

Creating an Effective National Security Industrial Base for the 21st Century:

An Action Plan to Address the Coming Crisis

**Report of the
Defense Science Board Task Force on
Defense Industrial Structure for Transformation**



July 2008

***Office of the Under Secretary of Defense
For Acquisition, Technology, and Logistics
Washington, D.C. 20301-3140***

This report is a product of the Defense Science Board (DSB). The DSB is a Federal Advisory Committee established to provide independent advice to the Secretary of Defense. Statements, opinions, conclusions, and recommendations in this report do not necessarily represent the official position of the Department of Defense.

This report is UNCLASSIFIED and releasable to the public.



DEFENSE SCIENCE
BOARD

OFFICE OF THE SECRETARY OF DEFENSE
3140 DEFENSE PENTAGON
WASHINGTON, DC 20301-3140

July 25, 2008

MEMORANDUM FOR UNDER SECRETARY OF DEFENSE FOR ACQUISITION,
TECHNOLOGY & LOGISTICS

SUBJECT: Final Report of the Defense Science Board (DSB) Task Force on Defense
Industrial Structure for Transformation

I am pleased to forward the final report of the DSB Task Force on Defense Industrial Structure for Transformation, chaired by Dr. Jacques Gansler. This study addresses the constraints, imposed by the current defense industry, on U.S. Armed Force's ability to defend against 21st Century threats.

The Terms of Reference requested the Task Force describe the defense industry required to cope with the international security environment in the 21st Century, and characterize the degree of change likely and/or desirable in defense industry due to the changing nature of DoD and the nation's industrial base. The Task Force investigated existing mitigation measures for competitive and subcontractor base concerns, and made recommendations to ensure competition and increase innovation throughout the Department's acquisition efforts. Specific areas examined include: trends in globalization, DoD acquisition of services, trends following the *1997 DSB Report on Vertical Integration and Supplier Decisions*, and best-value competition.

The Task Force concluded the nation currently has a consolidated 20th Century defense industry, not the required, transformed 21st Century National Security Industrial Base. Consequently, the final report includes findings and recommendations that focus on transforming the National Security Industry.

I endorse the Task Force's findings and recommendations and encourage you to review the report.

Dr. William Schneider, Jr.
DSB Chairman





DEFENSE SCIENCE
BOARD

OFFICE OF THE SECRETARY OF DEFENSE
3140 DEFENSE PENTAGON
WASHINGTON, DC 20301-3140

July 31, 2008

MEMORANDUM FOR THE CHAIRMAN, DEFENSE SCIENCE BOARD

SUBJECT: Final Report of the Defense Science Board Task Force on Defense Industrial Structure for Transformation

The final report of the Defense Science Board Task Force on Defense Industrial Structure for Transformation is attached. The Task Force has identified key elements of an action plan to work with Industry through the Customer/Supplier relationship to transform the consolidated 20th Century defense industry into the needed National Security Industrial Base for the 21st Century.

The action plan is based on four Key Findings by the Task Force:

- There is a critical need for DoD to establish a National Security Industrial Vision, working with industry to ensure realization of an improved Customer/Supplier relationship.
- DoD must also drive business practice transformation of its own in support of a 21st Century military.
- The Government must facilitate the rapid and affordable acquisition of needed weapons, systems, and services that are world-class.
- The DoD acquisition workforce must be strengthened in order to facilitate the timely and cost effective acquisition of military capabilities and provide enhanced government oversight of program management.

Based on these Key Findings, the Task Force offers nine recommendations for an Action Plan that will support achievement of both an appropriate National Security Industrial Base and the necessary Customer/Supplier relationship:

- Articulate a National Security Industrial Vision
- Focus on interoperable, net-centric systems-of-systems
- Achieve lower costs and faster-to-field capabilities while still achieving better performance
- Train As We Fight: Recognize the role of contractors in the "battlefield"

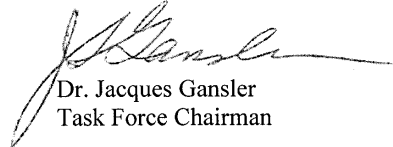
- Focus on “staying ahead” by adequately funding “Engines of Innovation”
- Understand the dynamics of globalization as it relates to national security and realize its benefits
- Achieve far greater use of “best value” competitions and foster long-term competitive dynamics
- Transform the DoD logistics system to a modern, world-class, information-based, data-centric logistics system.
- Move aggressively to strengthen the future high-quality, high-skill, DoD Acquisition workforce.

To achieve an effective and affordable National Security Industrial Base that will meet the needs of the coming years, the government must fundamentally change the way it conducts its business, as the sole Customer. To be successful, DoD must work closely with Industry, Congress and other key government agencies. In turn, Industry must be prepared to respond and adapt to the evolving responsibilities of the Supplier.

The Task Force recommendations will require three significant actions from DoD:

- Restructuring the Government/Industry relationship
- Incentivizing Industry to transform itself to meet 21st Century security environment requirements
- Rebuilding and reshaping the Government and Industry workforces.

The Task Force urges senior leaders of the U.S. government to implement the recommendations in this report at the earliest opportunity.



Dr. Jacques Gansler
Task Force Chairman

TABLE OF CONTENTS

Executive Summary	1
I. Overall Objectives Of the Study (Scope of Work).....	13
II. The Coming Crisis	15
III. Key Findings and Recommendations	21
IV. An Industry/Government Framework.....	47
V. Implementation Plan	51
Appendices	
A. Terms of Reference.....	A-1
B. Task Force Membership.....	B-1
C. Briefings Received	C-1
D. GLOSSARY.....	D-1

LIST OF FIGURES AND TABLES

Figure 1. Prime Contractor Consolidation.....	23
Figure 2. Spiral Development, Fielding, and Continuous Upgrades/Improvements.....	34
Figure 3. Faster Fielding, Lower Costs, and Better Capability for the Warfighter	35
Figure 4. Results of A-76 Cost Comparisons: 1978-1994.....	41
Figure 5. Results of A-76 Cost Comparison: FY 1997-2001	41
Figure 6. Performance Based Logistics Availability and Response Time.....	42
Figure 7. Acquisition Workforce declined even as procurement budgets increased.....	43
Figure 8. Shift from “Platform Centric” to Net-Centric Systems Requires a New Industry/Government Framework.....	48
Table 1. Changes Driving National Security Transformation	4
Table 2. Task Force Findings and Recommendations: Overview	6
Table 3. Changes Driving National Security Transformation	17
Table 4. FY06 DoD Production and Repair Facilities.....	25



CREATING AN EFFECTIVE NATIONAL SECURITY INDUSTRIAL BASE FOR THE 21ST CENTURY: *AN ACTION PLAN TO ADDRESS THE COMING CRISIS*

EXECUTIVE SUMMARY

The Issue: The Department of Defense (DoD) operates today in an international security environment of great change. DoD has also seen its Supplier base consolidate significantly over the last ten years at the same time as its procurement needs have both diversified and significantly increased. To accommodate both the current and emerging National Security needs associated with this dynamic environment, DoD has acknowledged the importance of a significant transformation of its relationship with the National Security Industrial Base. The conclusion of this Task Force is that *“the nation currently has a consolidated 20th Century defense industry, not the required and transformed 21st Century National Security Industrial Base it needs for the future.”* In order to meet the critical capability needs of the 21st Century Combatant Commands and joint forces on time and within budget, DoD leadership must take immediate and deliberate action to evolve its current working relationship with Industry to achieve a focused and strategic transformation of its relationship with the National Security Industrial Base of the future.

Terms of Reference: To better understand and address the scope of this challenge, the Under Secretary of Defense for Acquisition, Technology, and Logistics (USD [AT&L]) and the Acting Deputy Under Secretary of Defense for Industrial Policy (ADUSD [IP]) jointly requested that the Defense Science Board (DSB) establish a Task Force on Defense Industrial Structure for Transformation. The Terms of Reference (TOR) for the study¹ set an objective for the Task Force to “describe the defense industry required to cope with the international security environment in the 21st Century.” The TOR further requested that the Task Force characterize the likely and/or desirable degree of change in Industry, given the changing nature of the Nation’s security needs and the current consolidated state of its industrial base. Also included was a request to examine existing mitigation measures for any competitive and/or subcontractor base concerns as well as the development of recommendations to ensure competition and increased innovation throughout the Department’s acquisition efforts. Additional specific areas to be addressed included: trends in globalization, DoD acquisition of services, trends following the 1997 DSB Report on Vertical Integration and Supplier Decisions, and best-value competition.

Task Force Operation: Dr. Jacques Gansler served as the Task Force Chairman. Task Force Members included selected individuals from the public and private sectors, including private consultants and legal experts in areas of the National Security Industrial Base². The Task Force met between August 2006 and November 2007. These meetings focused on existing DoD acquisition and industrial efforts through the perspectives of numerous speakers including

¹ See Appendix A for a complete statement of the Terms of Reference.

² Appendix B provides a full list of Task Force Members and Advisors.

representatives from the Office of the Secretary of Defense (OSD) and the Services as well as from both large and small defense product and service firms, defense analysts and think tanks, and industry associations.³ Topics ranged from Lead Systems Integrators (LSIs) to Research and Development (R&D) incentives and examined their impact on a variety of current military programs such as DDG-1000 and the Army Future Combat System (FCS). The Task Force also outlined specific industrial base and competitive concerns and gathered input on these issues from speakers.

Fundamental Challenge: *Constraints associated with the need to evolve U.S. military forces (both people and equipment) for 21st Century threats and required capability environments within a likely flat or declining constant dollar national security budget are identified by the Task Force as being the fundamental challenge facing the current DoD/Industrial Base customer/supplier relationship.*

A number of related challenges include:

- Emergence of new and expanding traditional DoD missions (including support to homeland defense);
- Development of the capability to analyze “alternative capabilities” approaches at the portfolio level (i.e., ways to address broad mission areas) within resource constraints;
- Exploitation of new technologies and the synergies of systems-of-systems;
- Preparation for joint and coalition operations;
- Modernization after Iraq and Afghanistan (with sufficient quantities of 21st Century systems appropriate to future force requirements); and
- Addressing the reduced numbers of experienced professionals in the military and civilian acquisition workforce and the rapidly increasing dependence on contractors (“civilians on the battlefield”).

These challenges must be met during a period of dramatic change in virtually every economic, geopolitical, demographic, and technological area (see Table 1).

Focus Areas: Through assessment of the findings and recommendations of previous DSB studies,³ consideration of the information presented at Task Force meetings, and evaluation of the likely near-term realities of the U.S. political, economic, technical and military environments, the Task Force concluded that addressing the Fundamental Challenge will require three significant actions from DoD:

1. Restructure the Government/Industry relationship
 - Implement different government policies and practices (from requirements through acquisition strategy, execution, support, and services)
2. Incentivize Industry to Transform to meet 21st Century needs

³ Specifically the 1997 study on *Vertical Integration and Supplier Decisions* and the 1999 study on *Globalization and Security*.

- Enhance flexibility, innovation, and cost effectiveness
 - Competitively source wherever possible to facilitate innovation and affordability
 - Exploit the benefits of globalization (without vulnerability)
 - Restructure to accept the impact of the above challenges (e.g., different systems and “disruptive” technologies)
 - Achieve lower-costs and faster-to-field (for adequate quantities and deployed technological leadership)
3. Rebuild and reshape the Government and Industry workforces
- Adapt for the changing roles and skill mix required

CHANGES DRIVING NATIONAL SECURITY TRANSFORMATION	
1.	Holistic View of Security: Characterized by world-wide terrorism; pandemics; weapons proliferation; rogue nuclear states; energy dependence; insurgencies; environment; mass migration; regional conflicts; transnational threats; resource access (i.e., water, oil, critical materials).
2.	Domestic Economics: In a constrained resource environment, with likely reductions in defense spending (including reduced or eliminated Supplementals), trades between national security and other programs must be considered, including universal health care, Medicaid, Medicare, social security, and budget and trade deficits.
3.	Warfighting Changes. From Cold War operations to net-centric Warfare; Asymmetric warfare (biological, cyber, Improvised Explosive Devices [IEDs]); Systems-of-Systems; Joint and coalition operations; evolving doctrine requiring frontline decision-making.
4.	Industrial Sector Changes. Sector impacted by horizontal and vertical integration; commercial and foreign high-tech advances; open-network innovation; off-shore engineering and manufacturing; changing capital markets.
5.	Globalization: Technology and industry are globalized; geo-politics and scope of threats requires security coalitions; DoD no longer the leader in all military technologies; global financial markets enable borderless investing.
6.	Technology Changes: Including information technology, biological technology, nanotechnology, robotics, high-energy lasers, etc., and evolutionary cycles often measured in months rather than years. This requires not only a more responsive defense industry, but one capable of drawing on both the commercial and the global markets.
7.	New Missions: New DoD tasks include support of homeland security; missile defense; counterinsurgency; stability and reconstruction; cybersecurity; biodefense; non-kinetic situational influence of operations.
8.	Unpredictability: Today's world requires agility, rapid responsiveness, and broad-based capabilities.
9.	Intelligence Changes: Intelligence is focused on integrated data, open-sources, language, and cultural understanding, as well as real-time intelligence flow between soldier/sensors and command structure.
10.	Government and Industry Workforce Changes: The government workforce is aging; skill mix imbalance; rules vs. judgment; "managers" vs. "doers"; difficult to attract and retain top people. The industry workforce is also aging; eroded systems engineering skills; difficult to attract and retain top Science and Technology (S&T) people.
11.	Defense Budget Changes: Resource shifts from Equipment to Personnel, O&M and Homeland Security; frequent changes cloud spending outlook and planning (e.g., 50% procurement drop in 1990s, then doubling in 2000s).
12.	Isolationist/Protectionist Constraints: U.S. policy continues to inhibit the nation from gaining the security and economic benefits that could be realized from the global marketplace by instead focusing on "Buy American;" the Berry Amendment; obsolete International Traffic in Arms Regulations (ITAR) and export controls; and restrictions on foreign scholars, students, and S&T workers; all of which limit flexibility in acquisition options and cost savings.
13.	Uncertainties regarding China and Russia: With their large nuclear and conventional forces, and their internal changes, will they be integrated into the new global security environment.

Table 1. Changes Driving National Security Transformation

ASSUMPTIONS FOR THE 21ST CENTURY

Based upon an assessment of the current trends in the political, economic, technical and military environments, the Task Force derived four key assumptions for the coming decade of the 21st Century. Each is discussed in greater detail in the body of the report:

1. **U. S. National Security needs will continue to evolve.**
2. **Militarily-relevant technology will continue to change rapidly and will be increasingly global.**
3. **Defense dollars will likely decline in real terms and significant Supplementals will not be the norm.**
4. **Significant shifts in resource allocations within DoD will be implemented to achieve enhanced capabilities (e.g., toward net-centric system-of-systems; toward intelligence and unmanned systems; toward homeland security; from fighter aircraft; from large ships; etc.).**

THE COMING CRISIS

The world is at an inflection point, not unlike that following the launch of Sputnik or the fall of the Berlin Wall. National security is being redefined geopolitically and technologically, as well as in terms of threats, missions, warfighting processes, and commercial structure. A holistic perspective is required to ensure integrated efforts between DoD and the Department of Homeland Security and the Director of National Intelligence, as well as with the Department of State and multinational partners.

While there is widespread recognition of the need for change in the current Customer/Supplier relationship, the recent past decade of solid defense budget growth and wartime optempo have deferred difficult choices between sustaining the current force structure and investing in the future force. Further, the controlling acquisition policies, practices, and laws, and the Services' priorities, as reflected in their budgets and "requirements," have not transformed sufficiently to meet the needs of this new National Security environment.

On the "demand side," DoD needs to replace weapon systems consumed in current theaters, during an anticipated decline in the budget while accelerating the acquisition of net-centric systems-of-systems and other next generation equipment and services to counter asymmetric warfare so that the U.S. is prepared to support 21st Century military requirements.

On the "supply side", the last two decades have seen a consolidation of the defense industry around 20th Century platforms. Looking ahead, the critical challenge for DoD is to employ its leadership and influence in transforming the defense industry around a 21st Century National Security Industrial structure.

OVERVIEW OF TASK FORCE KEY FINDINGS AND RELATED RECOMMENDATIONS
<p>FINDING 1: <i>Current trends/policies will not result in an effective industrial base</i></p> <p>RECOMMENDATION 1: Articulate a National Security Industrial Vision; adopt government policies to implement the Vision; structure incentives for industry to achieve the Vision; and monitor ongoing industrial dynamics to ensure its realization.</p>
<p>FINDING 2: <i>DoD must drive transformation to a 21st Century military</i></p> <p>RECOMMENDATION 2: Focus on interoperable, Net-Centric Systems-of-Systems (with independent "architects" and enhanced government management and systems engineering capability).</p> <p>RECOMMENDATION 3: Achieve lower costs and faster-to-field capabilities, while still achieving better performance.</p> <p>RECOMMENDATION 4: Train as we fight: Recognize the role of "contractors on the battlefield."</p>
<p>FINDING 3: <i>Government must change to facilitate the rapid and affordable acquisition of needed weapons, systems and services</i></p> <p>RECOMMENDATION 5: Focus on "staying ahead" by adequately resourcing "Engines of Innovation."</p> <p>RECOMMENDATION 6: Understand and realize the benefits of globalization while mitigating risk.</p> <p>RECOMMENDATION 7: Achieve far greater use of "best value" competitions and foster long-term competitive dynamics.</p> <p>RECOMMENDATION 8: Transform the DoD logistics system into a world-class, data-centric logistics system.</p>
<p>FINDING 4: <i>A weakened DoD acquisition workforce impedes the acquisition of military capability and government oversight</i></p> <p>RECOMMENDATION 9: Move aggressively to strengthen the future, high-quality, high-skill, Government Acquisition Workforce.</p>

Table 2. Overview of Task Force Key Findings and Related Recommendations

TASK FORCE FINDINGS AND RECOMMENDATIONS: KEY ELEMENTS

The Task Force developed four primary findings and nine recommendations, all of which are outlined in Table 2 and summarized below. While the performance of the National Security Industry will be impacted by changes at DoD (i.e., regarding DoD's role as the Customer and the way that DoD conducts its business), the focus of this Task Force was on the future of the National Security Industry itself (i.e., the "Supplier"). As a result, Finding 1 and the nine associated recommendations focus on the National Security Industry. The full report of the Task Force contains greater detail on all Findings and Recommendations, including specific proposals as well as details regarding implementation.

FINDING 1: In the absence of a fully articulated National Security Industrial Vision and associated Customer/Supplier relationship, the current direction of U.S. government policies will not achieve the required 21st Century structural capabilities. Therefore, it is critically important for DoD to articulate a National Security Industrial Vision and to: adopt government policies to implement the Vision, structure incentives for industry to achieve the Vision, and monitor ongoing industrial dynamics to ensure its realization. Defining a vision will be key to successful Customer/Supplier relationship transformation, as it guides policy changes, supporting plans and actions to transition from the current industrial base to one needed for the future. A clear vision also ensures that all stakeholders and decision makers are working toward a shared objective.

Recommendation 1: DoD must articulate a clear Vision of the National Security Industrial Base it needs to support the war-fighter in the 21st Century. This Vision should have four elements:

- Strong focus on competition to encourage both innovation and lower cost solutions, as well as to ensure that suppliers deliver their commitments, on schedule and within budget.
- Relentless search for superior technology, manufacturing and logistics coupled with a willingness to look beyond the traditional defense industry to commercial suppliers, including companies located outside the U.S. with militarily-relevant capabilities
- Increased attention to C4ISR, information technology and other Services. Over half of DoD's spending is currently on Services in a less rigorous process than that associated with Platform acquisition.
- Renewed effort to build a true partnership between government and industry (i.e., working together, but still in a competitive environment). The next decade is likely to be a turbulent period and close cooperation will be essential if DoD is to provide effective support to the war-fighter.

Once this Vision is identified, it must be implemented. This will require well-defined policies to execute each major element of the Vision, supplemented by a set of regulations to provide clear guidance to government employees and the industrial partners. These regulations must be collaboratively vetted with all stakeholders prior to implementation.

The eight other Task Force recommendations focus on the government changes necessary to address the three "demand-side" findings regarding DoD transformations required in order to

create the necessary changes in force structure (Recommendations 2, 3, and 4), in weapon systems (Recommendations 5, 6, 7 and 8) and in government personnel (Recommendation 9). These recommended government changes will be needed to create the necessary incentives for Industry to transform itself into the Supplier Base that DoD will require in the future.

FINDING 2: DoD must drive transformation to a 21st Century military. Current DoD policies, processes, and management of the Defense Acquisition Enterprise (broadly defined) impede the transition to an effective, agile, and affordable overall joint military force for the 21st Century. The Department must shift its focus from its historic, platform-centric orientation to a focus on IT-based, interoperable, net-centric systems-of-systems. Current DoD practices do not emphasize the necessary cost/performance balance to allow sufficient quantities of weapons to be procured nor do current practices recognize the realities of the 21st century “battlefield” on which contractors may represent 50% of the personnel in military operations (as is the case today in Iraq/Afghanistan).

Recommendation 2: Focus on interoperable, Net-Centric Systems-of-Systems (with independent “architects” and enhanced government management and systems engineering capability). To achieve this, a Joint System-of-Systems management and oversight structure with clear lines of responsibility, authority, associated funding, and an appropriate systems architecture/engineering management organization must be established. Joint Forces Command (JFCOM) should be identified as the DoD institutional systems integrator; and educational and training programs should emphasize net-centric systems-of-systems engineering and management processes. (An organizational change that would facilitate this is to have the Assistant Secretary (Networks and Information Integration (NII)) report to USD (AT&L).

Recommendation 3: Achieve lower costs and faster-to-field capabilities, while still achieving better performance. This will require revising the “requirements process” to ensure that cost and schedule are part of a systems analysis/development planning effort that precedes approval of “firm requirements” by the Joint Requirements Oversight Council (JROC). This process should ensure that cost and schedule are Key Performance Parameters (KPPs). The revised process should include enabling the Program Manager to make cost/schedule/performance trades on each subsequent block, or increment of capability, with the approval of USD (AT&L)/SAE and lead-Service Vice Chief, without going back to the JROC. Additionally, utilization of a Modular Open Systems Approach (MOSA), in conjunction with spiral development, for long-term weapons and systems development should be combined with experimentation on prototypes to establish firm achievable requirements for new systems and subsystems. To support this recommendation, there is also a need to create and fund a Rapid Fielding Organization⁴ for fast-responses to urgent operational needs.

Recommendation 4: Train As We Fight: Recognize the role of contractors in the “battlefield.” Future operations are most likely to be “expeditionary” and to have large numbers of contractors involved (≈50% of the coalition “forces” in the Iraq/Afghanistan conflict are private-sector contractors). Leadership training, contingency planning, and military “exercises” must include preparations for the role of contractors in future military operations. Contracting procedures and

⁴ As described in the Defense Science Board 2006 Summer Study Report, “21st Century Strategic Technology Vectors,” especially Volume IV, “Accelerating the Transition of Technologies into U.S. Capabilities.”

practices must recognize the unique requirements of operations, in an expedited, flexible fashion, in a dangerous war zone⁵.

FINDING 3: *The Government must change to facilitate the rapid and affordable acquisition of needed weapons, systems and services.* U.S. Government policies, practices, and processes do not facilitate the development, deployment, and support of the innovative, affordable, and rapidly-acquired weapons, systems, and services needed for the 21st Century forces. To achieve its future objectives, the Department must focus on “staying ahead,” by adequately funding “Engines of Innovation” and changing current rules that prevent DoD from realizing the benefits of globalization. Additionally, DoD must take advantage of “best value” competitions, and create an environment which better fosters long-term competitive dynamics. Finally, there is an urgent need to transform the DoD logistics system to a modern, world-class, information-based, data-centric logistics system.

Recommendation 5: Focus on “staying ahead,” by adequately funding “Engines of Innovation.” Implementation of this recommendation will require: focusing a significant share of the Services’ R&D dollars on “disruptive” architectures and technologies; emphasizing competitive prototypes and technology demonstrations; establishing “prospectors” for commercial and foreign technologies; encouraging dual-use technology; adequately funding fundamental research; and establishing increased budgets and higher Small Business Innovation Research (SBIR) limits on firm size and award amounts.

Recommendation 6: Understand and realize the benefits of globalization while managing risk. This will require adjusting the ITAR, Export Controls, Berry Amendment, specialty metals, and other limitations that hinder DoD’s ability to procure world-class capabilities from the rapidly-evolving global technology and security market; implementing recommendations made in the 1999 DSB Task Force on Globalization and Security and the 2000 *Defense Trade and Security Initiative*; and developing effective tools and techniques to ensure security of Commercial Off the Shelf (COTS) hardware and software.

Recommendation 7: Achieve far greater use of “best value” competitions and foster long-term competitive dynamics. This will require R&D funding for a second source for next-generation, prototypes to achieve lower cost and/or higher performance; require MOSA on all systems; maintain the option for competition in sources beyond initial award; create profit incentives to encourage development of cost savings and improved productivity; and institutionalize smart make/buy decisions by awarding extra points in the RFP for assessment of proposed make/buy decisions and empowering PMs to be ongoing arbitrators of make/buy implementation decisions.

Recommendation 8: Transform the DoD logistics system into a modern, world-class, Data-Centric Logistics System. This requires a shift from a “supply push” system to a “demand pull” system based on: “sense and respond” and secure, integrated, end-to-end IT; logistics R&D funding to develop alternatives that improve speed and reduce costs throughout the life cycle; competing (public vs. private) for all “non-inherently governmental” logistics work; and use of performance-based-logistics, warranties or other “gainsharing” incentives on all systems (both

⁵ For details on this recommendation, refer to Urgent Reform Required: Army Expeditionary Contracting, *Report of the Commission on Army Acquisition and Program Management in Expeditionary Operations*. October 31, 2007.

legacy and new) to increase availability while lowering support costs. Existing commercial logistics systems offer depth of experience in the areas of logistics innovation and proven effectiveness upon which DoD can build.

FINDING 4: *The weakened DoD acquisition workforce impedes the acquisition of military capabilities as well as government oversight of program management.* Shortage of many of the essential skills needed by a world class Customer (e.g., systems engineering, program management, and advanced IT) combined with the near-term retirement of a large number of experienced, senior DoD acquisition professionals and the substantial reduction in DoD's acquisition workforce during the last ten years significantly impedes the development, production, support, and oversight of the military capabilities needed for the 21st Century.

Recommendation 9: Move aggressively to strengthen the quality, stature, and training of the future high-quality, high-skill, Government Acquisition Workforce. This effort will capitalize on the flexibility of the National Security Personnel System to compete with industry for “the best and the brightest;” provide rewards for creative, innovative DoD workforce behavior; introduce “Presidential Management Fellow”-type programs to attract top candidates from graduate programs; strengthen program management, systems engineering, production and logistics support; strengthen government contracting and contract management; encourage industry-to-government and government-to-industry rotations; and provide General Officer positions for military acquisition professionals to aspire to in their careers.

A NEW INDUSTRY/GOVERNMENT FRAMEWORK, DRIVEN BY A NEW DoD BUSINESS/ACQUISITION MODEL

The conclusion of this Task Force study is that “today the nation has a consolidated 20th Century Defense Industry, not the transformed National Security Industry needed for the 21st Century.” To achieve the required industrial transformation, it will be necessary to transform the way the government (especially the DoD, but also the Congress) conducts its business. In essence, the “demand side” must change in order to transform the “supply side.”

New DoD Business/Acquisition Model. The new business model proposed by the Task Force is characterized by the following attributes:

1. An adequately-sized, high-quality, highly-skilled, and well-trained Government Acquisition Workforce; with a systems-of-systems focus as the norm;
2. A clear priority and focus on innovation and technologically-advanced, fielded systems;
3. An acquisition management structure geared to deal with joint (multi-Service) net-centric programs, with clear lines of responsibility and budget authority;
4. Programs to bridge future technology potential, prior to established requirements and production programs, including easy access to fast moving commercial technologies;
5. Recognition of the benefits of globalization and a reasonable system for managing the risks of foreign sourcing and teaming; and

6. Appropriate contract and competition structures for acquiring products and services.

Business/Acquisition Model Objectives: By partnering with Industry to implement this new DoD business/acquisition model, the Department will be able to achieve the following objectives:

1. A robust, responsive, and innovative National Security Industrial Base;
2. Effective acquisition, management, and support of large, complex systems, systems-of-systems and services; and
3. An effective, agile, and affordable joint military force to meet 21st Century needs.

Before either the Industrial Base or the Business/Acquisition Model can change, the DoD and Congress must shift from a posture of “maximum risk avoidance” to an objective of “effective and efficient acquisition risk management.” The model for this transformed industrial structure is a partnership between Government and Industry, with both striving for an industry that is competitive, flexible, adaptive, agile, innovative, low-cost, and high-quality. The Chief Executive Officer (CEO) meetings with the Secretary of Defense (SecDef)/Deputy Secretary of Defense (DepSecDef) and Service Chiefs during which DoD and Industry exchanged ideas and concerns should be reintroduced, along with the establishment of DoD and private sector councils for finance, Information Technology (IT), Human Resources (HR), and logistics. Strong ongoing DoD leadership will be required to overcome expected institutional resistance. Little in the Customer/Supplier relationship will change unless these considerations become a high and continuing priority for the Nation’s future security.

IMPLEMENTATION

Personal leadership by the Secretary, the Deputy Secretary, Service Secretaries, and the Service Chiefs will be critical to implementation of the Task Force’s recommendations. USD (AT&L) should have overall responsibility for implementation of a majority of the recommendations, with the active support of senior military Department executives. In this Report, the Task Force defines the specific offices responsible for actions and monitoring of implementation in each of the nine areas of recommendations.

The current relationship between DoD and the consolidated 20th Century Defense Industry is based on a model of Customer and Supplier interaction that evolved to meet Cold War contingencies. Today’s broader U.S. National Security capability requirements call for customer and supplier interaction, as well as increased flexibility and speed in key acquisition processes, in order to achieve a new DoD Vision for the 21st Century National Security Industrial Base.

Over the years, there have been many recommendations for change in the way the DoD does its business (to improve its efficiency, responsiveness, effectiveness, etc.). Some of these recommendations have been implemented, but many have been strongly resisted. In recent years, especially in view of the large post-9/11 defense budget build-ups, there has been less pressure for “acquisition reform.” However, with the changed security environment and the

likely “budget crisis” it is essential that change takes place; if the Nation is to achieve the vision described in this report.

It will take time for both DoD and Industry to evolve in tandem to achieve this vision of a transformed National Security Industrial Base. However, it is the conclusion of the Task Force that the required actions must begin now, with the highest level of priority. The Nation’s future security depends on it.

I. OVERALL OBJECTIVES OF THE STUDY (SCOPE OF WORK)

The Defense Science Board (DSB) was requested jointly by the Under Secretary of Defense for Acquisition, Technology, and Logistics (USD [AT&L]) and the Acting Deputy Under Secretary of Defense for Industrial Policy (ADUSD [IP]) to establish a Task Force on Defense Industrial Structure for Transformation. The Task Force was requested to “describe the defense industry required to cope with the international security environment in the 21st Century,” in the Terms of Reference (TOR) for the study⁶. The TOR also requested that the Task Force characterize the likely and/or desirable degree of change in industry, due to the changing nature of the DoD and the industrial base, as well as examine existing mitigation measures and develop recommendations to ensure competition and innovation throughout the Department. In addition to these issues, the TOR requested that the Task Force address additional questions on such topics as: trends in globalization, DoD acquisition services, trends following the *1997 DSB Report on Vertical Integration and Supplier Decisions*, and best value competition.

Dr. Jacques Gansler served as the Task Force Chairman, with Mr. David Chu and Mr. Stephen Hull acting as Executive Secretary. Task Force Members were comprised of selected individuals from the public and private sector, including private consultants and legal experts in areas of the defense industrial base⁷. The Task Force held meetings between August 2006 and November 2007. Through the course of the meetings, the Task Force heard from numerous speakers⁸, including large and small defense contractors, as well as from the Services on current acquisition efforts. There were briefings on perspectives of Lead Systems Integrator (LSI) and incentives, as well as current military programs such as DDG-1000 and the Army Future Combat System (FCS).

The Task Force reviewed previous DSB studies, including the 1997 study on *Vertical Integration and Supplier Decisions*, and the 1999 study on *Globalization and Security*. Based on the findings and recommendations from the previous DSB studies, along with the information received during the briefings, the Task Force concluded that the Department would need to achieve the following core elements for the desired 21st Century National Security Industrial Base:

1. A more competitive environment in defense markets, for innovation and costs
2. An acquisition structure to address systems-of-systems, in an interoperable and resource-constrained net-centric environment
3. A new Government/Industry framework and business model for 21st Century needs
4. A Government and Industry acquisition workforce, with strong management and technical expertise.

⁶ See Appendix A for a complete statement of the Terms of Reference.

⁷ Appendix B provides a full list of Task Force Members and Advisors.

⁸ Appendix C provides a full list of briefings received during the course of the study.



II. THE COMING CRISIS

The U.S. Defense industrial base changed significantly due to dramatic reductions in the U.S. budget at the end of the Cold War. U.S. Defense firms were encouraged to consolidate. From fifty major defense contractors at the beginning of the 1990s, the defense industry consolidated into six large defense firms by the end of the decade. While competition still occurs between a few firms in each sector, the Government buyer can no longer benefit from a highly competitive defense market. The government now has to play a considerable role in maintaining minimal competition, horizontally in prime contractor selection and vertically in maintaining visibility over the make/buy decisions of the prime contractor.

By 2000, there were concerns about the current status and anticipated future trends within the defense industry. These concerns included a significantly declining overall DoD budget, reduction of corporate profits, considerable excess capacity in defense plants, lack of independent research, reduced capital investment by firms, and reluctance by scientists and engineers to join or remain in the defense industry. Following the terrorist events of September 11, 2001, the defense budget increased significantly. However, the government workforce – which had also been heavily consolidated during post-Cold War events – was not increased by Congress to meet the management challenges associated with increased budget dollars. The Defense Acquisition Workforce found it expedient to concentrate funding on prime contractors and their subcontractors. In the five years between 2001 and 2006 the amount of money awarded by DoD to prime contractors more than doubled from \$144B to \$294B, and the size of some individual contractor awards exceeded the total defense expenditures of several nation states.

The cost of individual weapon systems has risen dramatically. In spite of rapidly expanding defense budgets, the government was forced to utilize annual budget supplementals, (where approximately \$100B a year was added to the budget to help pay for “war costs”) as a result of extended conflict conditions in Afghanistan and Iraq; the high cost of manpower for large, deployed forces; and maintenance and operation costs for equipment. In this environment the net sales of large defense firms skyrocketed and profits reached record heights. The government has expressed concern that little of the increased revenues appears to be allocated to investments towards capital equipment or research and development. There is also a growing concern over whether adequate competition is possible within the newly-consolidated defense industrial structure.

The world is at an inflection point, not unlike that following the launch of Sputnik or the fall of the Berlin Wall. The national security arena is being redefined geopolitically and technologically, as well as in terms of threats, missions, war-fighting processes, and commercial structure. A holistic perspective is required to coordinate and integrate efforts with the Department of Homeland Security (DHS) and the Director of National Intelligence (DNI), as well as with the State Department and multinational partners.

While there is widespread recognition of the need for change, recent defense budget growth as a result of the Global War on Terrorism (GWOT) will almost certainly slow, and likely end.

Deferred difficult choices between sustaining the current force structure and investing in the future force will reassert themselves. Further, the controlling acquisition policies, practices, and laws, and the Services' priorities, as reflected in their budgets and "requirements," have not transformed sufficiently to meet the needs of this new world. This will be a source of significant challenge for future National Security decision makers.

On the "demand side," DoD will need to replace and refit weapon systems and platforms consumed in the current conflicts during a period of anticipated budget decline. At the same time, DoD will need to accelerate the acquisition of net-centric systems-of-systems, and other next-generation equipment, that anticipates the evolution of asymmetric warfare, so that the nation will have the needed 21st Century military force structure and capabilities. On the "supply side," the last two decades have seen a consolidation of the defense industry around its historical platform focus. A critical change for DoD will be to employ its leadership and influence in working with the defense industry to create a 21st Century National Security Industrial Supplier Base capable of meeting DoD's needs as the Customer.

The current U.S. defense industry must be restructured for the future to meet anticipated challenges. DoD also needs to modify its acquisition efforts to focus on information-based warfare as well as recognize the acquisition requirements associated with significant increases in role of contractors as service providers within the military enterprise. Events following the attacks on September 11, 2001 and the subsequent conflicts in Iraq and Afghanistan resulted in delaying these necessary changes which must now be addressed. Numerous changes are driving security transformation. These changes include, but are not limited to, the following factors listed below in Table 3.

CHANGES DRIVING NATIONAL SECURITY TRANSFORMATION

1. **Holistic View of Security:** Characterized by world-wide terrorism; pandemics; weapons proliferation; rogue nuclear states; energy dependence; insurgencies; environment; mass migration; regional conflicts; transnational threats; resource access (i.e., water, oil, critical materials).
2. **Domestic Economics:** In a constrained resource environment, with likely reductions in defense spending (including reduced or eliminated supplementals), trades between national security and other programs must be considered, including universal health care, Medicaid, Medicare, social security, and budget and trade deficits.
3. **Warfighting Changes.** From Cold War operations to net-centric Warfare; Asymmetric warfare (biological, cyber, Improvised Explosive Devices [IEDs]); Systems-of-Systems; Joint and coalition operations; evolving doctrine requiring frontline decision-making.
4. **Industrial Sector Changes.** Sector impacted by horizontal and vertical integration; commercial and foreign high-tech advances; open-network innovation; off-shore engineering and manufacturing; changing capital markets.
5. **Globalization:** Technology and industry are globalized; geo-politics and scope of threats requires security coalitions; DoD no longer the leader in all military technologies; global financial markets enable borderless investing.
6. **Technology Changes:** Including information technology, biological technology, nano technology, robotics, high-energy lasers, etc., and where evolutionary cycles are often measured in months. This requires not only a more responsive defense industry, but one capable of drawing on both the commercial and the global market.
7. **New Missions:** New tasks include support of homeland security; missile defense; counterinsurgency; stability and reconstruction; cybersecurity; biodefense; non-kinetic situational influence of operations.
8. **Unpredictability:** Unpredictability in today's world requires agility, rapid responsiveness, and broad-based capabilities.
9. **Intelligence Changes:** Intelligence is focused on integrated data, open-sources, language, and cultural understanding, as well as real-time intelligence flow between soldier/sensors and command structure.
10. **Government and Industry Workforce Changes.** The government workforce is aging; has the wrong skill mix; uses rules vs. judgment; are "managers" vs. "doers"; but it is difficult to attract and retain top people. The industry workforce is also aging; eroded systems engineering skills; difficult to attract and retain top Science and Technology (S&T) people.
11. **Defense Budget Changes:** Resource shifts from Equipment to Personnel, O&M and Homeland Security; frequent changes cloud spending outlook and planning (e.g., 50% procurement drop in 1990s, then doubling in 2000s).
12. **Isolationist/Protectionist Constraints:** Despite globalization, U.S. policy continues to not allow the nation to gain the security and economic benefits that could be realized; instead focusing on "Buy American," the Berry Amendment; obsolete International Traffic in Arms Regulations (ITAR) and export controls; and restrictions on foreign scholars, students, and S&T workers; all of which limit flexibility in acquisition options and cost savings.
13. **Uncertainties regarding China and Russia:** With their large nuclear and conventional forces, and their internal changes, will they be integrated into the new global security environment.

Table 3. Changes Driving National Security Transformation

Significant security-environment changes, such as radical Islam, rapidly growing Asian economic powers, challenges from a resurgent Russia, growing threats from weapons of mass destruction (WMD), transnational crime, and weapons proliferation will add to the current list of U.S. security challenges. Continued trends, toward a more diverse and unpredictable nature of conflicts and crisis, coupled with agile and innovative adversaries, are anticipated to increase the threat within the Continental United States (CONUS). A major nuclear/chemical/biological event could drastically alter budget allocations as well as DoD's role and responsibility.

Defense budgets are anticipated to decline in real terms and significant supplementals will no longer be the norm. Market forces alone are unlikely to achieve the government's desired objectives in industrial or military capability, capacity, and future investment. Government customers must make the difficult decisions that will result in stimulating the required shift in resources. Technology will continue to change rapidly, with industry and technology moving toward global practices, often with foreign leadership. DoD's use of technology will become increasingly "non-traditional" as it is applied to such areas as unmanned systems, directed energy, and nanotechnology. Most significant research breakthroughs will occur at the intersection of technologies. Examples of the critical intersections include: bio and information technology, bio and materials, materials and information technology. Militarily-relevant industry, research, and development will be global, often with foreign technical and production leadership. In order to "stay ahead" of competitors who are at liberty to source from "best practices" anywhere in the world, the U.S. government will need to empower industry to fully utilize worldwide technology, including commercial companies not structured to serve national security markets. Shifting technologies will require an adjustment in the structure and processes of the National Security Industrial Base. DoD will also need to create stronger incentives for defense firms to achieve a balance between innovation that delivers superior capability and increased production quantities of existing designs.

Some aspects and trends of today's national security posture are likely to persist, if not increase, in the future. Current platforms, and those under near-term production timetables, will form the major fielded platforms for the next 20+ years. R&D investments will need to shift to net-centric-relevant architectures, software, and Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance (C4ISR) systems which must be optimized for performance and cost, as "systems-of-systems." Services provided by contractors to DoD will continue to grow from the current level of 60 percent of contract dollars. Intelligence and unmanned systems will receive greater focus. Homeland Security will receive an increased emphasis and the integration of the Department of Homeland Security (DHS) and the Director of National Intelligence (DNI) requirements with DoD needs will be of greater importance. There will also be the need for improved ties and increased shared capabilities between DoD and the Department of State in a future environment that increasingly emphasizes partnership coalitions as well as military operations with key allies.

As noted above, this is a critical period for the defense industrial base, similar to that of the impact of the launch of Sputnik or the fall of the Berlin Wall. The security world has been changing dramatically since September 11, 2001 – geopolitically, technologically, and commercially, as well as changing threats, missions, and warfighting – and a holistic perspective is required.

Despite these changes in nature and optempo of current and near-term military operations, the controlling Acquisition policies, practices and laws, as well as the Services' budgets and requirements priorities, *have not been transformed to match the needs of the new world.* Moreover, the recent decade of solid budget growth during wartime, which will almost certainly change, has deferred difficult choices on resource allocation.

The last two decades have seen a consolidation of the 20th Century defense industry. The next step is for DoD and Industry leadership to achieve a transformation to a 21st Century National Security Industrial Base capable of meeting the future needs of the DoD.



III. KEY FINDINGS AND RECOMMENDATIONS

Throughout the course of the study, the Task Force encountered four Key Findings, broadly-defined as the following:

1. There is a critical need for DoD to establish a National Security Industrial Vision, working with industry to ensure realization of an improved Customer/Supplier relationship.
2. DoD must also drive business practice transformation of its own in support of a 21st Century military.
3. The Government must facilitate the rapid and affordable acquisition of needed weapons, systems, and services that are world-class.
4. The DoD acquisition workforce must be strengthened in order to facilitate the timely and cost effective acquisition of military capabilities and provide enhanced government oversight of program management.

Creating a vision is key to successful transformation since it guides policy changes and supports plans and actions to transition from the current industrial base to one necessary to meet future military requirements. A clear vision also ensures that all stakeholders and decision makers are working toward a shared objective.

To achieve an effective and affordable 21st Century National Security posture, there is a need for fundamental change in the way in which the government conducts its business as the Customer. Such change and the strong leadership that accompanies it is intended to result in a significant improvement in the responsiveness of the National Security Industrial Base as the Supplier to DoD. Necessary improvements include overriding laws which constrain innovation, streamlining the requirements, resource allocation, acquisition and support processes. To achieve such major change successfully, DoD must work closely with Industry, as well as with other key government agencies and Congress. In turn, Industry must be prepared to respond and adapt to new responsibilities.

Based on the above-noted four Key Findings, the Task Force makes the following specific recommendations for actions by the DoD toward creating conditions for a National Security Industrial Base for the 21st Century:

In response to Finding 1, DoD should:

- 1. Articulate a National Security Industrial Vision.**

In response to Finding 2, the Department should:

- 2. Focus on interoperable, net-centric systems-of-systems (with independent “architects” and enhanced government management and systems engineering capability).**

3. **Achieve lower costs and faster-to-field capabilities, while still achieving better performance.**
4. **Train As We Fight: Recognize the role of contractors on the “battlefield.”**

To accommodate changes for Finding 3, the Department should:

5. **Focus on “staying ahead,” by adequately funding “Engines of Innovation.”**
6. **Understand and realize the benefits of globalization.**
7. **Achieve far greater use of “best value” competitions, and foster long-term competitive dynamics.**
8. **Transform the DoD logistics system to a modern, world-class, information-based, data-centric logistics system.**

Finally, in response to Finding 4, DoD should:

9. **Move aggressively to strengthen the future high-quality, high-skill, Government Acquisition Workforce.**

FINDING 1:

IT IS CRITICALLY IMPORTANT FOR DoD TO ARTICULATE A NATIONAL SECURITY INDUSTRIAL VISION, ADOPT GOVERNMENT POLICIES TO IMPLEMENT THE VISION, STRUCTURE INCENTIVES FOR INDUSTRY TO ACHIEVE THE VISION, AND MONITOR ONGOING INDUSTRIAL DYNAMICS TO ENSURE ITS REALIZATION.

Today’s defense industry has changed significantly as a result of recent consolidations and ongoing merger and acquisition (M&A) activity (See Figure 1). Compared to a decade ago, there is greater horizontal concentration and vertical integration, as well as increased combinations of service and product firms, at both the prime and subsystem levels. While multiple suppliers still exist in most major market areas, a few large players have established dominant positions in multiple segments. “Super Primes” created through consolidation have been afforded broad program responsibility and authority to manage the supplier base. This creates powerful incentives for these firms to drive profitability associated with existing programs rather than propose significant innovation related to functionality or alternative subsystems. Large Scale Integrator (LSI), Total System Performance Responsibility (TSPR), and similar models have given Primes the defacto authority over systems engineering, subsystem make/buy decisions, and allocation of R&D resources to the supplier base. This situation becomes critical when the five largest Primes have been awarded discretion over 40 percent of the total acquisition budget.

Defense contractors have recovered from their financial challenges of the 1990s and now are generally strong. The anticipated decline in future defense budgets will force defense contractors to adopt coping strategies, such as market exit, further consolidation, or limited investment. These strategies may be positive for shareholders but may be contrary to DoD’s interests as the Customer. There are indications that less “disruptive” innovation is coming from large defense

firms than in the past. DoD has taken a shorter-term focus on R&D and is providing fewer incentives for innovation (e.g., reduced funding for unsolicited proposals, competitive prototypes, and demonstrations), especially from smaller, and/or non-traditional suppliers. Large companies tend to be more conservative about R&D and small financial incentives from DoD to explore alternative solutions to existing challenges are unlikely to get attention from the Primes. Small and medium-sized acquired companies often tend to lose their innovative culture following acquisition, when their lead innovators leave the acquiring firm to become serial entrepreneurs. Many “startup” small and mid-size innovative firms are not sufficiently encouraged by the government through access to sizable contracts in order to thrive within the industrial base.

There have also been significant changes in the growing Service sector as many assignments previously conducted by uniformed or government personnel have been outsourced. At the same time, many of the systems engineering firms which previously provided independent assessment have been acquired by the large prime contractors. The significant concentration of defense industry jobs in fewer geographic locations has resulted in more concentrated political power with increased emphasis on maintaining current programs and platforms at the expense of making important changes toward fulfillment of emerging requirements by new programs and or alternative suppliers.

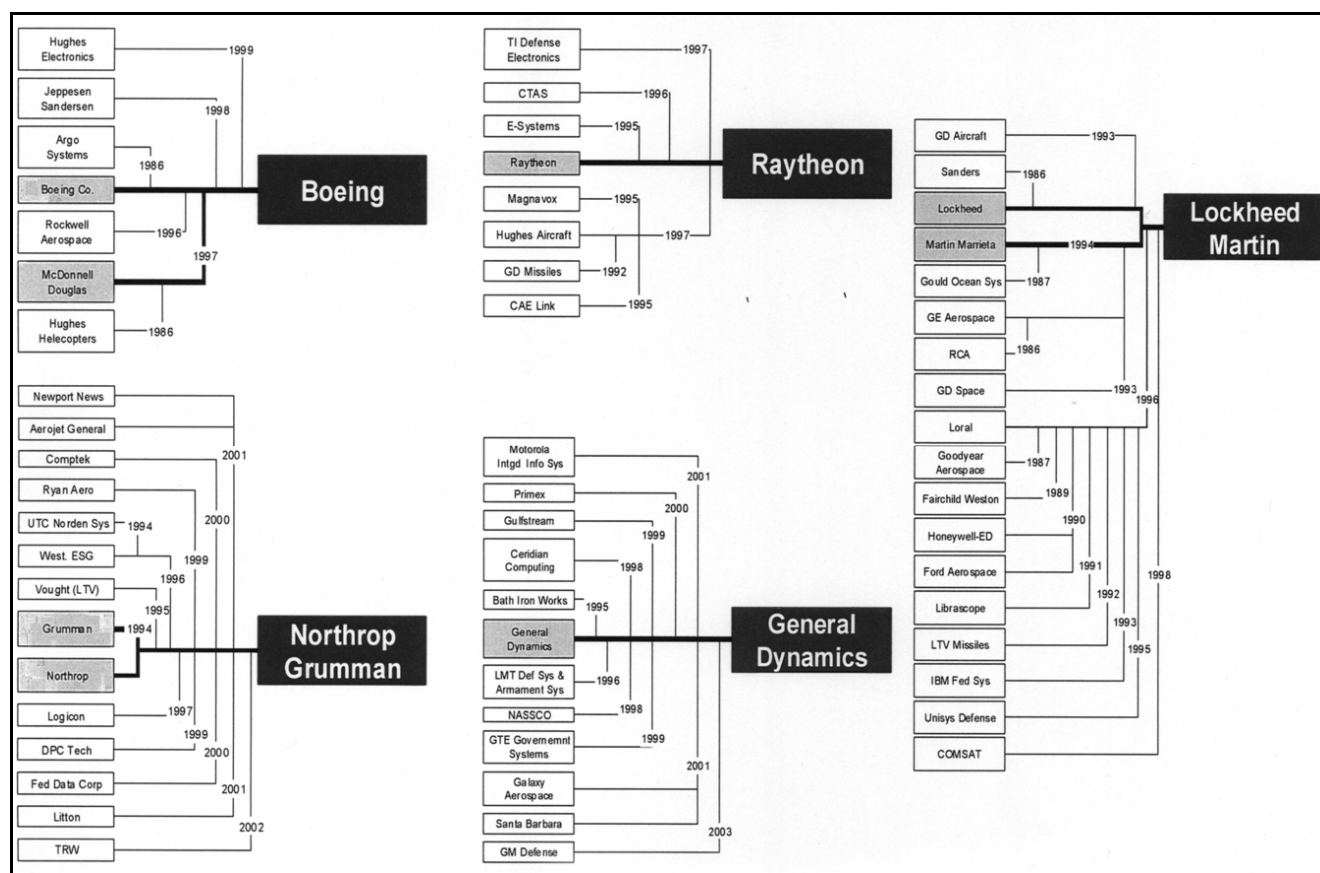


Figure 1. Prime Contractor Consolidation

The combination of today's DoD buying practices, regular barriers-to-entry, and the consolidating defense industrial structure, both current and projected, are increasingly limiting competition and putting DoD's ability to procure innovative, affordable, and advanced weaponry at risk. Vertical integration is also recognized as a systemic issue today. The 1997 study of the *DSB Task Force on Vertical Integration and Supplier Decisions* found that, at an early stage in the consolidation process, vertical integration "does not appear to be a systemic problem today but warrants caution." However, consolidation, especially vertical consolidation and diversification to other national security sectors, has continued since the 1997 study. While not widely pervasive, there is evidence that continued vertical integration poses significantly increased risks to competition, due to inherent attributes of the consolidating defense market structure. The combination of the Super Primes' broad program authority, along with their substantial subsystem capabilities, creates unintended incentives that undermine subsystem competition as well as the analysis of alternatives. Additionally, increased anecdotal evidence shows that, while subsystem and product providers are generally healthy, they face increasing challenges. There are complaints of unfair make/buy decisions, concerns over a lack of R&D flow down – where primes strategically keep developmental subsystem work "in house" rather than sharing with their subcontractors. As a result, subsystem firms increasingly do not bid in some areas due to competition from Super Primes who are also their lead customers.

Barriers-to-entry into the Defense Industrial Base are already high for commercial firms, and are increasing. There are significant barriers (especially in the R&D area) for advanced-technology commercial firms, cutting-edge commercial products, and commercial practices to contribute to the U.S. National Security Industrial Base, especially if they employ foreign technology and/or production.

There is also significant risk of emerging Organizational Conflicts of Interest (OCI) with consolidation of systems and/or product firms with Systems Engineering and Technical Assistance (SETA) service providers. As a consequence of these market dynamics, different business units of the same firm can end up with both the service and product side in the same program or market area. The result creates more classic OCIs, based on bias, impaired objectivity, and informal anomalies. Clusters of these conflicts in a market area are not inherently resolvable through firewalls or similar mitigations. Recusals and other structural solutions are necessary.

As a result of consolidation, prime contracts going to the mid-sized, independent firms have been greatly reduced, in both products and services. Second tier firms' share of DoD prime funds shrunk from 50% to 30%, from 1995 to 2004. Service contracts to mid-sized companies are down from 44% in 1995, to 33% in 2006. This reduction of mid-sized company awards deprives DoD of some of its best sources of competitive, innovative, and cutting-edge technical support.

Dynamic, agile, innovative, and information-based processes and practices are necessary to deliver a 21st Century National Security Industrial/Government framework, yet current regulatory processes, including DoD processes and internal corporate practices, are more applicable to a static industrial model. For example, DoD's portfolio management by product line tends to be platform-centric, not network-centric. As a result, industry's portfolio management is also platform-centric. DoD-driven processes have resulted in a defense industry

that often lacks the necessary agility and flexibility to respond to rapid changes in missions and requirements, while commercial high-tech industries are more adept at this. Significant U.S. governmental internal or institutional barriers exist, and are growing, especially for advanced-technology commercial and/or foreign firms.

Furthermore, the defense industrial base is undergoing fundamental change, but DoD has failed to adapt and/or respond in many areas. DoD now buys more services than hardware, yet its acquisition practices are hardware-focused and poorly suited to acquire services. Product acquisition gets the most attention, so higher skilled individuals tend to cluster there at the expense of needed competency throughout the system. Sophisticated and targeted acquisition strategies and/or approaches are needed to purchase the broad span of services. One size does not fit all. Training on acquisition of sophisticated services, especially for contingency services, is in great need of improvement. Despite increased industry concentration and capabilities/competition changes, DoD leadership attention and resources devoted to industrial issues declined. Also, current national security industrial base policies do not consider the significant part of the industrial base in the public sector, such as depots, shipyards, and arsenals (as shown in Table 4).

Category	Civilians	Military	Contract Personnel	FY06 O&M \$M
Air Logistics Centers	21,100	216	500	\$5,025
Army Depots	15,400	17	2,850	\$3,831
Naval Aviation Depots	10, 900	106	683	\$1,868
Naval Shipyards	25,000	1,655	616	\$3,736
Marine Corps Depots	1,700	11		\$496
Ammo Plants	2,000	5	18	\$275
Arsenals	3,050	5	53	\$502
Approx. Totals	69,150	2,014	4,700	\$15,733

Table 4. FY06 DoD Production and Repair Facilities⁹

DoD continues to retain more facilities and capabilities than are needed for anticipated requirements. Base Realignment and Closure (BRAC) 2005 largely failed to reduce capacity, with the BRAC Commission rejecting even the limited DoD recommendations. While the current backlog in providing logistical support to U.S. forces deployed in Iraq and Afghanistan

⁹ Based on DoD Reports to Congress – Notes:

1. Contract personnel numbers are based on telephone reports from each facility and clearly are not comprehensive.
2. Civilian personnel numbers are rounded to the nearest 100.
3. Funds do not include Working Capital Funds (WCF), which are not available for all facilities.

For those facilities for which data are reported, however, WCF in aviation depots equal or exceed the respective O&M funding levels.

by some Army depots counters the previous statement, funding may bear significant blame. Also, the Congressionally-mandated 50-50 rule that requires 50 percent of all government depot work to be performed by government personnel in government depots still causes trouble for partnerships (e.g., work done by an Air Logistics Center (ALC) under subcontract to a defense prime contractor counts as private sector work under the 50-50 rule).

RECOMMENDATION 1:

ARTICULATE A NATIONAL SECURITY INDUSTRIAL VISION

This recommendation includes four key elements:

- 1.1 Articulate the Vision
- 1.2 Implement the Vision
- 1.3 Structure Incentives
- 1.4 Monitor Dynamics

1.1 Articulate the Vision

DoD leadership must take an active and personal role in determining the desired industrial structure that will meet DoD needs as the Customer in the 21st Century. Based on this Vision, DoD should adopt government policies to implement the Vision, structure incentives for industry to achieve the Vision, and monitor ongoing industrial dynamics to ensure its realization. For the desired industrial structure to be achieved, private sector management teams who exercise sound stewardship of defense industrial base assets will need to look at the long-term horizon, focusing on technology investment and cost reductions in addition to ongoing prudent financial management. To permit competition for excellence, there should be at least two healthy suppliers in mature market areas, with a greater number of suppliers in areas where the demand is high and innovation is critical to meet future war fighting needs. Preferably, one or more suppliers would be independent of prime level contractors, especially in key subsystem areas. Each supplier should also have strong design and system engineering teams.

Further consolidation among the leading, large prime-level integrators would not provide sufficient benefits to DoD's Customer relationship with Industry to justify the adverse potential impacts on competition. Strong, independent systems architecture/engineering firms would advise the government on systems-of-systems solutions. Numerous small, mid-sized and commercial firms should be funded and provided opportunities to present and demonstrate new ideas. Structural separation beyond firewalls should occur between SETA service providers and hardware/software providers, with significant work in the same business area, to avoid COI. There should also be effective management of the supplier base by prime contractors and DoD, to ensure fair and objective make-buy decisions, in addition to recusals from managing subsystem competitions where the in-house supplier is bidding. There should also be a reasonable flow-down of R&D dollars from the Primes to their suppliers. All non-inherently-governmental work should be competitively sourced (via public/private) competitions.

1.2 Implement the Vision

DoD policy must define and use various tools to maintain competitive sourcing at prime and sub-tier levels, especially universal adoption of the Modular Open Systems Approach (MOSA). DoD must also establish a Program Executive Office (PEO)-level ombudsman to address concerns of subsystem/product firms, and must demonstrate commitment to maintaining competition in defense markets, with merger reviews focused on the impact of proposed M&As on continuous competition. The Department should require PEOs/PMs to consider a competitive environment when structuring acquisition strategy for R&D and procurement programs. DoD must assess the impact of program acquisition strategy on industry – will it dissuade entrants or result, in the long term, in unacceptably reducing the number of competitors, including market-limiting teaming? DoD must realize that there is no “one size fits all” approach and use various tools to maintain competitive sourcing, such as:

- Use of R&D funds to maintain the design team for an alternative (competitive) supplier;
- Down-select to two suppliers (not “winner take all”), and continue to compete for shares of the buy;
- Build-in periodic competitions of subsystem upgrades on major programs;
- Allow foreign competitors to compete and to win if they are the best-in-class and can address security concerns;
- License additional suppliers to utilize technology or enter into build-to print contracts, where volume permits; and
- Seek out commercial entrants by using streamlined commercial contracting practices that will reduce barriers to contracting with DoD.

Given the current Industrial Base market structure and the incentives it creates, DoD should require PEOs/PMs to adopt the following approaches in new major programs, or the next phase of an existing program, unless an exception request is granted by USD (AT&L). This approach must be briefed to the Defense Acquisition Board (DAB).

- Take the past performance record of Primes on Make/Buy into account as a best-value award criteria;
- Reinstitute development planning (including subsystems);
- Provide the government oversight of major Make/Buy decisions by Primes through the PM; treat as OCIs and appoint independent monitor to select sources in areas where prime competes for sub-tier work;
- Define directed subsystem competitions, managed directly by DoD PEO/PM, where appropriate; and/or
- Require system prime to sign up to appropriate hardware and software exclusions.

DoD senior leadership should offer industry clear and consistent public guidance on M&A policies and processes in speeches, documents, and other public fora. DoD should reaffirm its

commitment to maintaining competition in defense markets, with merger reviews focused on the impact of proposed M&As on continuous competition. DoD should also encourage firms to eliminate excess and/or underutilized capacity and may need to provide incentives to do so. Merger reviews should focus on where the acquisition will provide true consolidation savings from capacity and/or overhead reduction while still maintaining competition in the sector. The Department should signal different treatment for legacy and innovation markets in merger reviews; where higher levels of competition are sought in innovation markets and would be a key to enabling technology sectors to support 21st Century security operations.

Additionally, in view of today's consolidated defense industrial structure, the Department should announce "yellow" lights, indicating the likelihood of close DoD scrutiny of the following types of M&A transactions:

- Mergers among the top defense "super prime" firms that could create undue concentration in platforms, pose extensive vertical concerns and/or further concentrate program authority and DoD budgets into fewer firms
- Vertical acquisition by a system prime of critical, discriminating capabilities in areas where there are few competitors and/or where the service/SETA acquisition would present potential future conflicts

DoD should issue a clear explanation of the M&A process. The Department should reconfirm the policy of making merger decisions based on an *objective analysis of facts* at the OSD level, removed from the direct acquisition customer. PEOs/PMs would provide input, but they would not be the drivers. The Department should also publicize the clear entry point (through the Deputy Under Secretary of Defense for Industrial Policy (DUSD [IP])) for firms to discuss merger review issues. This will improve the review process for all types of firms, including commercially-oriented, smaller firms. DoD should develop product technical market analysis baselines and frameworks for assessing mergers in rapidly-changing, complex areas of C4, IT, net-centric capabilities and services. This will provide a clearer DoD focus and speed up the review process. Lastly, DoD should articulate a clear OCI policy for the consolidating marketplace. Through this, DoD would establish an inter-service OCI Review Board, led by DUSD (IP), to develop the overall COI policy. DoD would also closely examine proposed mergers between each service and system integrator and/or product provider for OCI issues during anti-trust reviews. A clear OCI policy would signal DoD's preference for structural solutions in situations where multiple OCIs exist.

1.3 Structure Incentives

Implementation requires greater DoD visibility into the overall capabilities of the global, private and public sectors, and specific insight into the national security industry. DoD should use such insight to work with Industry to determine an appropriate mix of incentives for industry to embrace the National Security Industrial Base Vision and undertake the actions necessary to achieve it. Incentives should include establishment of multiple centers of excellence based on industry and technology/product focus; drawing upon market-savvy experts to support acquisition strategies; and emphasis on diversity in make/buy decisions.

DoD must achieve greater visibility into, as well as greater effectiveness and efficiency from, the overall capabilities of the private and public industrial sectors. The Department should develop and deploy cross-DoD insight of the national security industry and add or align resources within OSD and the Services to focus on industrial capabilities. Experts would participate in technology, system and/or program reviews to provide insights on industry. At least every three years, a detailed sectoral analysis of each critical sector of the defense industrial base should be performed, and ensure that all stakeholders are informed. This would include, in each sector, a focus on the ability to have R&D competition, the potential for civil-military integration, the capabilities of the public sector, a global marketplace understanding, and the development of a risk-management plan for critical elements. Military Services would then create centers of excellence, or an equivalent network, of industry and technology and/or product market-savvy experts to support Service Acquisition Executive (SAE)/PEOs in acquisition strategies, M&A reviews, and other events. Lastly, DoD should compete – using public versus private firms, or public/private versus private firms – current government (non-inherently-governmental) commercial operations, such as depots and shipyards.

1.4 Monitor Dynamics

DoD should ensure M&A reviews meet the infrastructural goals of the Vision.

The Department should take action to remove the barriers-to-entry in order to broaden the range of suppliers to DoD and enhance the effectiveness and efficiency of the industrial base. DoD should revise the FAR and address other laws, policies, and practices required to encourage the integration of commercial technology and practices, including those from foreign sources. Acquisition practices, such as specialized cost accounting standards (CAS), should change to encourage civil-military industrial integration at the plant level. Barriers to commercial firms, such as CAS, should be removed, and participation through Other Transaction Authority (OTA), FAR Part 12, and other areas should be encouraged, especially at the lower tiers, to discourage pass-through requirements. DoD should also change profit and overhead policy to encourage the structural shifts, capital investments, lower-cost initiatives, and incentives-for-entry by new and commercial firms. DoD should take a leadership role in getting changes made in ITAR and EAR, in order to take full advantage of the potential benefits of globalization. DoD should also ensure the availability and use of strong, independent systems architecture and/or engineering firms as a staff function to the government, through acquisition strategy and the RFP process.

Additionally, DoD should work with industry and the National Institute of Standards and Technology (NIST) to establish standards, interface protocols (not common systems), and security procedures to allow and require full net-centric industrial operations. This would occur in all life-cycle phases and at all times, between government and all tiers of industry. The achievement of “Enterprise Integration” of all IT systems should occur across DoD, and between DoD and industry at all levels. This should be the role of the Business Transformation Agency. Development and implementation of new regulations and practices for procuring services rather than “things” for professional services and contractors on the battlefield should also occur. The Department should also work with Congress to develop new legislation, regulations, policies, and an “Expeditionary FAR” manual to deal with the greatly increased roles of contractors in conflict areas. DoD should encourage more use of benefit-sharing Value Engineering Change

Proposals (ECPs) to reduce costs to the government, and to incentivize industry. Lastly, DoD should develop contract incentives or other procedures to eliminate excess capacity and discourage paying to create and sustain fully unique “per product” and/or plans with attendant overhead costs.

FINDING 2:

DoD MUST DRIVE TRANSFORMATION TO A 21ST CENTURY MILITARY.

Due to ongoing warfighting, resources have shifted in recent years to near-term demands at the expense of necessary long-term investments. This is placing future military technological leadership at risk. Funding for longer-term S&T, technology demonstrations, and industrial investments (in R&D and capital equipment) is declining in real terms. Funding for competitive prototyping and logistics transformation is limited, but both are critical elements of future military effectiveness and long-term affordability. Incremental resources are going to existing platforms versus meeting 21st Century technology-based systems needs through the introduction of new capabilities. The problem is compounded by the lack of DoD visibility and access to new technologies being developed outside of the traditional defense supplier base but which may have military relevance, such as biotechnology, nanotechnology, and IT.

There are legal and regulatory barriers as well as inadequate incentives to achieve higher performance and/or affordable solutions based on the integration of new technology from the commercial sector or particularly from foreign sources of advanced technologies. While the industrial world has welcomed globalization, security legislation, policies, and practices, such as ITAR and Export Administration Regulations (EAR) have not adjusted to the reality of the contemporary commercial marketplace. –This has negatively impacted military effectiveness, U.S. competitiveness, and the national security industry (in terms of imports, exports, collaboration, and economics). Coalition Operations will become the norm, while the design and/or manufacturing of some of the best technologies will occur offshore.

“We cannot compete internationally (even in the UK) due to U.S. ITAR and Export Control regulations.”

A CEO of a large defense electronics firm (2007)

The DoD logistics systems are clearly behind commercial industry benchmarks, are costly, and do not optimally support combat operations. The logistics system is not only the most expensive of DoD’s acquisition processes, but it is also the most critical for sustained war fighting. It is currently far from world-class, as response time is measured in weeks vs. hours. In spite of high logistics costs, there is little total-asset-visibility since DoD has yet to adequately exploit the revolution in information technology and communications. Despite progress, DoD logistics costs are growing and in FY2007 exceeded \$150Billion.

“The DoD’s current plans will not achieve a modern logistics system by 2020.”

An experts panel at LMI (2006)

“We can not achieve a DoD transformation without a DoD logistics transformation.”

General (ret.) Eric “Rick” Shinseki, Chief of Staff, U.S. Army, (2000)

RECOMMENDATION 2:

DoD MUST FOCUS ON AN INTEROPERABLE, NET-CENTRIC SYSTEMS-OF-SYSTEMS (WITH INDEPENDENT “ARCHITECTS” AND ENHANCED GOVERNMENT MANAGEMENT AND SYSTEMS ENGINEERING CAPABILITY)

The Department should institute a DoD management structure and process to analyze, acquire, and field multi-service, interoperable systems-of-systems, including multi-program schedule and budget synchronization. USD (AT&L), in coordination with the Service Secretaries and Joint Staff, should form a Joint systems-of-systems management and oversight structure reporting to the USD (AT&L), with the authority to allocate resources, and enforce the development and fielding of optimized DoD-wide architectures and standards to manage this class of programs. This will require a cadre of sophisticated Acquisition personnel and systems analysts and/or systems engineers who are able to analyze optimized architectures in a resource-constrained environment. DoD should provide adequate funding – at the expense of some platforms, if necessary – and top people to optimize the complete systems-of-systems, within all available resources, with full recognition of the complexity of such systems-of-systems. A government systems architecture/engineering manager on each major program should be required. Experienced government program management and systems engineering oversight capability on systems-of-systems should become the norm (e.g. Future Combat System (FCS)). The Department should establish the intent to elevate the importance of systems management in the Request for Proposal (RFP).

DoD should also utilize an independent systems architecture/engineering firm to support the government in its effort to optimize the systems-of-systems, with hardware and software exclusions to avoid COI. Past performance by contractors should act as an important part of the selection criteria. Collaborative interoperability should become a KPP, and DoD should ensure that it is fully tested on a system-of-systems basis, within cost constraints (JFCOM should be identified as the DoD institutional systems integrator). Open systems must be fully utilized as well. In this case, interoperability is a governance issue more than a technical issue.

Since systems-of-systems are information-intensive, an organizational change that would significantly aid this area would be for the Assistant Secretary (NII) to report to USD (AT&L) – Small Red Teams – in government and/or industry – should be established to independently attempt to counter U.S. systems with globally-available technology. Established Blue Teams would then access the best in the world. Budgets and programs should be based on mission capabilities and portfolio management, such as battlespace awareness and joint command and control. Development of educational and training programs around net-centric systems-of-systems engineering and management should also be established, including mentoring and exchange programs.

Over the past decade, major DoD mission capabilities have improved as a result of the transition from interoperable to a collaborative Joint-Force-Integrated state. For the most part, this has been accomplished by employing legacy forces and their equipment. Many of the leveraging improvements have been realized with new or modified concepts of operation, such as: new and/or modified extended information networks; horizontal and vertical innovations in battle command, relative to echelons; new technology transfer programs (TTPs) and appropriate training; and the introduction of systems for Intelligence, Surveillance, and Reconnaissance (ISR)/reconnaissance, surveillance, and target acquisition (RSTA) and other functions.

Over a longer period of time, innovative businesses have applied similar principles and subsets of the same technology to leverage net-centricity. Just as in DoD, new concepts of operation were employed to great advantage. Within Industry “partnering,” which is the business version of joint operations, was and is being employed at an increased rate rarely, if never, seen before. Universities have now recognized the need for academic focus. And “usability engineering”¹⁰ has now grown to be systems-of-systems system engineering, which is interdisciplinary.

One proposed initiative for the future advancement of net-centric collaboration, focused on the human dimension, is for DoD to structure and execute a mentoring and exchange program to advance the understanding, application, and innovation possibilities for net-centric advances. Mentoring could be accomplished both internally and externally. The Services, and some defense agencies, have ongoing developmental and operation programs which could host such candidates. Examples of such activities include the Navy Civil Engineer Corps (CEC), Army Force XXI Battle Command, Brigade-and-Below (FBCB2), and Defense Threat Reduction Agency (DTRA) web-based efforts for Combatant Commands (COCOMs) and major subordinate components. Industry and commerce have DoD-related activities¹¹ which are continuously advanced through net-centric collaboration, but the opportunities are broader. Private sector examples of successful logistics collaboration that may provide insight for DoD include:

- Wal-Mart, which is a global distributor;
- General Electric or others as global suppliers and sustainers;
- Akamai Technologies, Inc. efficiently manages global networks.

The Office of the Under Secretary of Defense for Personnel and Readiness (USD [P&R]) should take the initiative to work with the Services to extend a netcentric mentoring and exchange program to both military and civilian operations.

RECOMMENDATION 3:

DoD MUST FOCUS ON ACHIEVING LOWER COSTS AND FASTER-TO-FIELD, WHILE STILL ACHIEVING BETTER PERFORMANCE

¹⁰ Nielsen, Jakob. *Usability Engineering*. Academic Press, 1993.

¹¹ The Services already have limited intern and mentoring programs with examples as FedEx, Caterpillar, and defense industrial base companies.

A focus on cost and schedule, along with spiral development (for lower risk, lower cost, and more rapid deployment) creates changes throughout various processes, including the following:

- Requirements – cost and schedule must be part of the “requirements” and make early trades of cost/schedule vs. performance; make rapid spiral adjustments of requirements based on field feedback
- Acquisition – use spiral development; MOSA; continuous option for competition;
- Budget – R&D should be underway for future blocks while earlier blocks are fielded;
- Logistics – plan on having multiple blocks in the field; make Performance-Based-Logistics the norm
- Test and Evaluation – test for utility vs. specs; and
- Government/Industry Interface – provide clear evidence of a transparent partnership.

DoD needs to dramatically simplify and shorten the requirements process in order to provide the flexibility, agility, and responsiveness needed to match 21st Century threats. DoD should also change the requirements process so that costs and schedule become part of the systems analysis effort that would precede a firm set of requirements in which cost and schedule are firm (i.e. unit cost-fixed and time-defined acquisitions) from the Joint Requirements Oversight Council (JROC). The DoD Program Manager and/or design team should have the ability to make cost/schedule/performance trades on each block, with the approval of USD (AT&L) and the lead Service Chief, without going back to the JROC. The Department should universally adopt MOSA to enable spiral changes, continuous competition, and greatly-reduced total ownership costs.

In order to achieve lower cost, lower risk, and more rapid fielding, a true spiral development process should be utilized as the norm for long-term weapons and systems development. The process would be based on proven technology with a maximum of a 5-year cycle for Block I, from Milestone B to Initial Operational Capability (IOC). There should be the option of prime and/or subsystem competition at each block, depending on performance and cost results from the prior block, and R&D should receive funding for subsequent blocks, as seen in Figure 2 (with the results as shown in Figure 3).

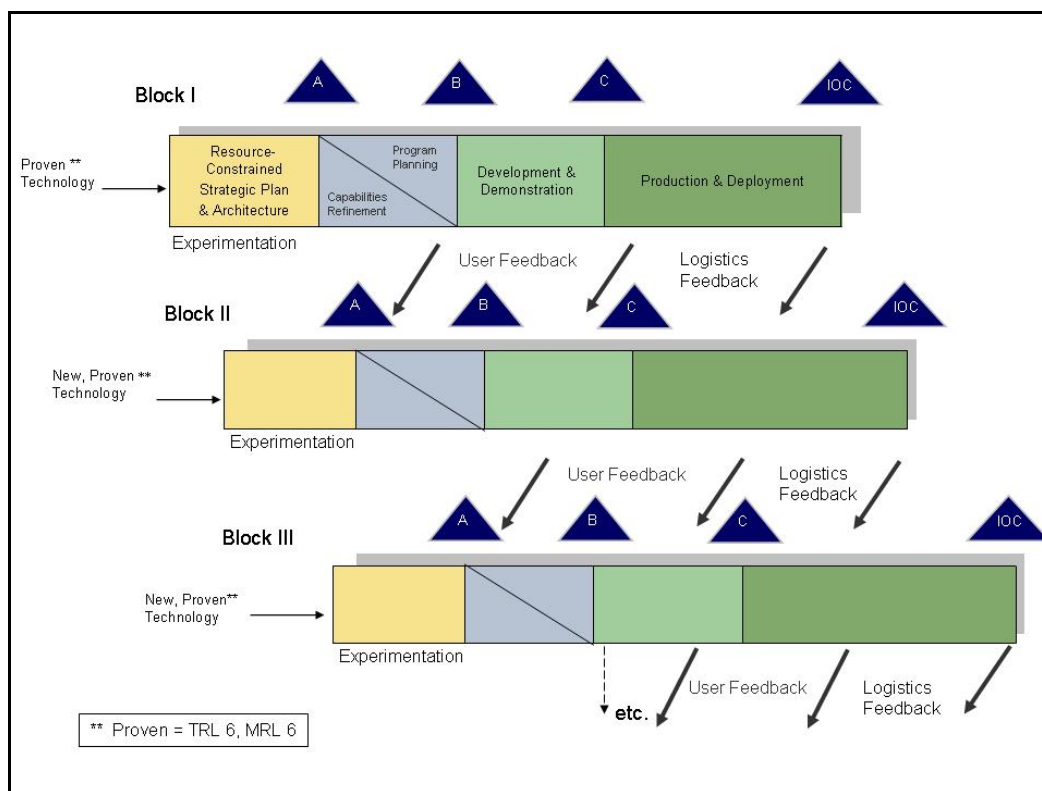


Figure 2. Spiral Development, Fielding, and Continuous Upgrades/Improvements

Further, DoD should assign senior enlisted or junior officers with field-use experience (representing the end-user) to collaborate with program managers as an active member of the development team. This experience would also be used to help build bench strength for Service and OSD acquisitions. Utilization of ongoing field-use inputs for continuous improvements should also be implemented.

DoD should budget programs to realistic costs and schedules by fully utilizing Independent Cost Analysis (ICA) as recommended by the DSB 2006 Summer Study.¹² A “Rapid Fielding Organization” should be created and adequately funded – using current programs and funds, and based on requirements from COCOMs to meet emerging threats and capability requirements.¹³ The Department should also extensively utilize experimentation at the earliest possible timing, with user feedback on hardware and software prototypes, to establish firm requirements for new systems and subsystems.

¹² Report of the 2006 DSB Summer Study on *21st Century Strategic Technology Vectors*: Vol I, February 2007, http://www.acq.osd.mil/dsb/reports/2006-02-Summer_Study_Strategic_Tech_Vectors_Vol_I_Web.pdf.

¹³ Ibid.

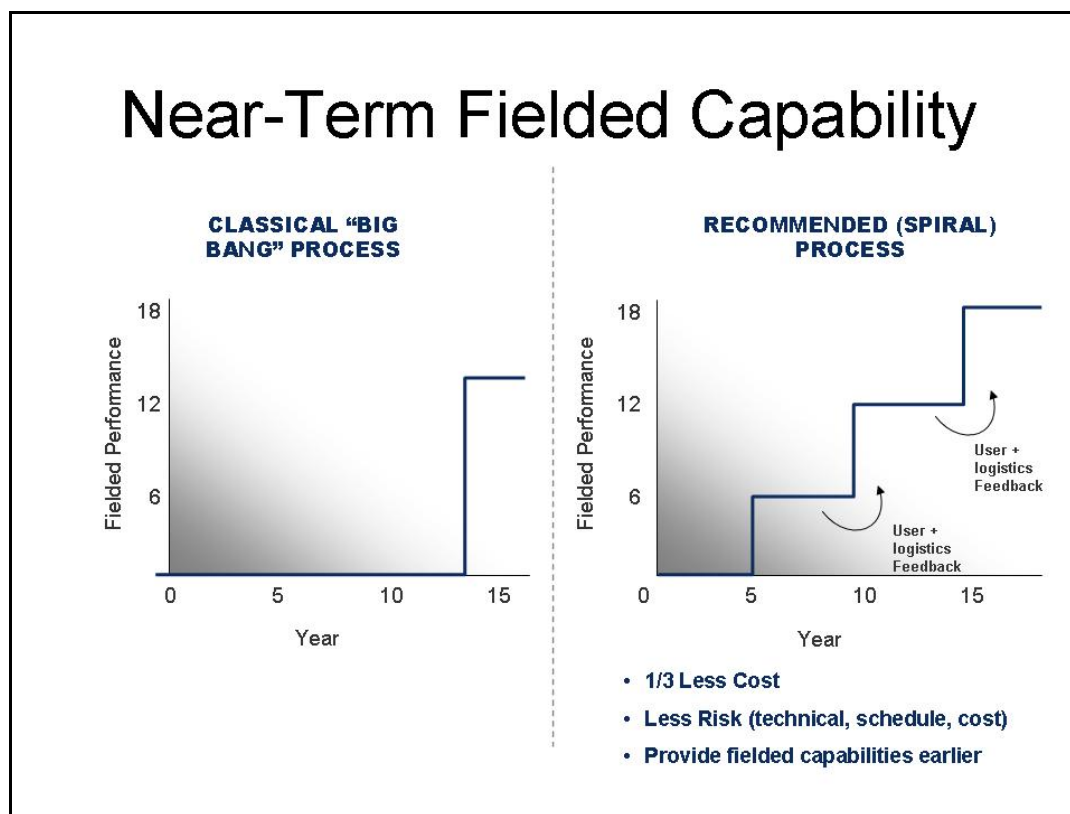


Figure 3. Faster Fielding, Lower Costs, and Better Capability for the Warfighter

RECOMMENDATION 4:

TRAIN AS WE FIGHT: RECOGNIZE THE ROLE OF CONTRACTORS ON THE "BATTLEFIELD"

Future military operations are most likely to be "expeditionary" and have large numbers of contractors involved ($\approx 50\%$ of the coalition "forces" in the Iraq/Afghanistan conflict are private-sector contractors). Leadership training, contingency planning, and military "exercises" must include preparations for the role of contractors in future military operations. Contracting procedures and practices must recognize the unique requirements of operation, in an expedited flexible fashion, and in a dangerous war zone¹⁴.

FINDING 3:

THE GOVERNMENT MUST CHANGE TO FACILITATE THE RAPID AND AFFORDABLE ACQUISITION OF NEEDED WEAPONS, SYSTEMS, AND SERVICES.

U.S. government policies, practices, and processes do not facilitate the development, deployment, and support of the innovative, affordable, and rapidly-acquired weapons, systems, and services needed for the 21st Century forces. The Department faces a critical period, where fundamental change is necessary for developing new capabilities – caused by the confluence of a

¹⁴ *Urgent Reform Required: Army Expeditionary Contracting, Report of the Commission on Army Acquisition and Program Management in Expeditionary Operations*. Washington D.C., October 31, 2007.

number of significant developments. While well-prepared for conventional, high-intensity warfare, DoD lacks sufficient depth of preparation or equipment for the likely conflicts of the next decade; and is slow to shift its focus.

DoD no longer has a virtual monopoly on military-relevant technology. Technologies key to military effectiveness and competitiveness come from varied commercial sources, often from outside the U.S. Future adversaries can be expected to aggressively and rapidly employ militarily-relevant technologies from any sources to develop and field asymmetric and disruptive tactics and weapons.

In general, the U.S. is spending billions to match insurgency adversaries spending millions, and this mismatch is not sustainable. DoD acquisition cycles are far too long, expensive, and inflexible to match the changing and unpredictable needs of the future security environment. As a result of moving to complex systems-of-systems, overall management of U.S. capabilities from requirements through realization has increased in difficulty. Results to date of alternative management structure efforts such as Lead System Integrator have tended to make the DoD Customer overly dependant on the Supplier's interests.

The DoD overall acquisition process (including the requirements and budget areas) has neither shifted to, nor focused on, the radically-different security needs of the future. The Requirements process has been struggling to achieve the required capabilities-based structure that would replace the current force-and-organization-focused structure and/or platform-focused structure. The requirements process has been slow and ponderous when it needs to be agile and responsive to changing threats and tactics. Cost and schedules are rarely included as KPPs – with allowance for performance trade-offs for their achievement on earlier “blocks.” The process often hinders or discourages the development by the U.S. of disruptive ideas or capabilities and seldom coordinates with the needs of other national security agencies such as DHS or DNI to achieve an integrated solution.

“In the past three years, the Army generated more than 5000 requirements documents for the purchase of IT systems.”

LTG Jeff Sorensen, Army CIO, August 24, 2007

DoD is not currently structured to realize the potential benefits of joint, net-centric operations. Today, DoD budgets are structured to fund individual programs managed in a Service-centric, single-platform environment rather than joint, multi-Service, multi-platform systems-of-systems programs. It is quite clear that multi-Service, Joint and Coalition Operations in a net-centric environment are the key to successful future DoD Concepts of Operation (CONOPs).

As presently constituted, there is no single entity within the Department of Defense that is officially in charge of joint, systems-of-systems programs. This problem is currently dealt with on an ad-hoc, program-by-program basis, often with great difficulty and delay. There is a serious lack of overall systems engineering on most DoD programs, especially those that involve systems-of-systems architectures, often leading to sub-optimal, non-interoperable software, hardware, and CONOPS. A proliferation of program unique, non-interoperable and often

proprietary architectures currently constitutes the inventory of DoD systems, making changes difficult, costly, and greatly complicating the task of achieving joint net-centric capabilities.

RECOMMENDATION 5:

DoD MUST FOCUS ON “STAYING AHEAD” BY ADEQUATELY FUNDING “ENGINES OF INNOVATION”

One effort for the Department to stay ahead would be to require increased S&T budgets, especially for research. Focus on a significant share of disruptive architectures and technologies (i.e. “game changers”) including prototypes and technology demonstrations would be enabled by increased budgets. DoD should also establish “prospectors” for commercial and foreign technologies as recommended in the 2006 DSB Summer Study on *21st Century Strategic Technology Vectors*: Vol I, February 2007.¹⁵

A new R&D funding source should be established for Disruptive Capabilities Demonstrations which would fall under the Director of Defense Research and Engineering (DDR&E), with Service implementations, and would also compliment Defense Advanced Research Projects Agency (DARPA) efforts. Such demonstrations would go beyond Advanced Technology Demonstrations (ATDs) and Advanced Concept Technology Demonstrations (ACTDs), and use 6 percent of the Research, Development, Test and Evaluation (RDT&E) budget (\approx \$4B/year); encourage participation from small and mid-sized firms; and take through field demonstrations by Special Operations Command (SOCOM). The demonstrations would use Other Transactions Authority (OTA) (especially for the lower tiers), and there would be no formal requirements. Lastly, the demonstrations would aim for low cost and accelerated availability.

Another step toward staying ahead would involve DoD returning to separate industrial IR&D programs (from the current combination with Bid and Proposal (B&P) costs). This would not require legislation and could be implemented with appropriate government monitoring and reporting. This would encourage exploration and utilization of dual-use and COTS technology. Raising the limits on Small Business Innovation Research (SBIR) on participating firm size and increased award amounts should be established to encourage more small business firms to contribute to DoD’s S&T program and to further their ability to achieve the scale needed to become a sustaining member of the Industrial Base. This would include product-cost/manufacturing orientations and an S&T funded Phase IIB or III (with appropriate increases in the total dollars for the SBIR program).

RECOMMENDATION 6:

DoD MUST UNDERSTAND AND REALIZE THE BENEFITS OF GLOBALIZATION

With appropriate risk-based consideration of security and vulnerability concerns, significant changes must be made in the ITAR, Export Controls, Berry Amendment, specialty metals clause, etc. to recognize the current realities of the global defense and commercial markets. These changes would enhance both national security and U.S. economic competition. While there must

¹⁵ Report of the 2006 DSB Summer Study on *21st Century Strategic Technology Vectors*: Vol I, February 2007, http://www.acq.osd.mil/dsb/reports/2006-02-Summer_Study_Strategic_Tech_Vectors_Vol_I_Web.pdf.

be recognition of the need for U.S. control of mission capability and for military superiority, foreign dependency need *not* mean vulnerability. Effective tools and techniques must be developed to ensure security of COTS hardware and software. Specific, detailed recommendations in this area have been provided in the *1999 Report of the Defense Science Board Task Force on Globalization and Security*¹⁶ but they must now be implemented. **DoD must actively take the lead with State, Commerce, and Congress in this critically-important (but politically difficult) security and competitiveness area. Change here is essential to staying ahead and the needed changes have been well-defined.** The recent U.S. /U.K. Treaty on Defense Trade Cooperation is a step forward.

The *1999 Report of the Defense Science Board Task Force on Globalization and Security* listed three main findings and recommendations:

- Findings
 1. Globalization is being resisted by individuals from CIA, NSA, Military Services, Industry, State, and Commerce who should, instead, be “reshaping the military-technological environment in which DoD must compete” – the current approach is counterproductive both militarily and industrially
 2. Globalization is “altering fundamentally the composition of DoD’s supporting industrial base”
 3. Globalization is “necessitating a reengineering of DoD acquisition and business practices”
- Recommendations
 1. To maintain military superiority, DoD needs to shift from “technology protection” to “capability protection” by continuously evolving a very short list of essential and U.S.-unique military capabilities; and a strategy for identifying and preserving each
 2. Make commercial items and practices the first choice; best assure the integrity of essential software-intensive options
 3. Encourage transnational defense industrial collaboration and integration, as well as transnational weapons systems

The 2000 *Defense Trade and Security Initiative* (agreed to in 2000 by State, DoD, and the White House) lists the following as a means to improve efficiency and competition in defense markets while maintaining the necessary export controls to safeguard mutual security:

1. Major Program Authorization	Comprehensive authorization for a range of activities between a single registered U.S. exporter, as original equipment manufacturer, and a foreign company or government including integration, co-development or production.
2. Major Project Authorization	Comprehensive authorization for a range of export activities for a principal registered contractor covering all aspects of a commercial project with a foreign company or government, including participation by multiple

¹⁶ Report of the 1999 *DSB Task Force on Globalization and Security*, December 1999, <http://www.acq.osd.mil/dsb/reports/globalization.pdf>; and the *Defense Trade and Security Initiative*, May 2000. <http://www.fas.org/asmp/campaigns/control/dtsa17pts.htm>

	subcontractors and exporters, such as a transaction for a foreign government's purchase of a U.S. major weapons system.
3. Global Project Authorization	Comprehensive authorization for a U.S. exporter to carry out a broad range of activities associated with a cooperative project pursuant to a government-to-government agreement or DoD-MOD Memorandum of Understanding (MOU).
4. Tech Data Supporting Terming and Joint Venture Authorization	Comprehensive authorization covering export of a broad range of tech data needed to explore possible opportunities for acquisitions, joint ventures, and mergers, teaming arrangements.
5. Multiple Destination	Marketing territories carved-out at beginning of joint manufacturing agreement between U.S. and foreign companies. Presumes approval of sales to end-users pre-approved for marketing. Provides reasonable sales assurances.
6. Warehousing Agreements	U.S. companies permitted to export bulk items to a foreign company for re-export to pre-approved end-users for specified end-uses.
7. Expedited Licensing Process for DCI-related Articles	Expedites review of licenses for items in support of North Atlantic Treaty Organization (NATO) Defense Capabilities Initiative (DCI)-related programs.
8. Expedited Embassy Licensing	Expedites license review of applications submitted by Washington, DC-based foreign embassies.
9. License Automation Database Upgrade	Enhancement of electronic processing of license applications to include improved interagency connectivity.
10. ITAR Country Exemption	Would provide exemptions for the export of certain unclassified defense items, tech data, and services to governments of treaty allies and qualified companies within those countries that have export controls comparable in scope and effectiveness to those of the U.S.
11. Exemption for Maintenance Services	Requirement waived for U.S. companies to obtain licenses when providing advanced maintenance and maintenance training on unclassified U.S.-origin defense articles owned/operated by NATO countries, Australia, or Japan.
12. Exemption for DoD Proposals	Exempts U.S. companies from licensing requirements to export certain unclassified tech data and assistance in support of responding to a DoD bid proposal.
13. DoD ITAR Exemption Guidelines	DoD to provide new guidelines to DoD components to facilitate appropriate use of ITAR exemptions available to DoD. Clear guidelines will lead to more effective and increased use of exemptions and a corresponding reduction in the number of licenses submitted to USG/DoD for review.
14. Communications Satellite (COMSAT) Licensing Regime	Minimizes licensing requirements for commercial COMSAT programs by expediting exports of COMSAT parts, components, and limited technical data to NATO and Major Non-NATO allies.
15. Exemption for Defense Services Related to FMS	Facilitates export of defense articles, technical data, or services sold pursuant to USG Foreign Military Sales (FMS) program. No license is required for transfer of those defense articles, tech data or services expressly identified as Defense Security Cooperation Agency (DSCA)-executed, State-approved letter of offer and acceptance (LOA) related to an FMS program.
16. Advanced Retransfer Consent	Grants prior re-transfer consent for items previously sold or granted by the USG between foreign governments that sign blanket re-transfer assurances.
17. United States Munitions List (USML) Review and Revision	State and DoD set up a schedule to review portions of the USML each year. Goal is to refine USML categories to ensure appropriate coverage.

One example of the perversion of current globalization policy is the United States Air Force (USAF) tanker competition. The Boeing 767 facility must be ITAR compliant, regarding business access and U.S. employees, so that the aircraft can be sold to the military. The Boeing 767 also required a Berry Amendment waiver, because large shares of its parts are developed offshore, including parts that are manufactured in Russia. By contrast, the Airbus KC-30 is exempt from the Berry Amendment because the law exempts production from certain allied nations.

RECOMMENDATION 7:

DoD MUST ACHIEVE FAR GREATER USE OF “BEST VALUE” COMPETITIONS AND FOSTER LONG-TERM COMPETITIVE DYNAMICS

DoD must increase its use of creative competitive acquisition strategies, within limited budgets, in order to ensure long-term innovation and cost savings, at both prime and critical sub-tier elements. Competition would not be required beyond the competitive prototype phase, as long as the current producer continuously improves performance and lowers cost – but other contractors should always represent a credible option if costs rise or performance is unacceptable. An inexpensive way to maintain the competition option would be to fund a second source for interchangeable, next-generation, lower cost/higher performance prototype systems or subsystems. Modular open architectures would be required on all systems – to encourage competition for upgrades, and evolution in systems-of-systems architectures. DoD should also require system and/or program reviews to address long-term competitive effects of program decisions.

DoD should encourage Federal Acquisition Regulation (FAR) Part 12/OTA use at lower tiers to bring in commercial suppliers; however, this may require legislative change to prevent flow-down of barriers. Smart make/buy decisions should be encouraged by awarding extra points in RFPs for prime’s make/buy decisions; where the prime contractor assesses detailed comparisons-of alternatives. This should also empower government project managers to arbitrate make/buy rationales. The Department should compete (public vs. private) all non-inherently-governmental work, which is empirically shown to achieve higher performance on (an average of) more than 30 percent cost savings, as shown by the data in Figures 4 and 5. Finally, DoD should use profit incentives to encourage cost savings and improved productivity.

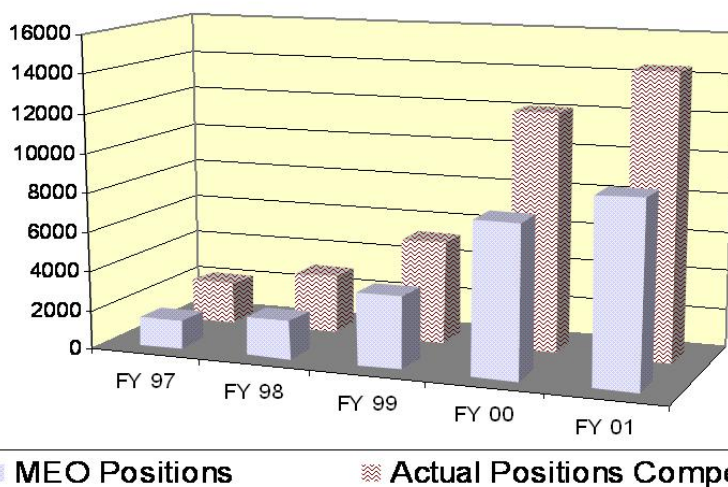
Results of A-76 DoD Cost Comparisons: 1978 - 1994

	Competitions Completed	Average Annual Savings (\$M)	Percent Savings
Army	510	\$470	27%
Air Force	733	\$560	36%
Marine Corps	39	\$23	34%
Navy	806	\$411	30%
Defense Agencies	50	\$13	28%
Total	2,138	\$1,478	31%

*Defense Reform Initiative
Report, Nov 1997*

Figure 4. A-76 Competitions Show Significant Savings: 1978-1994

Results of A-76 Cost Comparison: FY 1997 – 2001








Source: DoD CAMIS Data

Figure 5. Results of A-76 Cost Comparison: FY 1997-2001

RECOMMENDATION 8:**DoD MUST TRANSFORM THE DoD LOGISTICS SYSTEM TO A MODERN, WORLD-CLASS, INFORMATION-BASED, DATA-CENTRIC LOGISTICS CHAIN**

DoD must shift from a “supply push” system to a “demand pull” logistics system that is based on “sense and respond” and secure, integrated, end-to-end IT for total-asset-visibility. Funding for Logistics R&D should be established, perhaps under DDR&E, to improve speed and reduce cost wherever logistics transformation implementations would occur. These implementations should use one percent of the current support budget (\approx \$900M/yr), and make maximum use of commercial systems and software. The objective of these implementations would be to create dramatic improvements in readiness and responsiveness at significantly lower costs. DoD should also support public vs. private competition for all “non-inherently governmental” logistics work to gain improved performance at significantly lower costs, regardless of who wins. Performance-based logistics or warranties should be utilized on all systems (legacy and new) to drive up availability (as shown in Figure 6), while lowering support costs. If the trends do not match performance or cost needs, competition for support is inevitable.

Material Availability*			Logistics Response Time**	
Navy Program	Pre-PBL	Post-PBL	Pre-PBL	Post-PBL
F-14 LANTIRN 	73%	90%	56.9 Days	5 Days
H-60 Avionics 	71%	85%	52.7 Days	8 Days
F/A-18 Stores Mgmt System 	65%	98%	42.6 Days	2 Days CONUS 7 Days OCONUS
Tires 	81%	98%	28.9 Days	2 Days CONUS 4 Days OCONUS
APU 	65%	90%	35 Days	6.5 Days

*Klevan, Paul, NAVICP, UID Program Manager Workshop Briefing, 5 May 2005
 **Kratz, Lou, OSD, Status Report, NDIA Logistics Conference Briefing, 2 Mar 2004

Figure 6. Performance-Based-Logistics Improves Availability and Response Time

FINDING 4:**THE WEAKENED DoD ACQUISITION WORKFORCE IMPEDES BOTH THE ACQUISITION OF MILITARY CAPABILITY AND THE GOVERNMENT OVERSIGHT OF PROGRAM MANAGEMENT**

The DoD acquisition workforce declined dramatically (>50%) in the early 1990s and was not rebuilt during the large post-9/11 budget expansions (as shown in Figure 7). This has resulted in major quantity, quality, and skill-mix workforce issues. Inadequate staffing slows down the acquisition process and a lack of experience and/or needed skill mix reinforces the old way of doing things rather than encouraging innovation. Legal and/or regulatory changes, scandals, and perverse incentives discourage creative and innovative acquisition practices. They also created a risk adverse acquisition workforce that is reticent about proposing, implementing or supporting change. Anticipated retirement trends of experienced personnel, along with shortages of U.S. students going into S&T fields, will exacerbate the current situation.

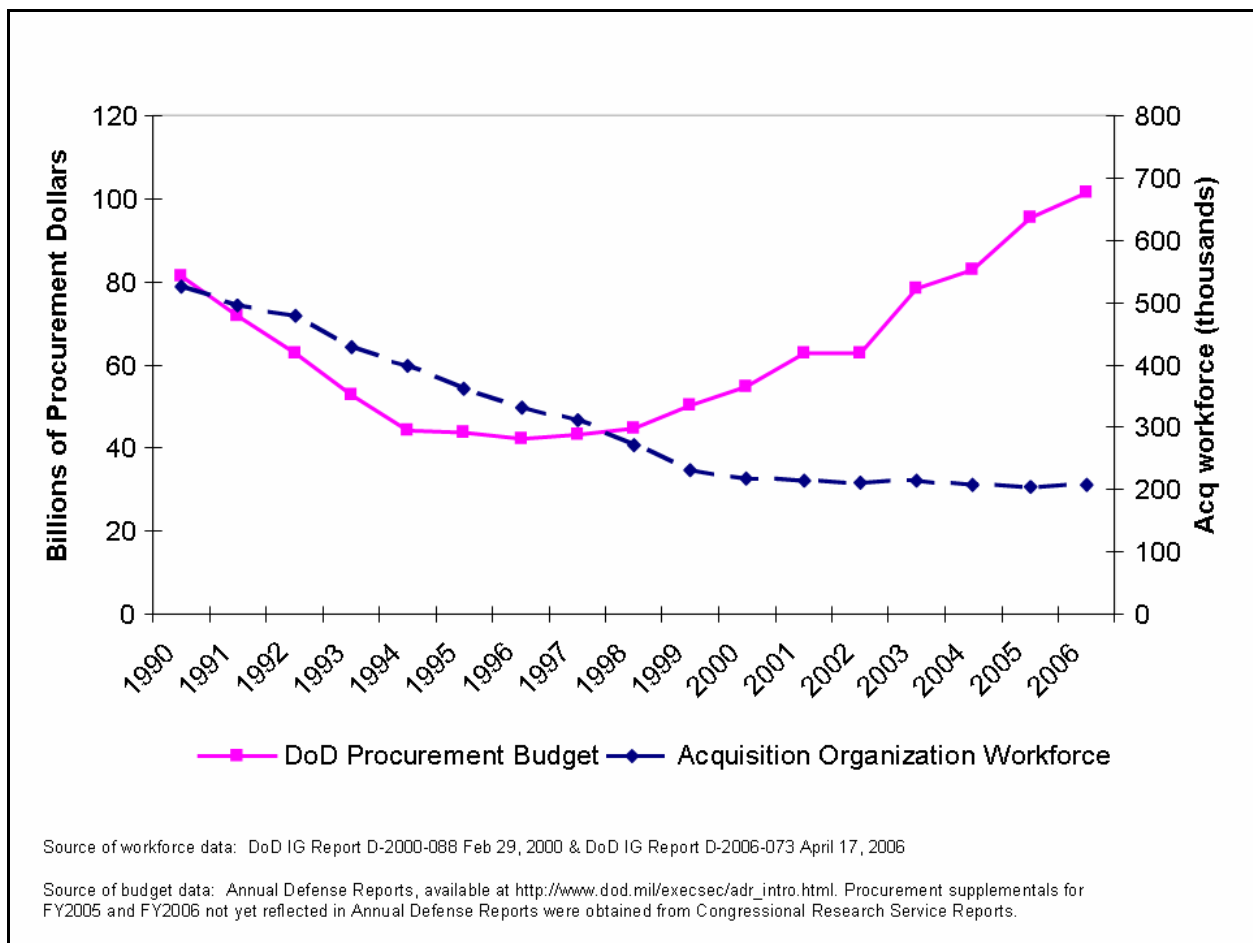


Figure 7. Acquisition Workforce declined even as procurement budgets increased

There is also a DoD S&T workforce with limited capability and expertise to manage emerging technologies, such as biotechnology, nanotechnology, and IT that are evolving outside the traditional defense industry base. The DoD Acquisition workforce is not staffed for the continued shift to service suppliers and currently is not sized for surge capabilities associated with contingency operations. The role and staffing requirements of managing acquisitions from the large number of contractors in future war zones (e.g. ~50% of the force in Iraq are contractor personnel) is not yet planned. Acquisition education is geared toward theory versus training for

implementation. The importance of senior government acquisition personnel, especially in the military – has declined significantly, as noted by the decreased number of Flag Officer positions.

Looking ahead, anticipated increases in the complexity of large programs and continued shift to net-centric systems-of-systems as well as Services require a revitalization of DoD workforce skill and capabilities. Overall management of systems-of-systems is far more complex and requires significant experience in program management and leadership-for-change. The importance of systems engineering and integration – skills which have been seriously eroded in the government – has increased significantly. Acquisition of interoperable, multi-platform, net-centric systems-of-systems thrusts a greater responsibility on government program offices, increasing the need for technically competent, experienced systems engineers and program managers. The complexity of life-cycle management and continuous improvement add to the skill demands. As a result, much of the responsibility for managing these complex systems has shifted to industry – which also has shortfalls in bench strength of necessary experience and skills – without effective government oversight.

RECOMMENDATION 9:

DoD MUST MOVE AGGRESSIVELY TO STRENGTHEN (IN QUALITY, STATURE, AND TRAINING) THE FUTURE HIGH-QUALITY, HIGH-SKILL, GOVERNMENT ACQUISITION WORKFORCE

To ensure development of the government acquisition workforce, DoD should define the acquisition workforce in its broadest context, including program management, logistics, contracts, finance, technology, and engineering. DoD should use the flexibility of the new National Security Personnel System (NSPS) to compete with industry for the best and brightest individuals, and reward creative, innovative behavior by the workforce. The Department should also introduce programs similar to the “Presidential Management Fellow” program, to attract top candidates from graduate programs. The Department should develop, fund, and implement training, advanced degree education, and career development programs for government acquisition civilians, comparable to the military’s program.

The Department should also strengthen the management of programs, systems engineering, production and logistics support – all inherently governmental management positions requiring high skills and experience. Industry-to-government and government-to-industry rotations should also be encouraged. Lost acquisition general officer positions should be reintroduced as incentives for military acquisition careers. **In this new security environment, the acquisition management challenges are far greater and the government must have the top people, with the necessary training and authority, to achieve success.**

SUMMARY

For a 21st Century National Security Industrial Base, the following changes are required:

1. Articulate a National Security Industrial Vision and assure its implementation.
2. Focus on interoperable, net-centric systems-of-systems (with independent “architects” and enhanced government management and systems engineering capability).
3. Achieve lower costs and faster-to-field, while still achieving better performance.
4. Train As We Fight: Recognize the role of contractors on the “battlefield.”
5. Focus on “staying ahead,” by adequately funding “engines of innovation.”
6. Understand and realize the benefits of globalization.
7. Achieve far greater use of “Best Value” competitions and foster long-term competitive dynamics.
8. Transform the DoD logistics system to a modern, world-class, information-based, data-centric logistics system.
9. Move aggressively to strengthen the future high-quality, high-skill, Government Acquisition Workforce.



IV. AN INDUSTRY/GOVERNMENT FRAMEWORK

DESIRED BROAD CHARACTERISTICS OF THE INDUSTRIAL BASE

The National Security Industrial Base needs to have the ability to satisfy the broad range of mid-21st Century national security needs of its DoD Customer. The Industrial Base should be innovative and cost-focused by being continuously competitive at all levels as well as throughout the product lifecycle. Anti-competitive behavior and waste should be effectively managed to deliver “Best Value.” The industrial base should aim to lower cost through product and process design in order to procure adequate quantities with continuous performance improvements.

Another characteristic the industrial base should focus on is becoming sufficiently agile and responsive to meet major security surprises and to address adversaries’ changes and surge. The industrial base should be connected and responsive to Customer end-user requirements and structured with incentives and capabilities to recognize and respond to changing requirements. Use of interoperable and/or modular open systems would allow innovation from a wide range of sources, while reducing upgrade and logistics support costs. Independent “red teams” could also represent potential asymmetric options from adversaries, using modern, global technologies in reaction to U.S. systems and solutions.

The industrial base should be highly competitive on major new platforms and among program primes and major subcontractors. Through competitive prototyping, two or more design teams should be selected by DoD with the potential to initiate production, with at least one team based in the U.S. Limited competition would often be adequate. A strong cadre of smaller firms should also provide innovation and independent technical leadership and advice. Small and medium-sized firms should be adequately funded and focused on competitive innovation, especially “disruptive innovation.” University research should be better utilized.

Briefings to the Task Force provided information that small companies frequently prove their innovative efforts are worthy of selection by primes. However, lacking the perception that DoD selects from open marketplace, smaller firms and non-traditional defense firms are become discouraged about working on subsequent contracts or proposals. Additionally, commercial leaders have helped sustain existing innovation, but often fail to self-fund disruptive innovation. It is the judgment of the Task Force that the expansion of a more competitive Supplier base to include small and medium-sized firms would spawn improved innovation.

The National Security Industrial Base would demonstrate the existence of a number of high-quality, competitive and independent systems architecture and/or engineering and software firms, who are willing to apply the spirit and contract language of hardware exclusion contracts. These firms can either advise the government (acting as the LSI), or they can satisfy the requirements of the National Defense Authorization Act for FY2006, and the corresponding January 18, 2007 DoD requirement regarding the independence of LSI contractors. Figure 8 shows the new, emerging structures within the industrial base.

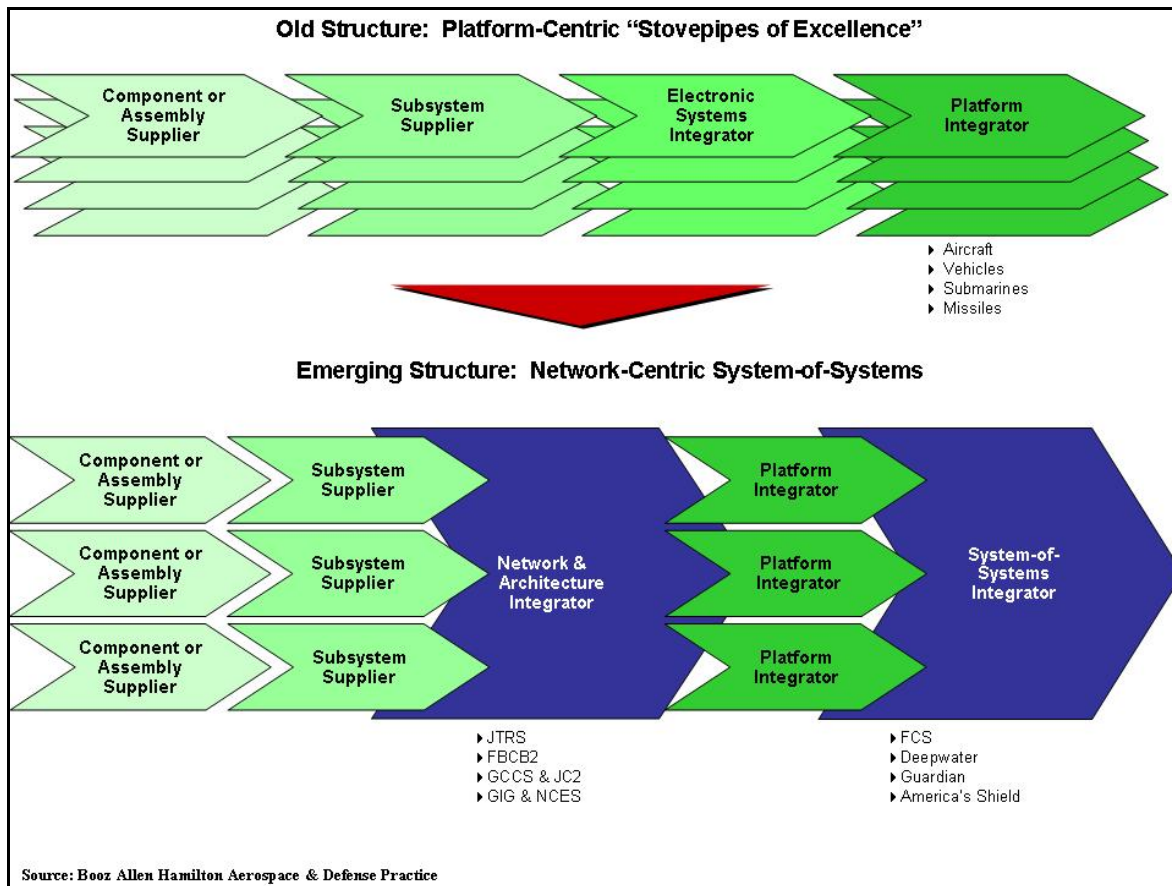


Figure 8. Shift from “Platform Centric” to Net-Centric Systems Requires a New Industry/Government Framework

Most of the key system characteristics are contained in software provided by multiple suppliers. The application of MOSA to both hardware and software permits affordable, continuous improvement, and makes continuous competition possible for “best of breed” upgrades throughout the systems-of-systems life cycle. Interoperability is a must, requiring a disciplined management process to synthesize and enforce adherence to interoperable architectures and standards.

Another characteristic the industrial base should focus on is becoming technologically advanced by maintaining technological superiority in systems and systems-of-systems for both hardware and software applications. Architectures, products, processes, and applications should be innovative, focusing on “game changers” and prototype demonstrations. The industrial base should be resilient to physical and cyber attacks, and other vulnerabilities, such as threats from foreign sourcing. It should draw on cutting edge commercial and global technologies, while maintaining diversity in size, location, and focus, in order to tap the various strengths and perspectives of different business cultures (e.g., small business, entrepreneurs, universities, and world-class manufacturing skills).

In addition to the current set of desired characteristics of the industrial base, network-centric overall enterprise operations – in government and industry – should be implemented throughout the life-cycle and interconnected to government and supplier bases through information-based,

non-proprietary enterprise integration. Outstanding human resources, especially S&T, systems engineering, and business management, would be another characteristic of the new, emerging industrial base. It should be financially viable and capable of attracting capital and investment, even in a challenging fiscal environment characterized by declining defense dollars.

A NEW DoD BUSINESS MODEL

A new DoD Business Model would consist of the following attributes:

1. An adequately-sized high-quality, highly-skilled, well-trained Government Acquisition Workforce; with a systems-of-systems focus as the norm;
2. A clear priority and focus on innovation and technologically-advanced, fielded systems;
3. An acquisition management structure geared to deal with joint (multi-Service) net-centric programs, with clear lines of responsibility and budget authority;
4. Programs to bridge future technology potential, prior to established requirements and production programs - including easy access to fast moving commercial technologies;
5. Recognition of the benefits of globalization and a reasonable system for managing the risks of foreign sourcing and teaming; and
6. Appropriate contract and competition structures for acquiring products and/or services.

Building and maintaining a high-quality, high-skill, and highly trained Government Acquisition Workforce, with systems-of-systems capabilities as the norm, would provide a means for deriving and enforcing interoperable architectures. It would also enhance management of competition and cooperation in design, as well as production and evolution of net-centric systems-of-systems. The Government Workforce would become a means for deploying cross-DoD insight and decisions on national security industrial capabilities. Lastly, system-of-system optimization would occur by an objective (independent) architect, to achieve maximum effectiveness at low cost, while minimizing OCIs. A clear priority and focus on innovation would use R&D as a profitable business. Contract terms and incentives would provide an acquisition strategy aimed at rapid delivery and low cost, with continuous performance and reliability improvements. They would also make maximum use of market forces (versus regulation) and value engineering (VE) incentives and acquisition practices would be developed for acquiring sophisticated services.

The Department should take full advantage of current DFARS guidelines that allow added profit percentage for the following:

- Cost Efficiency (Factor 4, added in 2000)
- Technology/Manufacturing Incentives (Factor 1, added in 2000)

Cost Efficiency would include reduction of elimination of excess facilities, cost reduction initiatives, and incorporation of commercial items and processes. It would also include contractor investment in cost-reducing facilities. Technology/Manufacturing Incentives (rewards) would include fundamentally reducing costs or improving the reliability of existing products. Technology and/or Manufacturing incentives would fundamentally reduce the costs or

improve the reliability of existing products. For new products, incentives would fundamentally reduce the costs or improve the reliability of products they would replace. This would also incentivize risk-taking initiatives for non-traditional technology investments. A tracking system would need to be established to encourage the use of these incentives.

In order to create a new framework, there are two primary areas of consideration – the desired characteristics of the National Security Industrial Base, and a new DoD Business Model to incorporate the needs of DNI and DHS. Agreement on the characteristics and interaction of these two factors is necessary for the Department to be able to:

1. Build a robust, responsive, efficient, and innovative national security industrial base;
2. Effectively acquire, manage, and support large, complex systems, systems-of-systems and services; and
3. Enable the development of an effective, agile, and affordable joint military force to meet 21st Century needs.

Before either the industrial base or the business/acquisition model can change, the DoD and Congress must shift from a posture of “maximum risk avoidance” to an objective of “effective and efficient acquisition risk management.” The model for this transformed industrial structure is a partnership between Government and Industry, with both striving for an industry that is competitive, flexible, adaptive, agile, innovative, low-cost, and high-quality. The Chief Executive Officer (CEO) meetings with the Secretary of Defense (SecDef)/Deputy Secretary of Defense (DepSecDef) and Service Chiefs should be reintroduced, along with establishing DoD and/or private sector councils for finance, Information Technology (IT), Human Resources (HR), and logistics.

Nothing will change unless these considerations become a high and continuing priority for the leaders charged with the nation’s future security. Only strong and sustained leadership will overcome the expected institutional resistance to these recommendations.

V. IMPLEMENTATION PLAN

Personal leadership by the Secretary, the Deputy Secretary, Service Secretaries, and the Service Chiefs will be critical to implementation of the Task Force's recommendations. USD (AT&L) should have overall responsibility for implementation of a majority of the recommendations, with the active support of senior military Department executives. Listed below are the specific offices responsible for actions and monitoring of implementation in each of the nine areas of recommendations.

The current relationship between DoD and the consolidated 20th Century Defense Industry is based on a model of Customer and Supplier interaction that evolved to meet Cold War contingencies. Today's broader U.S. National Security capability requirements call for customer and supplier interaction as well as increased flexibility and speed in key acquisition processes in order to achieve a new DoD Vision for the 21st Century National Security Industrial Base.

The following actions should be taken to implement the nine recommendations of this Report:

1. USD(AT&L) should have the responsibility, along with Industry, to envision, incentivize, monitor and achieve the desired 21st Century National Security Industrial Base structure and Government/Industry interfaces. Support would be provided by DUSD (IP). General Counsel would assist with M&A, while the DUSD (P) would provide assistance with the Services. ASD (Congressional Affairs) should assist with the public sector, and SAEs and industrial CEO's should provide active support of this recommendation. Lastly, DNI and the Secretary of DHS would assist USD (AT&L) with the needs in an integrated industrial base. (What is meant by "assist"? To be successful, Industry must be a partner in these changes. AT&L cannot be seen as having the responsibility for state-based management of private enterprise)
2. Vice-Chairman, Joint Chiefs of Staff (VCJCS) and USD (AT&L), with assistance from the Assistant Secretary of Defense for Networks and Information Integration (ASD [NII]) and the Under Secretary of Defense for Intelligence (USD [I]), should focus on net-centric systems-of-systems and the overall architecture and, with help from the Services, focus on program synchronization. The Joint Chiefs of Staff (JCS) should assist with interoperability. The Under Secretary of Defense Comptroller (USD [C]) should assist with affordability of implementation.
3. USD (AT&L) should have the responsibility to focus on achieving lower cost and faster-to-field, while still achieving better performance. With assistance from VCJCS and JROC, USD (AT&L) should focus on the requirements process. USD (AT&L) should also work with the Services and Service Acquisition Executives (SAEs) on establishing cost and schedule as requirements and work with USD (C) on process modernization. Lastly, USD (AT&L) should collaborate with Deputy Under Secretary of Defense for Logistics and Readiness (DUSD [L&R]) on logistics modernization.

4. USD (AT&L) should take the lead for the expeditionary training of contract and management-related activities. The Service Chiefs should be responsible for the training/exercises of the military leaders.
5. DDR&E should focus on staying ahead, receiving assistance from the Services on shifting resources. DDR&E should also work with the Department of Commerce (DoC) on SBIR.
6. The Undersecretary of Defense for Policy (USD [P]) should take responsibility to understand and realize the security benefits of globalization. With the support from USD (AT&L) on acquisition and industrial base, the Assistant Secretary of Defense for Legislative Affairs (ASD [LA]) assisting with legislation changes, and the Departments of State (DoS) and Commerce (DoC) on Export Controls, USD (P) should lead on the implementation of this recommendation.
7. USD (AT&L) should achieve far greater use of best-value competitions and take steps to foster long-term competitive industry dynamics. The Service Acquisition Executives and DUSD (Procurement) should provide aid in this endeavor.
8. DUSD (L&R) should take the lead in transforming the DoD logistics system to a modern, world-class, information-based, data-centric logistics chain. United States Transportation Command (TRANSCOM), the Defense Logistics Agency (DLA), JCS J-4, and Service Logistics Commanders would provide necessary assistance, and ASD (LA) would provide assistance regarding depots. DUSD (L&R) should also work with Industry for ideas on modernization.
9. The Under Secretary of Defense of Manpower and Personnel (USD [M&P]) should move aggressively to strengthen the future high-quality, high-skill government acquisition workforce. Additional support would come from USD (AT&L) in regards to prioritization and planning, as well as support from Service Chiefs on civilian and military career paths.

Implementing these recommendations must be a high priority for the Deputy Secretary of Defense. His personal leadership, along with that of the Service Chiefs and Secretaries, will be required for success. In addition to the above recommendations, one additional change that could have a significant and positive impact in a number of areas would be to change the designation of the DoD Chief Information Officer (CIO) to the USD (AT&L). This would meet the requirements of Clinger-Cohen Act and Goldwater-Nichols Act – which are now in conflict for the acquisition of information systems (which form major parts of weapon systems and systems-of-systems) – and would require no change in law. ASD (NII) should fall under the USD – this organizational change would emphasize the importance of information-centric systems, both for warfare and infrastructure. The overall emphasis on information systems would have a significant impact on both DoD and Industry effectiveness and efficiency.

It will take time for both DoD and Industry to evolve in tandem to achieve this Vision. It is the conclusion of the Task Force that the required actions must begin now, with the highest levels of priority. The Nation's future security depends on it.

A. TERMS OF REFERENCE



ACQUISITION,
TECHNOLOGY
AND LOGISTICS

THE UNDER SECRETARY OF DEFENSE

3010 DEFENSE PENTAGON
WASHINGTON, DC 20301-3010

MAR 02 2008

MEMORANDUM FOR CHAIRMAN, DEFENSE SCIENCE BOARD

SUBJECT: Terms of Reference – Defense Science Board Task Force on Defense Industrial Structure for Transformation

You are requested to form a Defense Science Board (DSB) Task Force on Defense Industrial Structure for Transformation to describe the defense industry required to cope with the international security environment in the 21st Century.

The Department of Defense (DoD) adaptation to the changing security environment may have a profound effect on the industrial base that serves the Department. The shift to network-enabled operations may diminish requirements for force structure and associated platforms. Product development rather than the production cycle may dominate industry costs, profitability, and manufacturing capacity. Diminished platform requirements create cost, programmatic, and investment incentives for consolidation well below Tier 1 vendors.

Previous DSB efforts examined vertical integration issues in early 1997 and found that major defense firms had increased vertical integration in some product areas, and noted that such vertical integration was not posing systemic problems at that time. In addition, it examined globalization issues in 1999 to identify both the beneficial and the negative consequences of globalization. Since then, the Department and industry have both undergone significant transformation. Vertical integration continues to be a matter of interest. Some firms and industry observers allege that vertically integrated prime contractors favor in-house capabilities over better external solutions. DoD antitrust evaluations of proposed business combinations increasingly identify vertical capabilities as concerns to be investigated. Interconnected, networked families of systems are leading to fewer but larger prime contracts where responsibilities for ensuring competition for key and innovative elements are delegated to the prime contractor. The Department generally mitigates risks to its interests by increasing emphasis on DoD oversight of make-buy policies, and decisions; and imposing behavioral remedies to preclude a newly combined firm from unfairly leveraging new internal capabilities to the detriment of its competitors.

Furthermore, the financial viability of the defense sector may be at risk. As defense expenditures "top out" (and begin to decline in real terms), the underlying financial viability of the defense sector for the longer term may be negatively impacted.



The Task Force should characterize the degree of change likely and/or desirable in industry due to the changing nature of DoD and the industrial base. The Task Force should examine the effectiveness of existing mitigation measures and develop recommendations, if necessary, designed to ensure adequate future competition and innovation throughout all tiers of the defense industrial base.

While investigating these concerns, the Task Force will want to address the following questions:

a. What are the implications for the industrial base of increased DoD acquisition of services? Will the existing (or perhaps more consolidated) defense industrial structure evolve into a predominately service orientation? What are the implications of the emerging practice of major defense firms acquiring independent service and support providers? To what degree should the globalization of product and service suppliers be enabled by policy and regulation?

b. If the trends in globalization and service continue, what are the policies and practices which allow DoD to benefit most from the future industrial base?

c. What have been the trends since the previous DSB study on Vertical Integration? Are critical component capabilities generally made available to competitors or not? After acquiring new companies, are critical or innovative capabilities effectively supplied to the Department?

d. What are the implications for the financial viability of the defense industrial base as the sector adapts to changing DoD needs for defense-related products and services. If the defense sector further consolidates as it absorbs excess capacity and retools to meet evolving defense needs (e.g. services-centric rather than platform-centric), will DoD acquisition practices and consolidation policy be effective in ensuring that the defense sector will have the financial strength to support the needs of the industrial dimension of transformation?

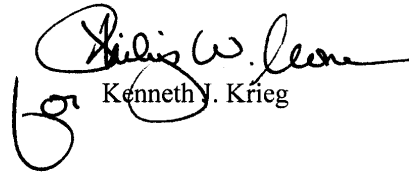
e. How does vertical integration affect competition among prime contractors? How does vertical integration affect competition among sub-tier suppliers? How does vertical integration affect the market opportunities of a merchant supplier of a critical capability? How does vertical integration affect innovation?

f. For both merger and acquisition antitrust reviews and subcontractor source selection decisions, are the current mitigation measures used by the Department effective in reducing the risks of anticompetitive behavior and vertically integrated market structures? How effective are these measures in enabling the Department to acquire a solution with the best value?

g. What measures or policies might the Department and industry adopt or modify to better reduce the risks of anticompetitive behavior? What measure or policies might the Department and industry adopt or modify to better ensure the availability of solutions with the best value to the Department?

The Study will be sponsored by me as the Under Secretary of Defense (Acquisition, Technology, and Logistics) and the Acting Deputy Under Secretary of Defense (Industrial Policy). Dr. Jacques Gansler will serve as the Task Force chairman. Mr. David Chu, ODUSD(IP), will serve as Executive Secretary and Major Charles Lominac, USAF, will serve as the Defense Science Board Secretariat representative.

The Task Force will operate in accordance with the provisions of P.L. 92-463, the "Federal Advisory Committee Act," and DoD Directive 5105.4, the "DoD Federal Advisory Committee Management program." It is not anticipated that this Task Force will need to go into any "particular matters" within the meaning of Section 208 of Title 18, United States Code, nor will it cause any member to be placed in the position of action as a procurement official.



Kenneth J. Krieg



B. TASK FORCE MEMBERSHIP

CHAIRMAN

Dr. Jacques Gansler

- Current: - University of Maryland Professor and Roger C. Lipitz
Chair in Public Policy and Private Enterprise
- Former: - USD (AT&L)

EXECUTIVE SECRETARY

Mr. David Chu

- Current: - Aircraft sector engineer with Industrial Base Assessments
Directorate for Industrial Policy
- Former: - Formerly with Department of Commerce as an aerospace
systems engineer

Mr. Stephen Hull

- Current: - Mergers & Acquisitions, Office of the Deputy Under
Secretary of Defense (Industrial Policy)
- Former: - Secondment with U.S. and European Defense Industries
- Office of Deputy Assistant Secretary of Defense
(Production Resources)

TASK FORCE MEMBERS

Ms. Anita Antenucci

- Current: - Managing Director and co-head of the Aerospace Defense
Government (ADG) industry group of Houlihan Lokey
- Former: - Former co-President and Managing Director of
Quarterdeck Investment Partners, LLC, an aerospace-
focused investment bank

Mr. Michael Bayer

- Current: - Chairman of Defense Business Board
- Consultant in enterprise strategic planning and mergers
and acquisitions
- Serves on numerous advisory boards
- Former: - Deputy Assistant Secretary for Congressional Affairs,
U.S. Department of Energy

Mr. David Berteau

- Current: - Senior Adviser and Director, Defense-Industrial Initiatives
Group, Center for Strategic and International Studies
- Former: - Former senior vice president at SAIC and former Principal
Deputy Assistant Secretary of Defense for Production and
Logistics

Mr. Jeffrey Bialos

- Current: - Partner at Sutherland Asbill & Brennan, providing legal, business, and strategy advice on aerospace, defense and homeland security and international matters
- Former: - Former Deputy Under Secretary of Defense for Industrial Affairs

Mr. Denis Bovin

- Current: - Vice-Chairman – Investment Banking and Senior Managing Director of Bear Stearns & Co
- Member of the Defense Business Practices Implementation Board (DBB)
- Former: - Former head of Salomon Brothers Inc. Investment Banking Corporate Coverage and Capital Markets Divisions

Dr. Joseph Braddock

- Current: - Private Consultant to Advisory Boards for the Secretary of Defense, DTRA, various DoD Agencies, U.S. Army Science Board, and Sandia National Laboratories
- Former: - Founded BDM, a technology-based professional services firm

Mr. Pierre Chao

- Current: - Senior Associate, Center for Strategic and International Studies
- Managing Partner, Renaissance Strategic Advisors
- Former: - Senior Fellow and Director of Defense Industrial Initiatives, CSIS
- Managing Director and Senior Aerospace/Defense Analyst for Credit Suisse First Boston

RADM (ret) Jay Cohen

- Current: - Undersecretary for Science and Technology of the Department of Homeland Security
- Former: - Chief of Naval Research

Ms. Christine Fisher

- Current: - Independent consultant on defense and aerospace industry
- Former: - Deputy Director, Industrial Capabilities and Assessments and Deputy Director, Industrial Consolidation and Globalization for ODUSD (IP)

Mr. John Goodman

- Current: - Global Managing Director for Business Consulting at Accenture's Government Operating Group, as well as lead for Army and Joint Defense Program group
- Former: - Former Deputy Under Secretary of Defense for Industrial Affairs and Installations

Hon. Noel Longuemare

- Current: - Independent consultant to the DoD and defense industry, serves on numerous advisory panels for the Department of Defense
- Former: - Former Principal Deputy USD AT&L, served in other top level management and technical positions for DoD and the Defense Aerospace Electronics Industry

Gen (ret) Gregory Martin

- Current: - Independent consultant to advisory boards and defense and aerospace industry corporations
- Former: - Former Commander of the Air Force Materiel Command

Mr. Philip Odeen

- Current: - Non-executive Chairman of Reynolds and Reynolds
- Former: - Formerly served senior positions with OSD and National Security Council Staff, as well as Principal Deputy Assistant Secretary of Defense (Systems Analysis)

Mr. Robert Spring

- Current: - Partner, Milbank, Tweed, Hadley & McCloy LLP
- Board Member, National Defense University
- Former: - General Counsel, Infrastructure Investment Commission

Ms. Leigh Warner

- Current: - Independent innovation strategist, providing counsel to senior executives of business, Federal government and nonprofit enterprises on design and introduction of products and services to anticipate emerging customer needs
- Former: - Former Assistant to the Secretary of Defense for Special Projects and White House Fellow

RADM (ret.) Charles Young

- Current: - Oceaneering International, Inc.
- Former: - Director Strategic Systems Programs U.S. Navy
- Director, Resources and Evaluation on staff of Assistant Secretary of the Navy for Research, Development and Acquisition.

GOVERNMENT ADVISORS

Col Kevin Dietrick, *US Army*

DSB SECRETARIAT

Maj Chad Lominac, *DSB Secretariat (USAF)*

SUPPORT STAFF

Ms. Michelle Ashley, *SAIC*

Ms. Diana Conty, *SAIC*

Mr. Jonathan Hamblin, *SAIC*

Ms. Lauren York, *SAIC*

C. BRIEFINGS RECEIVED

August 30 2006

Mr. John Douglass	AIA Aerospace	Aerospace Overview
Mr. Bill Greenwalt	DUSD (Industrial Policy)	Future Defense Industrial Base
Ms. Judy Kim	OGC	Ethics Briefing
Mr. Dave McCurdy	EIA	EIA Overview of Defense Industrial Base
Mr. Stan Soloway	PSC	Professional Services Council Overview

October 10 – 11 2006

Gen (ret.) Lawrence Farrell	NDIA	NDIA Overview of Defense Industrial Base - 2020
Mr. Stephen Hull	OSD	Update on Recommendations to 1997 DSB Report on Vertical Integration
Mr. Kenneth Krieg	USD (AT&L)	DoD Defense Industrial Base
Dr. Terry Pierce	University of Colorado	Creating an Industrial Structure to Encourage Disruptive Capabilities for U.S. Security
Mr. Herman Reininga	Rockwell Collins	Rockwell Collins and the Future of the Defense Industrial Base

December 11 – 12 2006

Mr. Chris Caine	IBM	Systems Engineering and Software
Mr. Galen Ho	BAE Systems	Globalization and BAE Systems
Ms. Robin Quinlan	Joint Forces Integration	Interoperability
Mr. William Swanson	Raytheon	Future Structure of the Defense Industrial Base
Dr. Robert Trice	Lockheed Martin	Globalization and the Defense Industrial Base
Mr. Ernst Volgenau	SRA International	Future Structure of the Defense Industrial Base
Mr. Alfred Volkman	OSD International	Export Controls & Update on 1999 DSB Report on Globalization
Gen (ret.) Larry Welch	IDA	Future Systems Requirements
Hon. John Young	DDR&E	Innovation in Defense Industry

January 4 2007

LTG Steven Boutelle	Army	Systems Engineering and Software
Gen (ret) Paul Kern	The Cohen Group	Future Structure of the Defense Industrial Base
Mr. David Oliver	EADS North America	Globalized Defense
VADM Stanley Szemborski	OSD (PA&E)	Future Systems Requirements
LTG (ret) Joe Yakovac	Army	LSI and Systems Engineering

February 21 – 22 2007

Dr. Charles Byvik	OSD	Update on 2005 DSB Report on High Performance Microchip Supply
Mr. Steve Carmel	MAERSK	Logistics in the Defense Industrial Base
Dr. James Finley	OSD	System of Systems Management
Mr. Abe Karem	Karem Aircraft	Defense Industry Efficiency
Mr. George Pedersen	ManTech	Defense Industrial Base in the 21st Century
Mr. Gary Powell	OSD	DoD Industrial Policy
Mr. Dave Vos	Athena Technologies	Incentives/LSI

March 28 – 29 2007

MG Charles Cartwright	Army	FCS
Mr. Terry Collins	Argon ST	Vertical Integration EO/IR
Mr. James Smith	EDO Corp.	Defense Electronics
CAPT James Syring	Navy	DDG 1000

April 19 2007

RADM Jay Cohen	DHS	DHS and Industrial Needs
Mr. Grover Dunn	USAF	eLog21
Mr. Bill Kessler	BellSouth	Integration Between Industrial and Government Enterprises

May 23 -24 2007

Mr. Wes Bush	Northrop Grumman	Future Defense Industrial Base
RDML Mike Frick	Navy	Open Systems and the Defense Industrial Base
Ms. Sophie Krasik	Navy	OCIs
Mr. Steve Schorer	DRS Technologies	Defense Electronics
Mr. Stan Soloway	PSC	Update from Professional Services Council
Dr. Tony Tether	DARPA	The Role of Programs in Industry

June 12 – 13 2007

Dr. Scot Arnold	IDA	IDA Study on Profit Policy
Mr. Marty Bollinger	Booz Allen Hamilton	Vertical Integration
Mr. Mike Strianese	L-3 Communications	E/O/IR and Training
VADM (ret) Wally Massenburg	Navy	Navy Logistics



D. GLOSSARY

ADUSD (IP)	Acting Deputy Under Secretary of Defense for Industrial Policy
ALC	Air Logistics Center
ACTD	Advanced Concept Technology Demonstration
ASD (LA)	Assistant Secretary of Defense for Legislative Affairs
ASD (NII)	Assistant Secretary of Defense for Networks and Information Integration
ATD	Advanced Technology Demonstration
BRAC	Base Realignment and Closure
C4ISR	Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance
CAS	Cost Accounting System
CEC	Civil Engineer Corps
CEO	Chief Executive Officer
CIA	Central Intelligence Agency
CIO	Chief Information Officer
COCOM	Combatant Command
COI	Conflict of Interest
COMSAT	Communications Satellite
CONOP	Concept of Operation
CONUS	Continental United States
COTS	Commercial-off-the-shelf
DAB	Defense Acquisition Board
DARPA	Defense Advanced Research Projects Agency
DCI	Defense Capabilities Initiative
DDG-1000	Zumwalt class destroyer
DDR&E	Director of Defense Research and Engineering
DepSecDef	Deputy Secretary of Defense
DFARS	Defense Federal Acquisition Regulation Supplement
DHS	Department of Homeland Defense

DLA	Defense Logistics Agency
DNI	Director of National Intelligence
DoC	Department of Commerce
DoD	Department of Defense
DoS	Department of State
DSB	Defense Science Board
DSCA	Defense Security Cooperation Agency
DTRA	Defense Threat Reduction Agency
DUSD	Deputy Under Secretary of Defense
DUSD (IP)	Deputy Under Secretary of Defense for Industrial Policy
DUSD (L&R)	Deputy Under Secretary of Defense for Logistics and Readiness
EAR	Export Administration Regulations
ECP	Enlisted Commissioning Program
FAR	Federal Acquisition Regulations
FBCB2	Army Force XXI Battle Command, Brigade-and-Below
FCS	Future Combat System
FFRDC	Federally Funded Research & Development Center
FMS	Foreign Military Sales
FY	Fiscal Year
GE	General Electric
GOCO	Government-Owned, Contractor-Operated
GOGO	Government-Owned, Government-Operated
GWOT	Global War on Terrorism
HR	Human Resources
ICA	Independent Cost Analysis
IDIQ	Infinite Delivery, Indefinite Quantity
IED	Improvised Explosive Device

IOC	Initial Operational Capability
IR&D	Industry Research and Development
ISR	Intelligence, Surveillance, and Reconnaissance
IT	Information Technology
ITAR	International Traffic in Arms Regulation
JCS	Joint Chiefs of Staff
JROC	Joint Requirements Oversight Council
KPP	Key Performance Parameter
LOA	Letter of Offer and Acceptance
LOGCOM	Logistics Command
LSI	Lead Systems Integrator
M&A	Mergers and Acquisitions
MOSA	Modular Open Systems Approach
MOU	Memorandum of Understanding
NATO	North Atlantic Treaty Organization
NIST	National Institute of Standards and Technology
NSA	National Security Agency
NSPS	National Security Personnel System
OCI	Organizational Conflict-of-Interest
O&M	Operations and Management
OSD	Office of the Secretary of Defense
OSD (P&R)	Office of the Secretary of Defense for Personnel and Readiness
OTA	Operational Test Authority
PEO	Program Executive Office
PM	Program Manager

R&D	Research and Development
RDT&E	Research, Development, Test and Evaluation
RFP	Request for Proposal
RSTA	Reconnaissance, Surveillance, and Target Acquisition
SAE	Service Acquisition Executive
SBIR	Small Business Innovation Research
S&T	Science and Technology
SecDef	Secretary of Defense
SETA	Systems Engineering and Technical Assistance
SOCOM	Special Operations Command
TOR	Terms of Reference
TRANSCOM	United States Transportation Command
TSPR	Total System Performance Responsibility
TTP	Technology Transfer Programs
U.S.	United States
USAF	United States Air Force
USD	Under Secretary of Defense
USD (AT&L)	Under Secretary of Defense for Acquisition, Technology, and Logistics
USD (C)	Under Secretary of Defense Comptroller
USD (I)	Under Secretary of Defense for Intelligence
USD (M&P)	Under Secretary of Defense for Manpower and Personnel
USD (P)	Under Secretary of Defense for Policy
USG	United States Government
USML	United States Munitions List
VCJCS	Vice-Chairman, Joint Chiefs of Staff
VE	Value engineering
WMD	Weapons of Mass Destruction