berlin Wall. In short, in viewing future defense needs, caution, hedging, and above all, flexibility, are crucial.

Profound uncertainties about what the future may hold make this conference even more important than usual. The panels and discussions over the next two days will shed considerable light on the murky future of the defense and space marketplace, so I will not venture very far into that territory.

Rather, to set the stage for those sessions, I shall limit my remarks to three subjects that will inevitably loom in the background of all your discussions:

- First, the evolving geopolitical environment;
- Second, the dynamics of the defense budget;
- And finally, the condition of the defense industry.

For 40 years, our defense requirements have been dominated by the objective of defending Western Europe and deterring Soviet threats there and elsewhere (including nuclear threats to our homeland). We generally

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[1]This was the keynote address at the Electronic Industries Association Symposium on "Balancing National Security with Realities of the 1990s: Ten Year Forecast of Defense Needs," Coronado, California, October 16, 1990. In preparing the speech, I benefited from the ideas and advice of several RAND colleagues, including Brent Bradley, Jess Cook, Jennifer Taw, and, especially, Kevin Lewis.

assumed that forces capable of deterring Soviet threats would be capable of protecting our security interests from non-Soviet threats, too. As Les Aspin is often quoted, we believed that "if we could 'skin the cat,' we could also 'skin the kitty.'"

As is well-known to all of you, the demanding strategic, operational, and technological dimensions of our competition with the Soviets heavily influenced nearly every aspect of our defense establishment, including design and acquisition strategies for advanced weapon systems.

Whether or not this orientation was the best way to view defense requirements then, continued adherence to the assumptions associated with that strategic image are certainly invalid now.

The Soviet threat, at least in its historical embodiment as a cohesive bloc of advanced multinational forces and capabilities, is severely diminished. Still, some anomalies remain. Let me give you a few examples:

- o The USSR has not perceptibly slowed its nuclear force modernization;
- o The Soviets have largely maintained that part of their force structure that threatens Japan; and
- o They continue to support various client states, such as Cuba, although such assistance may be on the wane.

Nevertheless, a sudden massive mobilization of offensive firepower close to the German border is no longer conceivable. And positive signs, such as

- o Moscow's zig-zag toward a market economy and democratic society;

- o Soviet support for the U.S.-led coalition against Iraq;
- o The reestablishment of official relations with Israel and Saudi Arabia; and
- o Certain positive steps in the East, such as the new diplomatic ties with South Korea and the indication that a compromise on the disputed Northern Territories of Japan is near

are significant enough for us to consign the Cold War to the history books.

As should be painfully clear, however, for all these positive developments, the world is not yet embarked on a course of global peace. At least 26 conflicts are currently being fought in 33 countries around the world. There is ample reason to believe that this alarming situation may worsen before it improves.

Let me begin with a quick survey of residual problems in Europe, where we face the possibility of:

- o Reversals in the democratization and free-market initiatives of some former Warsaw Pact nations
- o A resurgence of dormant national and ethnic conflicts, such as that between Hungarians and Romanians, or that among the republics of Yugoslavia. In the future, such traditional animosities could again beset Bulgaria and Turkey;
- o Rapid demobilization within Western Europe, especially in the smaller NATO members, constraining our choices should untoward developments arise;
- o Even a reversal in the positive trends in the Soviet Union, perhaps even leading to its disintegration and, in the process, massive flows of refugees into Western Europe.

To appreciate just how much the situation in the Soviet Union has changed, consider that in 1980 (shortly after its invasion of Afghanistan), we were worried that it might attempt to invade Iran. Today, we speculate about the possibility that countries in the Persian Gulf--such as Iran--might grab Soviet territory should the Central Asian Republics spin out of the Soviet orbit.

In the Middle East and Persian Gulf, even if the current Iraqi crisis is resolved short of outright war, we face numerous long-term problems, including:

- o the legitimacy of current national boundaries, which many in the region take to be an artificial result of previous imperialist meddling;
- o the representativeness of current governments and, related to that, a deep conflict between Arab "haves" and "have nots";
- o the growing strength of Islamic fundamentalism,
- o control of scarce or vital resources like oil and water,
- o the issue of a Palestinian homeland, and, of course,
- o the seemingly irreducible tensions between the Arab countries and Israel.

In Asia, there is growing political and social turmoil ahead on the Korean Peninsula, in Taiwan, and in the Peoples Republic of China (PRC). Problems in Southeast Asia continue unabated in Cambodia and Myanmar. Significant tensions still simmer in the subcontinent between India and Pakistan and India and China. National economic growth is paralleled by an increasing pace of regional arms production and acquisition. Although superpower instigation of overt conflict is no longer very likely, disputes over access to resources and markets, not to mention ancient internal disputes, hold out the constant potential for sparking a crisis.

In Latin America, numerous conflicts threaten stability, including:

- o the brutal violence between the government and the left-wing rebels in El Salvador;
- o The Maoist revolution fomented by Sendero Luminoso in Peru;
- o The terror campaign of the Colombian cocaine cartels against the Barco government and among themselves.

The same is true in Africa, where tragic armed conflicts rage in such places as Angola, Namibia, Mozambique, Chad, Liberia, Ethiopia, and the Sudan.

Ironically, as some commentators have suggested, the passing of the Cold War has left a vacuum that is not being filled by peace, but rather by the emergence of more traditional conflicts, particularly throughout the so-called developing world.

Many of these conflicts are localized, with little or no direct effect on U.S. interests. However, the proliferation of sophisticated weaponry, the potential for disruption in access to important resources, the threats these conflicts pose to U.S. citizens and travelers, and the potential for large-scale refugee movements all tend to extend the effects of such conflicts.

Israel, India, and South Africa are thought to be nuclear weapons nations and there is concern over Pakistan's accession to the nuclear club. Argentina, North Korea, and possibly still Brazil have domestic nuclear power programs and are capable of producing weapons-grade uranium or, possibly in the case of North Korea, plutonium. Iraq and Iran may be only a short distance behind.

Thirty-two nations currently possess ballistic missiles. Within the current decade, at least 15 developing nations will be PRODUCING their own ballistic missiles.

There are now 15 "blue-water" navies in the world and 42 countries have attack submarines, including 19 nations in what we normally call the Third World. We saw during the Persian Gulf reflagging operation in 1988 how even obsolete mine warfare capabilities could severely jeopardize sea lanes.

Even more troubling is the proliferation of Exocets, Silkworms, and other relatively "cheap-kill" systems. It is almost easier to compile a list of nations that don't have them, but those that do include Argentina, Brazil, Chile, and Ecuador in South America; China, India, Pakistan, Indonesia, South Korea, and several Persian Gulf nations in Asia. The proliferation of man-portable anti-aircraft systems, such as Stinger, is another case in point.

We are also all familiar with the accumulation of armor systems in Iraq. Israel, India, Vietnam, and China also have substantial inventories, with Thailand, South Africa, Pakistan, Brazil, and others close behind. These are not, by the way, hand-me-down tanks, but front-line combat vehicles.

My rundown has not been scientific, but it is sufficient, I believe, to conclude that the geopolitical environment will continue to contain many sources of instability and threats.

Many of the threats will have more than just a military dimension. We will need effective diplomatic and economic instruments as well as creative capabilities for orchestrating their use in combination with military force. Wishful thinking, in short, must not blind us to the regrettable fact that military force will remain an important instrument of national security strategy--even, and some might say especially, in the aftermath of the Cold War.

It is by no means certain that the strategy, force capabilities, and systems that we currently possess are appropriate for a future so unlike the one we envisioned when we developed all of them. The intellectual exercise required to rethink strategy and force structure is by no means a trivial undertaking. Even with an ideal blueprint before us, it would take years to revamp our posture and capabilities to meet new challenges. But whatever choices we make, the fact is that our success may in large part depend on the amount of budgetary resources available. At present, the future of the defense budget seems as clouded as any other element of the strategic picture.

Since peaking in FY 1985, the defense budget has declined in real terms in every year since. Depending on how the FY 1991 budget works out, the average rate of decline over that period works out to a fairly gradual 2.9 to 3.1 percent.

It is worth noting that not even the Persian Gulf situation now seems likely to reverse this decline; and plans through the mid-1990s envision an even faster rate of decline. If this pattern continues, moreover, the top-line will break the previous post-Vietnam decline in terms of its endurance in FY 1993.

On the other hand, the starting point for the decline--the 1985 defense budget--was the largest peacetime defense budget ever and capped several years of large increases known as the Reagan build-up. The main beneficiary during the Reagan build-up was the procurement account. This reflects an unchanging historical pattern: When the overall budget has increased, procurement has increased even faster.

Unfortunately, the reverse pattern holds for periods during which the total budget declines. Thus, between FY 1985 and FY 1990, the total budget has declined by one-eighth in real terms, procurement by almost one-third.

There is some reason to believe that subsequent budget cuts will not hit procurement quite as hard. The main one is the recent willingness on the part of the Office of the Secretary of Defense and the services to reduce force structure, basing posture, and personnel levels. Also, procurement cuts will not produce big short-term outlay savings.

On the other hand, several political realities suggest that these proferred reductions will not fully materialize. Thus, it is probably safer to assume that procurement will continue to constitute a smaller and smaller portion of the overall defense budget. The picture for research and development, though, has not been so bad and is nowhere near as bleak.

I know that some people have looked to the sharply increasing NASA budget for an offset, but they soon discover that the NASA budget is, at most, just one-twentieth of the Pentagon budget.

Issues of budget "top-lines" and mixes of resources aside, however, there is no need to remind you that, ultimately, our long-term success in modernizing our military forces will depend on the capabilities of the defense industry. In light of the budget decline, can we continue to depend on it?

Many would say, "no, not with assurance." But, I think the evidence is much more mixed. Let me outline some of the good news and bad news.

Bad news: Substantial layoffs have already occurred. Overall defense industry employment has declined 10 percent since 1988 and is expected to decline another 10 percent in the next two years. Some companies have been hit especially hard, and several are on their second or third round of layoffs. The effects on the economies in areas with major aerospace concentrations are already clear in the form of higher unemployment and lower housing prices.

There are those, however, who argue that these contractions are not bad news at all. In some cases, it is said, the layoffs are the result of overdue corporate restructuring and streamlining; in others, especially where the reductions have been concentrated in the white-collar ranks, it is said that the layoffs may have actually strengthened the companies. In still other cases, such as relocations to escape the high costs of doing business in such areas as Los Angeles, the restructuring seems to be independent of budgetary trends.

Plus, we have been through such contractions before and lived to tell about it. There were even greater corporate reductions during the last era of extended budget declines--1969 to 1975. During that period, employment at McDonnell Douglas, Boeing, and Lockheed each shrunk by about 40 percent, while General Dynamics contracted even more.

But, more bad news: Both the overall economy and the individual firms in the defense industry are not as healthy as they were at the start of previous periods of budget decline. Stock prices are low, revenues are down, and heavy debts are more common, especially among firms that entered into large cost-sharing commitments during the 1980s. And the competition from abroad is today far more determined.

On the other hand, there is a substantial backlog of military business, roughly three times the size of the backlog a decade ago. Those defense firms that are also involved in commercial airline work also have large order books in that sector. Some estimates place the number of required new large airliners in the next 15 years at over 8,000.

This backlog will provide only temporary relief, however, owing to fundamental changes in the character of defense demand that date back to before the end of the Reagan-era buildup.

For one thing, there was a sharp drop-off in the frequency of new major program starts. Take Air Force fighter aircraft. In the 1940s and 1950s, six new fighters were developed AND produced per decade. In the 1960s and 1970s, two new systems were developed per decade. It seems possible that the last two decades of the century will see just one new Air Force fighter aircraft--and, it is conceivable that the number will eventually turn out to be zero.

Not only did the number of new fighters decrease, so did the average number of model variants developed from each design and the average number of units produced of each variant.

To provide a striking illustration, between FY 1951 and FY 1956, the Air Force, Navy, and Marine Corps bought substantially more fighters and attack aircraft than we have in all the years since FY 1956. In fact, at current buy rates, we will be well into the second quarter of the next century before we reach a "crossover" point. For another case in point, there were many years in the 1950s when we bought more strategic bombers in one year than we buy fighters today.

Production volumes and rates dropped and the differences between commercial and defense production methods grew.

As a result of these trends, and others, the aircraft industry began to change markedly in the 1960s.

- Companies in the industry merged (McDonnell and Douglas, Fairchild and Republic, Vertol and Boeing, McDonnell Douglas and Hughes Helicopters)
- Companies were absorbed by firms from other industries (Textron and Bell, Rockwell and North American, General Motors and Hughes Aircraft)

- o Prime contractors became subcontractors, often very successful ones (Vought, Fairchild)

Also during this time, military aircraft, themselves, underwent a change. Once just an airframe, engine, and gun, military aircraft became loaded with electronics. They began staying in the inventory much longer.

- o Airframe contractors began adding electronics capability
- o They developed significant modification and refurbishment capabilities.
- o One firm decided to specialize in major subassembly work and has one of the most advanced aircraft production plants in the world. Others will follow suit.

Some firms became adept at marketing their products overseas (McDonnell Douglas, Lockheed, and, especially, Northrop). Others adapted by developing or expanding capability to design and produce new types of defense systems, most notably, space launch vehicles and satellites.

Important new firms, with their main roots in electronics, emerged as new powerhouses--first E-Systems, more recently Loral.

All of these examples suggest an industry that is adept at adaptation, responsiveness, and even anticipatory innovation.

The track record of attempted cross-overs to the commercial world has not been good, however. Raytheon has done well with appliances and energy services, but failed with televisions and data processing terminals; Boeing has attempted to build monorails and hydrofoils; General Dynamics attempted commercial ships and asbestos mining; and, of course, there is the example of the Grumman buses.

I am not sure that this phenomenon is well understood though there is no shortage of explanations. Some of the more commonly heard are:

- Defense firms lack marketing and distribution smarts
- They are generally geared to low-volume production and lack the flexible manufacturing systems necessary for adapting efficiently to production-rate changes
- On account of the historical focus on "state of the art" technology, they have little tradition of confronting quality/price tradeoffs
- They typically have large overhead cost structures as a result of government and military supervision and the need to maintain surge capability
- Defense industry diversification pursued some lines of endeavors, such as steel and ships, where profitability stymied even more specialized firms

I am sure that we will see more attempted crossovers. There is a company that makes advanced voice recognition equipment for the military that thinks it can apply this technology to automated teller machines and home security systems. One company that makes rocket propellant is making automobile airbags. I assume that we will soon see someone marketing radar-absorbent coatings for sports cars and interstate truckers--if it has not happened already.

Well, enough of this mix of criss-crossing indicators. Let me offer a brief net assessment that I trust you will confirm and round out--or reject--in your deliberations.

Large backlogs of orders notwithstanding, the paucity of new programs and the decline in overall procurement budgets will require further adaptation and streamlining by the industry. In addition to the workforce reductions that have already begun, I expect that we will see more of the kinds of structural adaptations that have already taken

place. We could well see one or two of the traditional prime contractors leave that tier of the industry--perhaps as the result of absorption by another firm. We will see more automation in design and fabrication and more attention paid to more typical business considerations (local cost of living, labor relations, and so on).

This type of consolidation is occurring frequently in Europe, too, and those of you who remember prime contractors, such as Vultee, Curtiss, Temco, Piasecki, Stearman, North American, Taylor, Ryan, and Stinson, know that it has happened often in our own history. I do not think that it is something that should necessarily be feared.

Even though the future is not well-understood, I think that there are several lessons for senior Pentagon policymakers concerned with the health of the defense industrial base.

One lesson is that the conventional view that the defense industrial base consists of those private companies currently doing business with the Defense Department is outdated. A substantial fraction of the industrial establishment serving the needs of the military services is represented by the organic depot system. These large industrial facilities, which perform extensive modification, upgrade, refurbishment, maintenance, and repair functions, face many of the same physical plant and workforce problems as the civilian defense industry. Industrial base planning should extend to these facilities. It may be possible to fashion joint solutions.

It is also clear that in order to satisfy its future needs, the Pentagon may have to turn to companies that are not currently doing business with it. Therefore, if ever there were a time for the Pentagon to reduce to the bare minimum the differences between its own business practices and technical standards and those of the commercial sector, now is it! The barriers to entry and reentry into the defense sector should be minimal.

The third lesson concerns future diagnoses of the industrial base. Right now, we are stuck with woefully inadequate indicators--such as the number of companies doing business with the Pentagon in a particular year. The Defense Department must make it a top priority to develop the means to detect erosion of defense industrial capability when it occurs and size the magnitude of erosion when it is detected. Until we have better indicators, we will have a poor understanding of the true health of the industrial base and the direction in which it is heading.

The last lesson I will mention derives from the decline in procurement funding. Much of the support for innovative research and development is currently tied to the level of procurement spending. Firms that win design competitions often recoup unreimbursed development expenses during the production phase. And, of course, reimbursement for Independent Research and Development (referred to more often as, IR&D) is tied directly to procurement contracts; it is an explicit element of the indirect cost pool. Thus, the reduction in procurement funding directly threatens the defense industry's pace of innovation. The government must find a way of maintaining incentives for innovation even as procurement funding falls. If it doesn't, we will surely lose our technological edge.

Let me end by thanking you for the opportunity to share these views with you this morning. I am sure you would have preferred more and better forecasting of upcoming trends and developments in the industry, but as the Chinese say, "prediction is difficult, especially when it comes to the future." Best wishes for a productive conference.