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ACQUISITION MANAGEMENT

The Impact of Globalization on the U.S. Defense Industry

Jacques S. Gansler and William Lucyshyn
University of Maryland

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Preface & Acknowledgements

Welcome to our Tenth Annual Acquisition Research Symposium! We regret that this year it will be a “paper only” event. The double whammy of sequestration and a continuing resolution, with the attendant restrictions on travel and conferences, created too much uncertainty to properly stage the event. We will miss the dialogue with our acquisition colleagues and the opportunity for all our researchers to present their work. However, we intend to simulate the symposium as best we can, and these *Proceedings* present an opportunity for the papers to be published just as if they had been delivered. In any case, we will have a rich store of papers to draw from for next year’s event scheduled for May 14–15, 2014!

Despite these temporary setbacks, our Acquisition Research Program (ARP) here at the Naval Postgraduate School (NPS) continues at a normal pace. Since the ARP’s founding in 2003, over 1,200 original research reports have been added to the acquisition body of knowledge. We continue to add to that library, located online at www.acquisitionresearch.net, at a rate of roughly 140 reports per year. This activity has engaged researchers at over 70 universities and other institutions, greatly enhancing the diversity of thought brought to bear on the business activities of the DoD.

We generate this level of activity in three ways. First, we solicit research topics from academia and other institutions through an annual Broad Agency Announcement, sponsored by the USD(AT&L). Second, we issue an annual internal call for proposals to seek NPS faculty research supporting the interests of our program sponsors. Finally, we serve as a “broker” to market specific research topics identified by our sponsors to NPS graduate students. This three-pronged approach provides for a rich and broad diversity of scholarly rigor mixed with a good blend of practitioner experience in the field of acquisition. We are grateful to those of you who have contributed to our research program in the past and encourage your future participation.

Unfortunately, what will be missing this year is the active participation and networking that has been the hallmark of previous symposia. By purposely limiting attendance to 350 people, we encourage just that. This forum remains unique in its effort to bring scholars and practitioners together around acquisition research that is both relevant in application and rigorous in method. It provides the opportunity to interact with many top DoD acquisition officials and acquisition researchers. We encourage dialogue both in the formal panel sessions and in the many opportunities we make available at meals, breaks, and the day-ending socials. Many of our researchers use these occasions to establish new teaming arrangements for future research work. Despite the fact that we will not be gathered together to reap the above-listed benefits, the ARP will endeavor to stimulate this dialogue through various means throughout the year as we interact with our researchers and DoD officials.

Affordability remains a major focus in the DoD acquisition world and will no doubt get even more attention as the sequestration outcomes unfold. It is a central tenet of the DoD’s Better Buying Power initiatives, which continue to evolve as the DoD finds which of them work and which do not. This suggests that research with a focus on affordability will be of great interest to the DoD leadership in the year to come. Whether you’re a practitioner or scholar, we invite you to participate in that research.

We gratefully acknowledge the ongoing support and leadership of our sponsors, whose foresight and vision have assured the continuing success of the ARP:



- Office of the Under Secretary of Defense (Acquisition, Technology, & Logistics)
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Acquisition Management

Naval Ship Maintenance: An Analysis of the Dutch Shipbuilding Industry Using the Knowledge Value Added, Systems Dynamics, and Integrated Risk Management Methodologies

David N. Ford, Thomas J. Housel, and Johnathan C. Mun
Naval Postgraduate School

Time as an Independent Variable: A Tool to Drive Cost Out of and Efficiency Into Major Acquisition Programs

J. David Patterson
National Defense Business Institute, University of Tennessee

The Impact of Globalization on the U.S. Defense Industry

Jacques S. Gansler and William Lucyshyn
University of Maryland

Bottleneck Analysis on the DoD Pre-Milestone B Acquisition Processes

Danielle Worger and Teresa Wu, *Arizona State University*
Eugene Rex Jalao, *Arizona State University and University of the Philippines*
Christopher Auger, Lars Baldus, Brian Yoshimoto, J. Robert Wirthlin, and John Colombi, *The Air Force Institute of Technology*

Software Acquisition Patterns of Failure and How to Recognize Them

Lisa Brownsword, Cecilia Albert, Patrick Place, and David Carney
Carnegie Mellon University

Fewer Mistakes on the First Day: Architectural Strategies and Their Impacts on Acquisition Outcomes

Linda McCabe and Anthony Wicht
Massachusetts Institute of Technology

The Joint Program Dilemma: Analyzing the Pervasive Role That Social Dilemmas Play in Undermining Acquisition Success

Andrew P. Moore, William E. Novak, Julie B. Cohen, Jay D. Marchetti, and Matthew L. Collins
Software Engineering Institute, Carnegie Mellon University

Acquisition Risks in a World of Joint Capabilities: A Study of Interdependency Complexity



Mary Maureen Brown
University of North Carolina Charlotte

Leveraging Structural Characteristics of Interdependent Networks to Model Non-Linear Cascading Risks

Anita Raja, Mohammad Rashedul Hasan, and Shalini Rajanna
University of North Carolina at Charlotte
Ansaf Salleb-Aoussi, *Columbia University, Center for Computational Learning Systems*

Lexical Link Analysis Application: Improving Web Service to Acquisition Visibility Portal

Ying Zhao, Shelley Gallup, and Douglas MacKinnon
Naval Postgraduate School

Capturing Creative Program Management Best Practices

Brandon Keller and J. Robert Wirthlin
Air Force Institute of Technology

The RITE Approach to Agile Acquisition

Timothy Boyce, Iva Sherman, and Nicholas Roussel
Space and Naval Warfare Systems Center Pacific

Challenge-Based Acquisition: Stimulating Innovative Solutions Faster and Cheaper by Asking the Right Questions

Richard Weatherly, Virginia Wydler, Matthew D. Way, Scott Anderson, and Michael Arendt
MITRE Corporation

Defense Acquisition and the Case of the Joint Capabilities Technology Demonstration Office: Ad Hoc Problem Solving as a Mechanism for Adaptive Change

Kathryn Aten and John T. Dillard
Naval Postgraduate School

A Comparative Assessment of the Navy's Future Naval Capabilities (FNC) Process and Joint Staff Capability Gap Assessment Process as Related to Pacific Command's (PACOM) Integrated Priority List Submission

Jaime Frittman, Sibel McGee, and John Yuhas, *Analytic Services, Inc.*
Ansaf Salleb-Aoussi, *Columbia University*

Enabling Design for Affordability: An Epoch-Era Analysis Approach

Michael A. Schaffner, Marcus Wu Shihong, Adam M. Ross, and Donna H. Rhodes
Massachusetts Institute of Technology



Measuring Dynamic Knowledge and Performance at the Tactical Edges of Organizations: Assessing Acquisition Workforce Quality

Mark E. Nissen
Naval Postgraduate School

Outcome-Focused Market Intelligence: Extracting Better Value and Effectiveness From Strategic Sourcing

Timothy G. Hawkins, *Naval Postgraduate School*
Michael E. Knipper, *771 Enterprise Sourcing Squadron USAF*
Timothy S. Reed, *Beyond Optimal Strategic Solutions*



The Impact of Globalization on the U.S. Defense Industry¹

Jaques S. Gansler—The Honorable Jacques S. Gansler, former Under Secretary of Defense for Acquisition, Technology, and Logistics, is a professor and holds the Roger C. Lipitz Chair in Public Policy and Private Enterprise in the School of Public Policy, University of Maryland; he is also the director of the Center for Public Policy and Private Enterprise. As the third-ranking civilian at the Pentagon from 1997–2001, Dr. Gansler was responsible for all research and development, acquisition reform, logistics, advance technology, environmental security, defense industry, and numerous other security programs. Before joining the Clinton administration, Dr. Gansler held a variety of positions in government and the private sector, including Deputy Assistant Secretary of Defense (Material Acquisition), Assistant Director of Defense Research and Engineering (Electronics), Senior Vice President at TASC, Vice President of ITT, and engineering and management positions with Singer and Raytheon Corporations.

Throughout his career, Dr. Gansler has written, published, testified, and taught on subjects related to his work. He is the author of five books and over 100 articles. His most recent book is *Democracy's Arsenal: Creating a 21st Century Defense Industry* (MIT Press, 2011).

In 2007, Dr. Gansler served as the chair of the Secretary of the Army's Commission on Contracting and Program Management for Army Expeditionary Forces. He is a member of the Defense Science Board and the Government Accountability Office (GAO) Advisory Board. He is also a member of the National Academy of Engineering and a fellow of the National Academy of Public Administration. Additionally, he is the Glenn L. Martin Institute Fellow of Engineering at the A. James Clarke School of Engineering; an affiliate faculty member at the Robert H. Smith School of Business; and a senior fellow at the James MacGregor Burns Academy of Leadership (all at the University of Maryland). From 2003–2004, Dr. Gansler served as interim dean of the School of Public Policy at the University of Maryland, and from 2004–2006, he served as Vice President for Research at the University of Maryland. [jgansler@umd.edu]

William Lucyshyn—Mr. Lucyshyn is the Director of Research and a senior research scholar at the Center for Public Policy and Private Enterprise in the School of Public Policy at the University of Maryland. Previously, Mr. Lucyshyn served as a program manager and the Principal Technical Advisor to the Director of the Defense Advanced Research Projects Agency (DARPA) on the identification, selection, research, development, and prototype production of advanced technology projects. Prior to joining DARPA, Mr. Lucyshyn completed a 25-year career in the U.S. Air Force. Mr. Lucyshyn received his bachelor's degree in engineering science from the City University of New York and earned his master's degree in nuclear engineering from the Air Force Institute of Technology. He has authored numerous reports, book chapters, and journal articles. [lucyshyn@umd.edu]

Introduction

The nation's military strategy, in large part, continues to depend on superior technology, highly qualified operational forces, and the ability to sustain those forces in order to achieve its objectives. However, the global industrial base (as well as the U.S. industrial base) no longer exists as it did during the Cold War, and the DoD must seek to gain the benefits of globalization.

In the past, the U.S. industrial base would ramp up to meet the needs of the U.S. military and then fade into the background when the conflict was ended. Throughout the Cold War however, the defense industry became a permanent segment of the industrial base, providing dedicated development and production of the systems, equipment, and supplies. The approach was to not to mobilize for conflict but to have enough permanent

¹ This is a summary of the full report, which will be available in July 2013.



capacity within the defense industry to address it (Gansler, 1980). The industrial base, however, no longer exists as it did during the Cold War.

The Cold War's end ushered in the following developments that came to dominate the restructuring of the defense industry. First, deep cuts in defense spending forced a major consolidation, down to a small number of defense-dedicated firms. Shrinking defense budgets in the 1990s resulted in a string of mergers of defense industry suppliers. In 1993, there were 21 companies doing major defense and aerospace work; today, there are six U.S.-based companies: Boeing, Lockheed Martin, BAE Systems, Raytheon, General Dynamics, and Northrop Grumman. Small and large suppliers alike—especially if they can survive on commercial business alone—consider government accounting and reporting requirements burdensome, and many have stopped bidding on government contracts, thereby reducing the stream of suppliers. In many critical defense areas, the number of suppliers remaining—at either the prime contractor or lower-tier levels—is down to only one or two. And with the likely future stabilization or decline of defense budgets, this consolidation trend is potentially going to increase. Second, the commercial sector began to invest heavily in high-tech research and development and technological advancement. Third, globally dispersed technology development and production has left the U.S. dependent upon off-shore sources for critical defense-related technologies (especially in critical, lower tier component areas). Finally, there was a shift in emphasis within the DoD from weapons and systems to complex communications and information technology. As a result of these, the former U.S. defense industry,² almost without exception, is transforming itself (through consolidations, mergers, acquisitions, joint ventures, and integration that crosses national boundaries) into a global, more commercially oriented industry (Defense Science Board, 1999).

As a result of these four changes, the formally segregated defense industries of Western countries are in the process of transforming themselves (through consolidations, mergers, acquisitions, joint ventures, and integrations that cross national boundaries) into a global, more commercially oriented industry. Take, for example, the DoD's new MRAP vehicles. They use a V-shaped hull that was originally developed and refined in South Africa, armor designed and developed in Israel, robust axles from Europe, and electronics from Asia (Gansler, 2009). The rest of the world's defense industry is also becoming more flat. Just recently, the United Arab Emirates introduced a new corvette class ship, built by Abu Dhabi Shipbuilding.

But little of what the company featured came from the UAE. The design of the planned fleet of six Baynunah-class ships originated at Constructions Mecaniques de Normandie of Cherbourg, France. The fire control, and command and control for the weapon systems came from Italy. The Exocet and SeaSparrow missiles were built in France and the United States, respectively. South Africa's SAAB Avitronics supplied the laser warning system. German companies provided the decoy system, the sonar, the underwater communications and the engines. (Magnuson, 2011)

This tendency toward globalization—the tendency of markets for goods, services, and capital to transcend national boundaries and become interconnected—is not new; Ford and General Motors were assembling cars in 24 countries in 1928 (Sturgeon & Florida, 2000). The term *globalization* was first used and identified as an unstoppable process

² The Europe Community has similar concerns, and is working on developing a Community security strategy and industrial policy (Hartley, 2006; Markusen & Costigan, 1999) .



almost 25 years ago (Levitt, 1983); it has significantly accelerated with advances in communications and computer technology.

Current U.S. defense trade and industrial policy does not clearly address globalization or its implications. Instead, the current U.S. policy is the consolidation of numerous incremental changes, often contradictory in their aims. For example, the National Security Strategy seeks to open markets and increase military cooperation, while export controls and “buy American” laws inhibit the international trade in defense products (McLean, 2005). Furthermore, other factors such as International Traffic in Arms Regulations (ITAR) and export control laws disincentivize commercial firms from entering the defense market. When commercial technology has military applications, the State Department requires compliance with export control laws prior to exportation. These restrictions often make commercial firms think twice before entering the defense market, because their goods may be restricted in the commercial market. For example, in the construction of Boeing’s new 787 Dreamliner, significant concern was raised over similar components that were also used in the Air Force’s B-2 Bomber (Gates, 2006). Finally, restrictions are not made for goods alone but can have an impact on the availability of labor as well. For example, restrictions on security clearances or visas for foreign nationals often make it difficult for U.S. firms to gain access to the best and brightest minds from around the world to work on highly technical fundamental research programs.

However, since the globalization of the defense industry is a relatively recent phenomenon, its impacts have not yet been fully realized, or understood. Recent comprehensive studies of the U.S. defense industry (since the end of the Cold War but before the September 11, 2001, terrorist attacks) have focused on the then perceived overcapacity, downsizing, and conversion of the defense industry (Gholz & Sopolsky, 1999–2000). Although acknowledged as a growing trend, globalization is recognized for its benefits along with its risks, as well as the lack of a consistent and cohesive national policy (Gansler, 2011; Markusen & Costigan, 1999). RAND examined the impact of globalization on the defense aerospace industry and identified many benefits, and some risks but called for more research on the issue (Lorell et al., 2002). Finally, a study by the National Research Council (Dr. Jacques Gansler participated in the study) examined the availability of the U.S. critical technology in a globalized environment and recommended the development of monitoring capability of both U.S. industrial health and component unavailability (National Research Council, 2004). Lacking from these studies is a comprehensive examination of globalization’s impact on the defense industrial base and national security.

The commercial sector (which pays little attention to national boundaries) is now driving the development of advanced information technology, required for most military systems, and is already very global. Manufacturing industries were found to be more globalized in major industrial countries, although lagging in the U.S. (Makhija, Kim, & Williamson, 1997). Original equipment manufacturers are increasingly contracting out their manufacturing and focusing exclusively on the product design and marketing (Sturgeon & Florida, 2000). Moreover, the source of competitive pressure is shifting from the globalization of markets to the globalization of production, and with it the key competitive advantage has begun to shift from excellence at the point of production to excellence in governing the spatially dispersed networks of plants, affiliates, and suppliers (Sturgeon & Florida, 2000).

When globalization is viewed through the prism of international trade, White House staff have argued that the impact of increased job exportation, offshoring (Mankiw referred to it as *outsourcing*) is just another form of trade and “would ultimately benefit the United



States” (Andrews, 2004). Other research has supported this view and concludes that offshoring leads to gains from trade and increases to national income, with minimal negative job impact (Bhagwati, Panagariya, & Srinivasan, 2004). Gomory and Baumol (2000) argued that the modern free-trade world is very different from original free-trade models, and that with modern industries, dominance can occur as a result of “the vagaries of historical accident.” Once these patterns are established, they tend to be preserved and are less influenced by free-market forces; therefore, they suggest that government policy should favor the high-value retainable industries (Gomory & Baumol, 2000).

Although the globalization of the defense industry is not a relatively recent phenomenon, its impacts have not yet been fully realized or understood.

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Appendix



Defense Industry Globalization*

The Honorable Jacques S. Gansler, PhD**
*Professor and Roger C. Lipitz Chair
Director, Center for Public Policy and Private Enterprise
School of Public Policy
University of Maryland*

Mr. William Lucyshyn
*Director of Research and Senior Research Scholar
Center for Public Policy and Private Enterprise
School of Public Policy
University of Maryland*

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** Dr. Gansler served as Under Secretary of Defense (Acquisition, Technology and Logistics) from 1997 – 2001

Defense Industry Globalization - 10/21/13

1



Globalization Defined

- Globalization is the long-term, largely irreversible phenomenon involving the political, cultural, and economic merging of geographically dispersed groups of people across geopolitical lines.
- Globalization as a concept has existed for centuries, but only with the advent of modern transportation and communication technologies has its application become so pervasive and consequential.

Defense Industry Globalization - 10/21/13

2





“God did not bestow all products upon all parts of the earth, but distributed His gifts over different regions, to the end that men might cultivate a social relationship because one would have need of the help of another. And so He called commerce into being, that all men might be able to have common enjoyment of the fruits of the earth, no matter where produced.”

-Libanius (AD 314-393), Orations (III)

“Ziglar Heavy Oration” 1991.10.10

3



Today’ s Environment

- ➔ Declining Resources (with great “uncertainty”)
- ➔ Rising Costs (labor, equipment, energy, health, etc.)
- ➔ Demographics and debt payments adverse to needs
- ➔ Rapidly Changing World (technology, economics, geopolitics, etc.)
- ➔ Globalization a reality (industry, technology, economics, labor, and security)
- ➔ Broad spectrum of security concerns (pirates, terrorists, cyber, chemical bio, nuclear proliferation, “road-side bombs,” regional instabilities, etc.) - - with great “uncertainty”(both in scenarios and in funding)

“Ziglar Heavy Oration” 1991.10.10

4





The Message

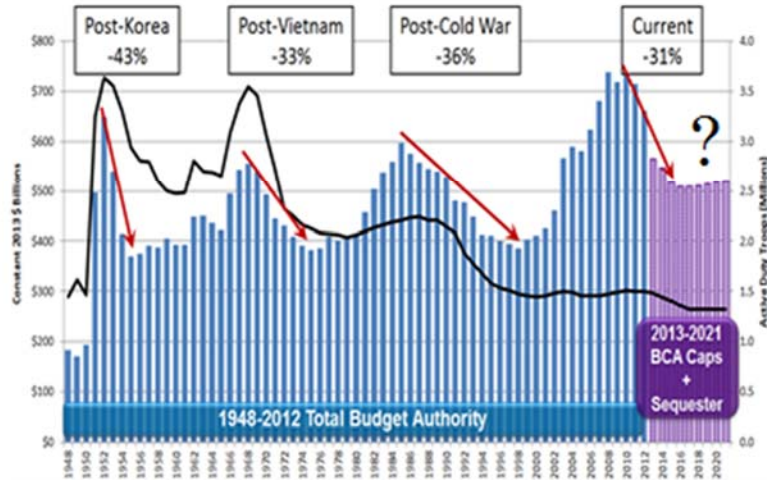
- In General: Today, industry, technology, and labor are Globalized - - but, U.S. defense industrial-based policies are not!
- All Future Security Scenarios are likely to be multi-nation: requiring combined-force interoperability - - but U.S. export controls largely limit this.
- In many areas today, the U.S. is no longer the technological leader - - but “buy America” and other import controls, limit our acquisitions; yet our National Security strategy is “technological superiority.”

U.S. Defense Industrial Strategy/Policy Must Change; In Order to Gain the Economic and Security Benefits of Globalization.

2



Likely Shrinking U.S. Defense Budget



Source: Center for Strategic and International Studies (CSIS).

4





Allies also Resource Constrained

- ➔ *"The economic crisis has hit our defence spending hard,"* said NATO Secretary General Anders Fogh Rasmussen, addressing the NATO Parliamentary Assembly in Prague. *"Compared to 2009, total Allied defence expenditure last year declined by over 56 billion US dollars in real terms"* (NATO Press Release, November 2012).
- ➔ In an era of decreasing defense budgets, the United States and other NATO allies must understand how best to allocate their resources within a global market.

NATO has proposed integrated "Smart Buying" as the best **Multinational** approach.

2012-09-10 10:00:00

7



Internationalizing the Defense Industrial Base

- ➔ The defense industrial base of the United States has undergone a sea change in its composition, becoming increasingly reliant on international sources for its development, production, and provision.
- ➔ Major players in the U. S. defense industrial base are no longer solely domestic.
- ➔ In 2012, 20 Aerospace and Defense firms made the Forbes Global 2000 List of the largest public companies operating in the global market.

2012-09-10 10:00:00

8





Impacts of Globalization

- ➔ **Communication**
 - The advent of new technologies allows for the relatively low-cost and, in many cases, instantaneous, transfer of large amounts of information.
 - Borders are porous and no longer easily enforced.
- ➔ **Culture and Education**
 - A complicated global citizenry exists - Loyalties may be split
 - Foreign nationals are able to travel to the United States and obtain visas to work and attend school - "brain drain" occurs as these people return to their countries of origin
- ➔ **Economic**
 - Firms are increasingly multinational in orientation.
 - Economic alliances and treaties are created to promote mutually beneficial international trade policies for member states.
 - Dual-use technology is made available to the commercial market.
 - e.g., Global Positioning System (GPS), night-vision technology, etc.

Continued →





Impacts of Globalization (cont.)

- Security and Technology
 - A greater need for cooperation among states exists to act jointly against other states and, increasingly, against terrorist organizations and other non-state actors.
 - The proliferation of weapons and military technology has become easier, making for alliances among "rogue" states. For example:

"Since the 1960s, North Korea's [weapons] sales have run the gamut, from conventional weapons, to increasingly sophisticated, long-range missiles, to collaborating with Syria on the construction of an entire clandestine nuclear reactor with no evident purpose except to produce plutonium for nuclear weapons." (Rosett, "North Korea's Middle East Webs and Nuclear Wares," Feb. 13, 2013)
 - The rise of cyber warfare
 - Cyberspace has become the "fifth domain" of modern warfare
 - China and Iran have been implicated in many cyber attacks against the US aerospace and defense industries
 - The President has been given broad authority to issue pre-emptive cyber strikes, if a state is deemed a cyber threat
 - Between 2014 and 2016, U.S. Cyber Command (CYBERCOM) will increase its workforce by 500%

2013 February 13, 2013

11



Potential Benefits of Strategy/Policy Change

- ➔ **Security:**
 - U.S. and allies would both have State of the Art ("best in class")
 - U.S. and allies' forces would be interoperable (exercises and war)
- ➔ **Economic:**
 - Economies of scale (from greater volume)
 - Greater competition (for best performance at lowest cost)

These Can Be Realized; While Always Directly Addressing Any Potential Security Risks

2013 February 13, 2013

12





The “Good News”

- In spite of the domestic politics, and “barriers” created, steps are being taken:
 - The MRAP vehicle (designed to harden against roadside bombs) uses armor designed in Israel, shock absorbers from Germany, tires from France, and some Asian electronics
 - All U.S. weapons have some elements originally from foreign sources -- because of their superior performance
 - Many leading, domestically located, U.S. defense firms are majority-foreign-owned (e.g., BAE systems; Finmeccanica; EADS; Thales; Plasan; Serco; etc. -- all with “Special Security” Boards)

President Obama Has Indicated a Willingness to Review Export/Import Controls

Defense Industry Daily.com - 10/21/10

11



Joint Strike Fighter: F-35 Lightning II Program

- The prime contractor of the F-35 program is the American firm Lockheed Martin, with American and British firms, Northrup Grumman and BAE Systems, brought in as principal partners.
- Additionally, eight nations besides the United States are involved in the F-35's 10-year System Development and Demonstration (SDD) phase: the United Kingdom, Italy, the Netherlands, Turkey, Canada, Denmark, Norway and Australia.
- By partnering with the US during System Design and Development, firms in these countries can “bid for work on a best-value basis, and participate in the aircraft's development.”
- Israel and Singapore have also agreed to join the program as Security Cooperation Participants.

(Source: “F-35,” Joint Strike Fighter, <http://www.jsf.mil/f35/>.)

Defense Industry Daily.com - 10/21/10

12





The Critical Labor Market

- ➔ National Security requires the best in STEM (Science, Technology, Engineering, and Math) - - but U.S. students are not selecting these fields
- ➔ Many Top U.S. Universities and U.S. Industry Research Centers are establishing overseas operations
- ➔ More than half of the graduate students in many top U.S. Universities, in STEM, are foreign students - - who we “encourage” to return home after their studies (vs. obtain citizenship; if they want it)
- ➔ President Reagan decided they can work on government-funded, fundamental research (NSDD-189); but even this has been “discouraged”
- ➔ The Executive and Legislative branches are considering increasing the number of visas for STEM immigrants (with advanced degrees)

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Initial Signs of Change

- ➔ Most U.S. and foreign defense firms are now “globalized” - - and the trend is growing
- ➔ A DOD “Study on the Impact of Foreign Sourcing of Systems” [OSD, January 2004] concluded “utilizing foreign sources does not impact long-term readiness; nor impact the economic viability of the national technology and industrial base”
- ➔ The U.K. recently had a Navy ship built in South Korea (for “best value”); and the U.S. is competing its Littoral Combat Ship between a U.S firm and an Australian firm.

The Technological, Economic and Security Potential Benefits of Globalization are Slowly Being Recognized; Now the Strategies and Policies Must be Adjusted!





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