2012

Showcase of selected faculty and students research

Monterey, California, Naval Postgraduate School.

GRADUATE SCHOOL OF BUSINESS & PUBLIC POLICY

The Nation's Premier Defense-focused Business Management & Public Policy School for Graduate Education & Research

Showcase of selected faculty and students Research

Naval Postgraduate School

The Graduate School of Business & Public Policy Mission

To serve our nation by educating U.S. and allied military officers as well as defense civilians in defense-focused business and public policy, by conducting research in defense management and public policy, and by providing intellectual resources for leaders and organizations concerned with defense business management practices and policies.

We pursue our vision and perform our mission through graduate education, research, and professional service.

Research at the Graduate School of Business & Public Policy (GSBPP) is carried out by faculty, students, and four research programs and centers. This booklet contains research summaries of projects undertaken by faculty and students grouped by area.

Additional published information on GSBPP research programs can be found in the following locations:

- *The Graduate School of Business & Public Policy Research Newsletter*. A quarterly newsletter highlighting GSBPP faculty and student research, GSBPP alumni achievements, and GSBPP past and future events. See the newsletter at http://www.nps.edu/Academics/Schools/GSBPP/Research/Newsletter/index.html

- The GSBPP website, available at http://www.nps.edu/Academics/Schools/GSBPP/index.html

A Message from …

Dr. William R. Gates,
Dean of GSBPP

Dr. William R. Gates, Dean, Graduate School of Business & Public Policy

The Graduate School of Business and Public Policy (GSBPP) at the Naval Postgraduate School (NPS) is the nation's premier research-oriented graduate school for defense management, public policy, and administration. We attract a world-class faculty who conduct research at the intersection of their academic disciplines and national security challenges. Faculty research is intrinsically intertwined with classroom instruction and student research, ensuring that our graduates are professionally ready and technically accomplished to operate in a complex and uncertain global security environment.

We offer a unique synergy between sponsors, faculty, and students. Our research and curriculum sponsors ensure that we remain relevant and timely in both research and graduate education. Our students are directly involved in our research through their classroom instruction and student capstone projects. Our sponsors also employ our students, so our graduates return to duty with detailed knowledge of the current security challenges. Through this symbiotic relationship, we provide both transformative education and creative, informed solutions to complex and uncertain global security challenges.

The GSBPP offers a blend of faculty skills, including federal budgeting and financial management, operations and logistics management, economics and manpower systems analysis, acquisition and contract management, and organizational management. We can combine these capabilities, as best serves our sponsors, to address questions focused within a particular discipline or questions requiring a mix of skills across disciplines. Our students add a unique element of operational experience to further inform our research.

In this booklet, we offer examples of the unique interaction between faculty capabilities, sponsor needs, and student operational experience. We look forward to working with both current and future sponsors to find the mix of skills that best addresses the evolving global security challenges.

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Research Centers, Programs & Groups

The GSBPP is home to four important research initiatives. This research addresses areas of special interest to the Department of the Navy and the Department of Defense and to the global security establishment, providing decision-makers with critical information and recommendations. GSBPP faculty and students enable the Department of the Navy and the Department of Defense to manage defense organizations, systems and processes efficiently and effectively.

Acquisition Research Program (ARP)

Creating Synergy for Informed Change

Established in 2003, the Acquisition Research Program (ARP) at the Naval Postgraduate School (NPS) provides leadership in innovation, creative problem solving, and an ongoing dialogue, contributing to the evolution of Department of Defense acquisition strategies. Promoting applied research across multiple disciplines, the ARP addresses complex defense challenges from a number of perspectives by integrating defense applications with leading-edge intellectual concepts and tools. Graduate student involvement in current acquisition issues through the ARP ensures that the future acquisition workforce is prepared with the scholarly skills and practical knowledge needed for success.

Recent ARP research efforts include the following papers and reports:

- *Wall Street and the Pentagon: U.S. Defense Industry's Access to Capital Markets, 1990-2010,*
- *Investigating Advances in the Acquisition of Secure Systems Based on Open Architecture, Open Source Software and Software Product Lines,*
- *A Web Service Implementation for Large-Scale Automation, Visualization, and Real-Time Program-Awareness via Lexical Link Analysis,*
- *Ship Maintenance Processes With Collaborative Product Lifecycle Management and 3D Terrestrial Laser Scanning Tools: Reducing Costs and Increasing Productivity,*
- *The Excessive Profits of Defense Contractors: Evidence and Determinants,*
- *An Administrative Workload and Cost Analysis for the Defense Security Cooperation Agency's Foreign Military Sales.*

Annual Acquisition Research

Each May NPS hosts the Annual Acquisition Research Symposium in Monterey, California. This symposium serves as a forum for the presentation of acquisition research and the exchange of ideas among scholars and practitioners of public-sector acquisition. The event features papers and presentations on recently completed and ongoing projects conducted by researchers from NPS and other institutions on current acquisition issues, as well as remarks by a distinguished slate of guest speakers and panelists. Each year the ARP seeks a diverse audience of influential attendees from academe, government, and industry who are well placed to shape and promote future research in acquisition.

ARP by the Numbers

- *20-25 grants issued to Universities / Think Tanks each year,*
- *10–20 NPS-wide faculty research projects funded each year,*
- *75–100 graduate students each year,*
- *140+ acquisition research products produced each year,*
- *800+ research products added to the acquisition body of knowledge,*
- *60+ universities and think tanks engaged in a virtual consortium on acquisition research.*

Acquisition Chair: RADM James B. Greene, Jr.,USN, (Ret.); jbgreene@nps.edu
Principal Investigator: Keith F. Snider, PhD Associate Professor of Public Administration & Management; ksnider@nps.edu
Research Associate and Program Manager: Karey L. Shaffer, MBA, General Dynamics Information Technology; klshaffe@nps.edu

Program Website: www.acquisitionresearch.net
Symposium Website: www.researchsymposium.org

Center for Defense Management Research (CDMR)

The CDMR is a chartered research center of NPS. It provides assistance, information, and research on business management in national defense. The goal of the CDMR is to provide research-based solutions to the most persistent issues of defense business management and to support current and future defense leaders by informing and guiding the design and execution of current and future reforms. The CDMR provides access to scholarly research publications, contacts with faculty experts, and opportunities to commission research on key issues in defense management. The CDMR's leading defense management scholars engage with research sponsors to conduct applied research that is timely, accessible, and useful.

The CDMR works with sponsors on research projects. Some of the sponsors have included the following:

- U.S. Office of Personnel Management;
- Undersecretary of Defense for Personnel and Readiness,
- U.S. Navy Office of Budget,
- Office of the Chief of Naval Operations, N40, Sea Enterprise Program,
- Office of the Chief of Naval Operations N40, Task Force Energy,
- Defense Supply Center, Richmond,
- Deputy Chief of Naval Operations (Material Readiness and Logistics),
- Defense Business Transformation Agency,
- Defense Contract Audit Agency.

Working with its sponsors, the CDMR has conducted research projects in a variety of areas:

- The history of defense management reform,
- Personnel management reform,
- Financial management reform,
- Communication and organizational change,
- Performance measurement and benchmarking.

Recent Titles from the Center

- *Communication and Senior Leader Ethos: Examining Employee Reception to a Policy Change Memo in a Federal Agency,*
- *Federal Personnel Management Reform from the Civil Service Reform Act to DHS and NSPS,*
- *National Security Personnel System: The Period of Implementation ,*
- *Best Practices in the Navy's Energy Programs: Strategic Communication Factors Operating in the Tactical Forces,*
- *Exploring the Link between Performance and Resource Allocation in the Navy Enterprise ,*
- *Transformation in Transition: Defense Management Reform and the 2008 Election ,*
- *Business Management Reform in the Department of Defense in Anticipation of Declining Budgets*.

Director: Professor Douglas A. Brook; dabrook@nps.edu
Associate Director: Senior Lecturer Phil Candreva; **pjcandre@nps.edu**
Website: http://www.defensereform.org/

Humanitarian Research Group (HRG)






Founding Members: Dr. Aruna Apte, auapte@nps.edu, Keenan Yoho, kdyoho@nps.edu

The strategic challenges of humanitarian assistance and disaster relief (HADR) have increased many folds in the current era because of increased scale and frequency of all types of disasters—natural and manmade. Three of the most devastating natural disasters (the Asian tsunami, the Haitian earthquake, and the Japanese earthquake) registered in the last 100 years took place during the last decade.

The Humanitarian Research Group was formed to address the challenges in such humanitarian operations. The group was founded by Dr. Aruna Apte and Dr. Keenan Yoho from the Department of Operations & Logistics Management at the GSBPP. The group focuses on developing a body of research that will address and improve missions of the U.S. Department of Defense (DoD), first responders, policy makers, and non-governmental organizations (NGOs). Its principal streams of research include the following:

- disaster preparedness and prepositioning,
- response supply chain,
- the role of military in humanitarian operations, and
- interagency collaboration and contingency contracting.

The Humanitarian Research Group's objectives are as follows:

- conduct academic and applied research in humanitarian operations,
- provide a source of education and thought leadership in humanitarian operations and military operations other than war , and
- align humanitarian research activities with and disseminate findings to U.S. governmental (to include the DoD) and non-governmental entities, as well as other academic institutes.

Principal research studies include scholarly journal articles, conference proceedings, technical reports, and student reports. Reference information for some of these research efforts is listed as follows:

Aruna Apte. (2009). Humanitarian logistics: A new field of research and action. *Foundations and Trends® in Technology, Information and OM*, *3*(1), 1–100. http://dx.doi.org/10.1561/0200000014

Javier Salmeron and Aruna Apte. (2010). Stochastic optimization for natural disaster asset prepositioning. *Production and Operations Management*, *19*(5), 561–575.

Aruna Apte and Susan Heath. (2011). Request and response processes for support from Department of Defense during disaster. *Journal of Homeland Security and Emergency Management*, *8*(1), Article 17.

Aruna Apte and Keenan Yoho. (2011, September). *Strategies for logistics in case of a natural disaster*. [Acquisition Research Sponsored Report Series]. Monterey, CA: Graduate School of Business and Public Policy, Naval Postgraduate School.

Aruna Apte and E. Cory Yoder. (2011, September). *When disaster strikes: Is logistics and contracting support ready?* [Acquisition Research Sponsored Report Series]. Monterey, CA: Graduate School of Business and Public Policy, Naval Postgraduate School.

Stephen Ures,. (2011). Paying for military support in humanitarian assistance & disaster response: A cost analysis and planning model [MBA student report]. Advisors: Aruna Apte and Keenan Yoho.

Cullen Greenfield and Cameron Ingram. (2011). An analysis of U.S. Navy humanitarian assistance and disaster relief operations [MBA student report]. Advisors: Aruna Apte and Keenan Yoho.

Aruna Apte and Keenan Yoho. (2011). Capabilities and competencies in humanitarian operations. In *Proceedings of the Eighteenth International Annual European Operations Management Association (EurOMA) Conference*. Cambridge, UK: Cambridge University.

Manpower, Personnel, Training, and Education Research Program (MPTE)

The Manpower, Personnel, Training, and Education (MPTE) Research Program was developed to allow faculty and students at NPS to research topics of importance to the Navy's Manpower, Personnel, Training, and Education community. The program is sponsored by the Chief of Naval Personnel (N1) through a memorandum of understanding (MOU) between the N1 and the president of NPS. Funding is provided to support research activities (including labor, travel, equipment, contracts, grants, and other expenses) related to N1-sponsored research.

The MPTE research program involves, among other things, coordinating research opportunities for NPS faculty, stimulating research projects by selected graduate students, traveling as necessary to support research objectives, and providing reports regarding research progress, results, and accomplishments.

GSBPP faculty and students undertake specific research projects in consultation with N1 representatives. Some examples of faculty research projects include the following:

- Analysis of Non-Cognitive Instruments for Screening of Navy Applicants,
- Female Aviation Accessions and Retention,
- SRB Auction: A Pilot Program,
- Navy Econometric Modeling System ,
- Alternatives for Improving Recruiter Productivity.

Examples of student research projects are as follows:

- *The Effect of Deployment Frequencies on the Military Divorce Rate,*
- *Analysis of SWO Fundamentals Exam Scores,*
- *The Effect of Deployment on the Rate of Major Depression and Substance Abuse in Active Duty Military from 2011 to 2006, and*
- *Analysis of the Preventive/Corrective Maintenance Ratio for DDG Class Ship.*

Thesis Day

Thesis Day was established by the Chief of Naval Personnel (N1) for graduates of the Manpower Systems Analysis (MSA) curriculum at NPS. The Chief of Naval Personnel is the sponsor for the MSA curriculum. Each year, five or six students are selected to present their research in Washington, DC, to the N1 staff and leadership. The students are chosen based on the quality of their thesis work, on the relevance to the manpower and personnel issues facing the Navy, and on their presentation skills. During Thesis Day, the CNP Award for Excellence is presented to the student with the best grade point average and thesis research.

Program Coordinator: Dr. Yu-Chu Shen; yshen@nps.edu

System Dynamics Modeling for Improved Knowledge Value Assessment: A Proof-of-Concept Study

[1]David N. Ford, John T. Dillard, and Thomas J. Housel

(Sponsor: Program Executive Office Integrated Warfare Systems, PEO IWS)

Effective and efficient Department of Defense (DoD) acquisition programs require the analysis of a wide range of materiel alternatives. Alternative diversity, difficulties in selecting metrics and measuring performance, and other factors make the analysis of alternatives (AoA) difficult. The benefits of alternatives should be included in AoA, but cost estimates predominate most AoA processes. Incorporating benefits into AoA is particularly difficult because of the intangible nature of many important benefits.

The current work addresses the need to improve the use of benefits in AoA by building a system dynamics model of a military operation and integrating it with the knowledge value added (KVA) methodology. The synergies may be able to significantly improve the accuracy of KVA estimates in the AoA process.

A notional mobile weapon system was modeled and calibrated to reflect four weaponized unmanned aerial vehicles (UAVs) (Figure 1). Modeling a hypothetical AoA for upgrading one of the UAV indicated that there were potentially significant synergies that can increase the number of alternatives that could be analyzed, establishing common units of benefit estimates for an AoA, improved reliability of an AoA, and improved justification of AoA results. These can improve alternative selection, thereby improving final materiel effectiveness and DoD acquisition processes.

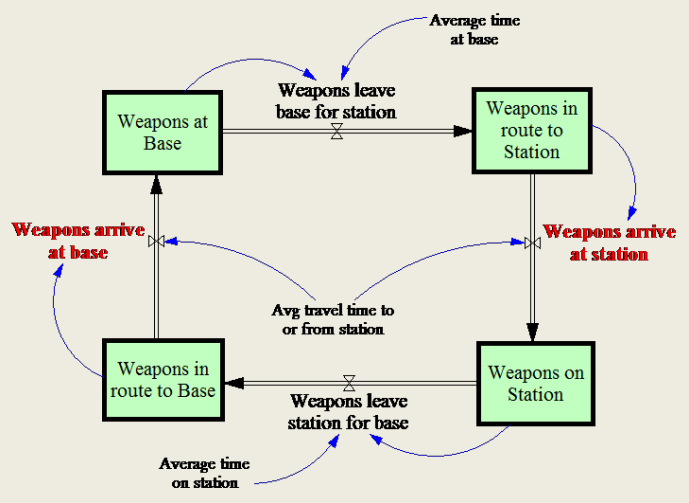


Figure 1: Position and movement of weapons during operations

AoA based on an integrated system dynamics/KVA model provides program management teams with several kinds of valuable information:

- quantified measures of improvement that include benefits,
- overall system improvement estimates,
- subprocess improvement estimates,
- guidance for alternative selection in AoA,
- help in justification of AoA decisions, and
- guidance for further investigation.

Findings showed that neither a system dynamics model nor a KVA analysis alone can produce these improvements (Table 1). Only by integrating system dynamics and the KVA approach are the previously mentioned improvements available.

		Weaponized UAV			
		Predator	Reaper	Sky Warrior	X-47B
Subprocess Productivity	Acquire targets	377	377	377	377
	Fire support coordination	189	189	189	189
	Fire mission development	943	3122	1222	3962
	Move weapons	50	23	44	607
	Engage targets	5094	70761	15212	254736
	Battlefield assessment	377	377	377	377
	Weapon	705	907	954	1067

Table 1: KVA Productivity Ratios

Total Ownership Cost—Tools and Discipline

[2]Michael Boudreau and Brad Naegle

(Sponsor: This project was not funded by the ARP, but it received publication and editorial support through the ARP-GDIT contract.)

In 2003, a report was prepared on the reduction of total ownership cost (R-TOC). At the time of the report, there was substantial effort ongoing, and in more than seven years since, much has happened. As is always the case with a very large organization such as the Department of Defense (DoD), change has come slowly and unevenly across the organization. In 2011, a number of things that need to be done to control and reduce the life cycle cost of weapon systems became clear. Many of the steps that need to be accomplished are well-known but not practiced. Some aspects are not widely understood or are otherwise not in place. This report begins with background extracted directly from the 2003 report.

As Dr. Gansler said in his 1998 memorandum, the program manager's (PM) job in trying to reduce total ownership costs (TOC) is a very difficult one, and PMs should seek help, wherever they can, to reduce ownership costs. Because of the extreme amount of focus on the authorized and appropriated budget, it is easy for PMs to focus on the near-term acquisition cost and make decisions that appear to be beneficial in reducing acquisition costs but that are detrimental to operations and support costs because they increase future budgets. So the PM is faced with a choice: cut the number of systems to be acquired, or reduce the logistics performance (eliminate built-in test [BIT] capability, onboard diagnostics/prognostics/autonomics, etc.), which will add significant operations and support (O&S) costs well after the PM has moved to a different position. Which choice do you suppose is most appealing to the PM?

Pursuit of TOC reduction at the level of the warfighting system may be separated into two major approaches that are connected, end-to-end, along a life cycle time line. During the developmental phases, the effort (or process) is called cost as an independent variable (CAIV). For systems in the field or fleet, the process (or goal) becomes R-TOC. The chart in Figure 1 is a typical depiction of the CAIV/R-TOC relationship.

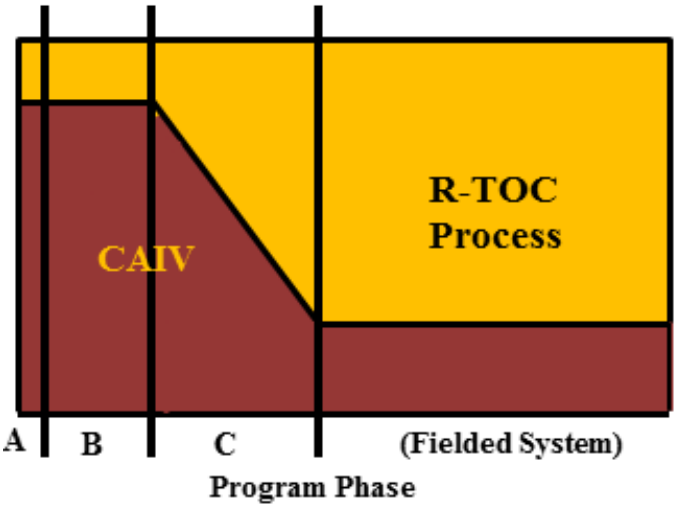


Figure 1.CAIV/R-TOC Relationship
(Kaye, Sobota, Graham, & Gotwald, 2000, p. 354)

The first approach, CAIV addresses TOC during the warfighting system's developmental phases, beginning with the Concept Refinement phase. The focus of CAIV is to establish cost targets based on affordability and requirements and then to manage those targets, thereby controlling TOC. Employing the CAIV concept early in the developmental process offers, potentially, the greatest opportunity for TOC reduction at the lowest possible investment cost.

The second approach to TOC is the R-TOC and focuses on the reduction of average procurement unit cost (APUC) and weapon system sustainment cost (i.e., O&S costs).
R-TOC is employed as the warfighting system is produced and placed in service Often there are the secondary benefits of enhanced performance (i.e., improved reliability and operational availability), but the forcing function is the reduction of O&S costs, the largest constituent of TOC. Often overlooked as a TOC driver, system software has become a never-increasing TOC driver the more systems rely on software functions. In this research, several areas have been identified that remain as significant hindrances to effective TOC assessment and reduction, including conflicting policy guidance, inadequate or missing databases, and inadequate process controls for software and system of systems (SoS)/net-centric TOC drivers. Future policy and guidance should address these shortfalls to more fully address TOC issues. The DoD has not yet demonstrated its ability to estimate program costs within reasonable confidence limits. Estimation of developmental costs are challenging at best and are not yet well-enough supported by solid cost databases.

Defense Acquisition Management Information Retrieval (DAMIR) and the Navy Visibility and Management of Operating and Support Costs (VAMOSC) databases that collect O&S cost information should be improved or replaced for better support of cost-estimating. Current GAO reports indicate that VAMOSC is inaccurate, incomplete, and internally inconsistent. Software component analysis and decision databases, like those that would be developed using the Software Engineering Institute's (SEI) QAW and ATAM[SM] tools, should be required for every software-intensive system. Software continues to be a "wildcard" in estimating both acquisition costs and O&S costs, so front-end analyses must be improved, cataloged, and shared widely through a collaborative environment.

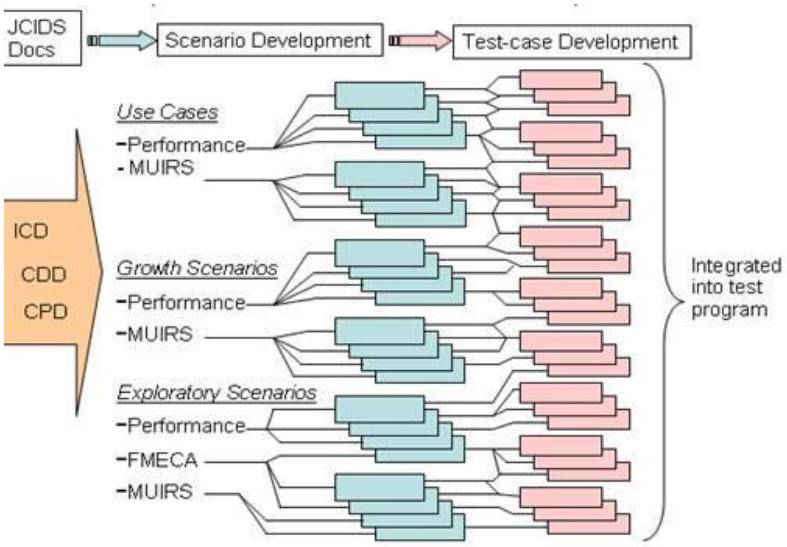


Figure 2.Capabilities-Based ATAM SM Scenario Development

The DoD is very familiar with the demands of sustainment, but the Office of the Secretary of Defense (OSD) has not insisted on proper planning and implementation of affordable sustainment. The OSD has not focused enough on the metrics that indicate success of warfighting systems or on the cost to achieve required metrics. Instead, focus has been on commodity management, with the Defense Logistics Agency (DLA) as a prime example, where metrics have reflected performance of the support organization but not weapon system readiness (Figure 2).

The study revealed that PBL must be applied more widely, such that non-PBL systems should be an unusual occurrence. PBL requirements should initially be analyzed vertically by an individual system such that the warfighting system is affordable and able to achieve its mission.

Service Acquisition in the DOD: A comparison of Management Practices in the Army, Navy, and Air Force

[3]Rene Rendon, Aruna Apte, and Uday Apte

(Sponsor: Naval Sea Systems Command, NAVSEA)

Considering the high value of weapon systems and military equipment purchased in the recent years, the Department of Defense (DoD) has spent more on services than on supplies, equipment, and systems together. Specifically, the DoD's obligations on contracts have more than doubled between fiscal years 2001 and 2008—to over $387 billion, with over $200 billion spent just for services. The characteristics of service production include the intangibility of service output, co-production, simultaneity of production and consumption, the inability to store services, and the complexity in the definition and measurement of services. Given these differences in the production of services as opposed to that of manufactured products, it is natural to ask if the challenges faced in services acquisition are different than those in the acquisition of products, and more specifically, how services acquisition should be managed. This exploratory research studies how services acquisition is being presently managed within and across the departments of the Army, Navy, and Air Force. A web-based survey instrument was developed and used to collect primary data from all three departments. The analysis of survey results (see Table 1) focused on the following areas: contract characteristics, acquisition management methods, project-team approach, services acquisition leadership, and other management issues.

During this study, the predominant procurement approach used in the services was full and open competition using firm-fixed price contracts. Since these services—administrative, maintenance, data processing, utilities/housekeeping, and transportation services—are traditional and commercial in nature, it would follow that the competitive marketplace would be capable of proposing and competing for these contracts.

The study showed that services acquisition in the Navy takes place predominantly at the regional level, whereas services acquisition in the Army and the Air Force occurs predominantly at the installation level. This difference in the two approaches will likely have a significant influence on effectiveness of various management practices, such as the use of the project-team approach and the position of the person who provides the contractor surveillance.

Best practices in contract management reflect the use of project teams—specifically, cross-functional teams—in the management of services projects. The use of project teams facilitates the proper integration and controls of the various functional disciplines involved in the project and help achieve the project's cost, schedule, and performance objectives. This research revealed that the Army and Air Force use a project-team approach more frequently than the Navy, which uses it slightly more than 50% of the time.

In addition to the use of project teams, another best practice is to formally designate a trained project manager with the authority to lead the services acquisition effort. The data indicated that when a project team is used, the contracting officer predominantly leads the services acquisition project in the Army and Air Force and leads it only slightly more than half of the time in the Navy. It was also observed for the Army and the Air Force that the use of a project team increased the probability of the contracting officer leading the services acquisition, and for the Navy, perhaps due to regional organization, the use of project teams decreased the probability of the contracting officer leading the acquisition. These research findings illustrated situations in which contracting officers may be performing activities outside of their area of expertise as well as beyond their authority.

Another critical aspect of services acquisition is contractor surveillance. As expected, in the Air Force and the Army, quality assurance evaluators (QAEs) and contracting officer representatives (CORs) predominantly provide contractor surveillance. However, in the Navy, QAEs and CORs provide contractor surveillance in about 50% of the cases, with the contracting officer shouldering that responsibility in the remaining cases. These results indicate another situation in which contracting officers may be performing activities outside of their area of expertise—in this case, performing contractor surveillance.

Finally, in terms of the services acquisition workforce at the locations studied, data revealed that the Army and Air Force predominantly disagreed that there is an adequate number of acquisition billets, while the Navy survey responses were inconclusive.

The Army, Navy, and Air Force all predominantly disagreed that these acquisition billets are adequately filled. In addition, the Navy and Air Force predominantly agreed that the services acquisition personnel are adequately trained, while the Army survey responses were inconclusive.

Based on the analysis of the research findings, to improve the management of services acquisition in the DoD, the first recommendation was to continue the use of fixed-priced contracts while also increasing the number of competitively awarded contracts. As an initial step in increasing competition, results show that the DoD take an in-depth look at the current justifications and approvals for not providing for full and open competition.

The second recommendation related to the management of services acquisition at the regional versus installation level. The key to success under either approach is to use the proper supporting project management processes, such as requirements management, designating project managers and project teams with established roles and responsibilities, and ensuring sufficient QAE and COR surveillance of contractor performance. It is also recommended that the Navy adopt a more disciplined and rigorous project management approach to its management of services acquisition, possibly including a virtual project management team.

The third recommendation was to improve the overall management of services acquisition in order to increase the fill-rate of current acquisition billets. Over 75% of the respondents disagreed that the acquisition billets were adequately filled. Thus, the initial effort in increasing the acquisition workforce should be to first fill the current acquisition billets throughout the DoD with trained and experienced personnel. Only then will the DoD be able to determine if additional acquisition billets are needed. Additionally, special emphasis should be place on ensuring sufficient QAEs and CORs are assigned to oversee contractors' performance. Ensuring that the acquisition billets are filled with properly trained and experienced acquisition personnel will allow for better oversight and help ensure that contractor performance is properly monitored.

The fourth and final recommendation was to increase the effectiveness and availability of training to ensure a qualified acquisition workforce. This recommendation was not necessarily that additional training is needed but that more appropriate training is needed. This needed training may be in the form of experiential or on-the-job training and localized coaching and mentoring in contracting procedures, as opposed to additional formal DAU classroom training. Additionally, and more importantly, if the contracting officers are to continue acting as de facto project managers by leading the acquisition teams, then they should receive training on project management concepts, project control techniques, and project leadership (See Table 2).

As mentioned earlier, the services acquisition in the DoD is increasing in scope and dollars. Hence, greater attention must be given to the management of services acquisition. This study has addressed the need for research in this increasingly important area by undertaking a stream of research projects focusing on the management of services acquisition in the DoD. The first two research projects were exploratory in nature, aimed at understanding the types of services being acquired, the associated rates of growth, and the major challenges and opportunities present in the service supply chain. The next three research projects were survey-based empirical studies aimed at developing a high-level understanding of how services acquisition is currently being managed at a wide range of Army, Navy, and Air Force installations.

The preceding summary is based on the results of those three research projects. The sixth research project was focused on the drivers of management practices in services acquisition. Using empirical data from real-world Army contract files, factors were identified that promote or obstruct the use of best practices in services acquisition management and influence the efficiency and effectiveness of service contracts performance. This ongoing research project, seventh in the series, has focused on defining and measuring success of services contracts, while the goal of the eighth research project will be to identify drivers of acquisition practices and success of services contracts in the DoD.

MANAGEMENT PRACTICE	ARMY	NAVY	AIR FORCE
CONTRACT CHARACTERISTICS			
Degree of competition	66	56	71
Competitive	10	13	4
Sole Source	24	28	25
Not applicable			
Contract Type	66	69	71
Fixed price	8	0	4
Cost reimbursement	26	31	25
Not applicable			
ACQUISITION MANAGEMENT METHODS			
Organization Level at Which Services are Acquired	11	32	5
Regional	66	24	70
Installation	23	44	25
No Response			
Use of Projects Team Approach	63	51	64
Yes	38	49	36
No			
ACQUISITION LEADERSHIP			
When the Project Team Approach is Used	69	56	76
CO	31	44	24
Other			
When the Project Team is Not Used	47	65	61
CO	53	35	39
Other			
SCOPE AND ABILITY OF PERSONNEL RESPONSIBLE FOR ACQUISITION			
Who is Responsible for Surveillance?	13	38	9
CO	51	38	91
QAE/COR	36	25	0
Other			
ACQUISITION BILLETS, FILL RATE AND TRAINING			
Number of Billets is Adequate	74	38	59
Disagree	10	25	6
Neutral	13	25	35
Agree	3	12	0
No Answer			
Billets are Adequately Filled	66	50	65
Disagree	13	13	9
Neutral	17	25	26
Agree	5	12	0
No Answer			
Staff is Adequately Trained	38	13	9
Disagree	20	25	21
Neutral	39	50	71
Agree	3	12	0
No Answer			

Table 2. Comparison of Management Practices in the Army, Navy, and Air Force
(All Numbers are in Percentages)

Increasing Responsiveness of the Army Rapid Acquisition Process: The Army Rapid Equipping Force

[4]Alicia B. Baldauf and Jason Reherman

(Sponsor: U.S. Army)

Department of Defense (DoD) rapid acquisition activities have developed processes and best practices, learned critical lessons, and evolved over the last nine years in order to operate effectively in the current Overseas Contingency Operation (OCO) environment. As a result, there exists an opportunity for the greater acquisition community to leverage these processes, best practices, and lessons learned to improve the Urgent Materiel Release (UMR) process executed by traditional acquisition organizations. The U.S. Army Rapid Equipping Force (REF) is a prime example of an organization that has overcome many of the institutional barriers and that thrives within the constraints of the current policies and processes. The REF provides an example of innovation, flexibility, and responsiveness that is worthy of study to determine what is appropriate for emulation by other organizations.

This project captured the Army's current applicable rapid acquisition policies and the processes, best practices, and lessons learned through a review of the REF office. It compared the processes and practices of the REF to the processes and practices executed by Joint Project Manager Nuclear, Biological, and Chemical Contamination Avoidance (JPM NBC CA) in support of an UMR program. The analysis examined the three DoD decision support systems—Joint Capabilities Integration & Development System (JCIDS), Defense Acquisition System (DAS), and Planning, Programming, Budgeting & Execution System (PPBES)—utilizing the framework established in the Defense Acquisition Performance Assessment (DAPA) to focus the streamlined acquisition process improvement recommendations in the areas of organization, workforce, budget, requirements, and acquisition.

Many of the problems that affect effectiveness and responsiveness have been identified multiple times, and implementation criteria have even been defined by some. However, defining new processes and implementing institutional culture change in an organization like the DoD is extremely difficult, and these kinds of changes are not without risk. It would be possible to argue that the current DAS is the product of over 50 years of evolution, and even though it has it flaws, it has produced some of the finest military equipment in the world. This study showed that external factors are creating new rules of engagement that are forcing us to adapt quickly or be forced to fight with outdated and ineffective equipment and technology.

The Army rapid acquisition processes, especially those of the REF, have given us insight into what can be done within the established laws and regulations. Additionally, the test and evaluation (T&E) community has been transformed by the rapid acquisition process with smaller and earlier tests, as opposed to the pass/fail operational test of the past. Items are being fielded as tests are ongoing, and the results of that testing are being applied to the next iteration of the system to be fielded. The pioneering and creative processes and practices developed by the REF can be lasting legacies that serve the needs of the Army now and into the future if the Army can capture and take advantage of them now. Results of the study showed that the acquisition and T&E communities have an opportunity to use the REF processes, practices, and lessons learned to bring meaningful change to rapid acquisition systems and position us to maintain dominance on the battlefields of the future.

Based on the study's results, recommendations were given as follows:

Requirements—JCIDS

- Create tiered categories below the Acquisition Category III designation within JCIDS for rapid initiatives. Classify the tiers according to thresholds for the estimated cost and urgency of the acquisition effort, and designate the levels of necessary oversight and validation.
- Incorporate a process similar to the REF 10-Liner to streamline and standardize submission process and aid in project classification.

Acquisition—DAS

- Develop rapid initiative specific guidance based on the REF's METT-TC-FLARS process to create a streamlined, repeatable process for conducting requirements analysis.
- Tailor the amount of testing and associated operational assessments to the urgency, technical maturity level, and cost risk associated with the system(s) based on the tiered approach, with more robust follow-on testing planned to confirm the effectiveness, suitability, and survivability of the system(s).
- Incorporate theater data events and assessments conducted by the Army Test and Evaluation Command (ATEC) Forward Operating Assessment teams as part of the robust follow-on testing to provide a risk reduction measure for the tiered approach.
- Develop a standardized common operating picture/project management system to provide situational awareness and visibility of projects across the three major acquisition systems (JCIDS, DAS, and PPBES).

Budget—PPBES

- Establish a specific funding line for rapid acquisition projects that is not tied to specific "colors" of money.
- Develop funding threshold criteria that align with the tiered approach.

Workforce

- Increase the number of military acquisition professionals in program management organizations, and develop a corps of civilian employees that has experience interacting with operational organizations.
- Maintain a rapid cell as a center of excellence that can advise and guide traditional acquisition organizations and provide training to program managers (PMs) during rapid projects.
- Develop a core of subject matter experts in contracting for rapid acquisition projects.

Organization

- Reduce the level of decision authority and oversight for urgent needs projects based on a tiered approach organized according to the associated technical maturity level and cost risk of the effort.
- Incorporate liaison officers (LNOs) from the requirements community into the PM offices to develop habitual relationships.
- Increase the number of ATEC LNOs within the PMs to improve the efficiency of test and evaluation activities.
- Transfer the operational contact team approach to the requirements community to (1) increase responsiveness to emerging needs by reducing the lines of communication from the warfighter to the requirements community and (2) increase efficiency for accurately capturing the information required to make informed decisions. Additionally, these teams should maintain habitual relationships with the PMs.
- Maintain the REF logistics group as a center of excellence for the fielding of urgent needs to provide guidance on the intricacies of urgent need system deployment to traditional PM logisticians.

Many of the problems that affect effectiveness and responsiveness have been identified multiple times, and implementation criteria have even been defined by some. However, defining new processes and implementing institutional culture change in an organization like the DoD is extremely difficult, and these kinds of changes are not without risk. The current DAS is the product of over 50 years of evolution, and even though it has its flaws, it has produced some of the finest military equipment in the world. External factors are creating new rules of engagement which are forcing us to adapt quickly or be forced to fight with outdated and ineffective equipment and technology. The Army rapid acquisition processes, especially those of the REF, have given insight into what can be done within the established laws and regulations.

Additionally, the T&E community has been transformed by the rapid acquisition process with smaller and earlier tests as opposed to the pass/fail operational test of the past. Items are being fielded as tests are ongoing, and the results of that testing are being applied to the next iteration of the system to be fielded. The pioneering and creative processes and practices developed by the REF can be lasting legacies that serve the needs of the Army now and into the future if we capture them and take advantage of them now. The acquisition and T&E communities have an opportunity to use the REF processes, practices, and lessons learned to bring meaningful change to the rapid acquisition system, and make it possible to maintain dominance on the battlefields of the future.

Department of Defense Strategic and Business Case Analyses for Commercial Products in Secure Mobile Computing

[5]Matthew R. O'Neal and Joshua S. Dixon

(Sponsor: Marine Corps Systems Command PG 11)

The Department of Defense (DoD) has a clearly stated need for interoperable, affordable, innovative, and small form factor mobile communication devices. To date, however, the DoD has been unable to acquire a suitable device, or set of devices, that meets all of its needs. The DoD's unique requirements for supporting secure communications further increase the complexity of efficiently procuring the devices.

Currently, the defense Services procure unclassified commercial handsets and network services in a fractured manner via various contracting vehicles. The inefficiencies found in these vehicles ultimately limit the DoD's mobile communications potential for both unclassified and classified communications. Although the existing vehicles for procuring secure communications are more centralized, the current government-only solutions also result in inefficiencies. The shortfalls in the current situation ultimately translate to imprudent cost allocations, either directly in actual dollars or indirectly through various means (e.g., decreased productivity or suboptimal technical capability).

The authors of this paper conducted strategic and business case analyses to identify a path toward achieving mobile communications solutions that meet the following criteria:

- reduce the DoD's high device and service costs,
- increase overall smartphone functionality for the DoD, and
- maintain or increase the level of security functionality available in commercial devices for the DoD.

The strategic analysis points out trends in market conditions that may allow the DoD greater leverage in acquiring suitable commercial handsets. Most notable among these trends are the apparent decreasing bargaining power of handset manufacturers and the increasing opportunities for more flexible acquisition of mobile voice and data service (i.e., mobile virtual network operator [MVNO] opportunities).

Following the strategic analysis of the study, business case analyses addressed the potential costs, benefits, and a limited set of security considerations for undertaking the following two efforts: (1) acquiring a commercial off-the-shelf (COTS) cross-domain solution (CDS) smartphone and (2) implementing one of various MVNO business models to obtain network services. As illustrated in Figure 1, these analyses yielded the following conclusions:

- The current level of DoD spending for reoccurring wireless services is $235 million for FY2010 with a $40 million increasing trend.
- The current secure mobile environment portable electronic device (SME PED) average annual total cost of ownership (including service) is $4,100 per user (amortized over two years).
- Over seven years, the DoD can potentially save $1 billion (in current dollars) by implementing the most cost-beneficial MVNO.

In Figure 1, the blue bars represent the net present value (NPV) of costs for current DoD wireless services on the unclassified (e.g., Blackberry) and classified (e.g., SME PEDs) domains. The proposed (red) bars represent the NPV of costs for the least costly MVNO approach.

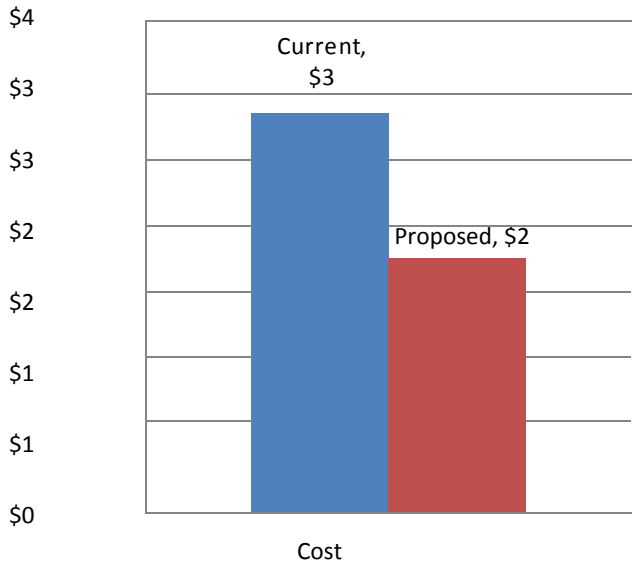


Figure 1. DoD Wireless Services (Cost)

Figure 2 presents only the costs in order to clearly illustrate the difference in each of the seven years. The numbers under the years indicate the total estimated demand for wireless services based on current DoD trends.

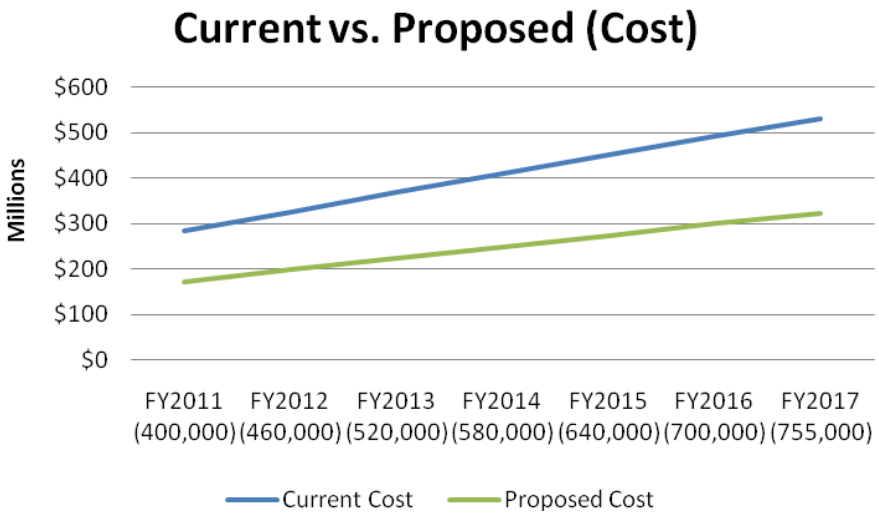


Figure 2. DoD Wireless Services (Current Versus Propose)

AUDITED FINANCIAL STATEMENTS IN THE FEDERAL GOVERNMENT: INTENTIONS, OUTCOMES AND ON-GOING CHALLENGES FOR MANAGEMENT AND POLICY-MAKING

[6]**Douglas A. Brook**

The Chief Financial Officers Act of 1990 (CFO Act; and the subsequent Government Management Reform Act of 1994) mandated federal agencies to prepare corporate-style annual financial statements and subject them to independent audit. Over a decade later, it is reasonable to ask what have been the consequences of CFO Act financial statements.

Perhaps the most challenging and most promising provision of the CFO Act was to "provide for the production of complete, reliable, timely and consistent financial information for use by the executive branch of the Government and the Congress in the financing, management, and evaluation of Federal programs." Much of this effort has been based on private-sector management models. Yet questions remain over the assumptions about the production and use of private-sector-style financial statements in the federal government, what the results have been from the drive to produce audited financial statements, and ultimately, what the impact has been on public policy decision-making and agency management. Now, after over a decade of working to produce audited financial statements, it is possible to examine these questions with data and information from both observers and participants.

Through a review of a considerable body of government reports and scholarly literature and an analysis of the fiscal year 2006 and 2007 performance and accountability reports of the 24 major reporting agencies, this paper reviews the progress in producing audited financial statements and achieving unqualified audit opinions, assesses the outcomes and value derived from producing auditable financial statements, identifies problems and shortcomings, and discusses theoretical and contextual issues that may affect the long-term use of agency financial statements for management and policy-making. Accrual accounting produces auditable financial statements that establish accountability, contribute to the credibility of financial information, and identify long-term financial issues; however, financial statements are not linked to the processes for resource allocation decisions nor do they produce information needed by managers. Some of these shortcomings are explained by contextual and sectoral differences.

Diagnosing Performance Management and Performance Budgeting Systems: A Case Study of the U.S. Navy

[7]Natalie J. Webb and Philip J. Candreva

(Sponsor: Office of the Chief of Naval Operations (OPNAV), Code N09X, the Navy Enterprise Program Office)

Responding to a charge in the performance budgeting literature that research has "been too long on exhortation and too short on diagnosis," a diagnostic case study of a performance management system in the U.S. Navy was conducted. This study examined the surface warfare enterprise (SWE), an organizational construct that is part of a larger "Navy Enterprise" initiative. Broadly, the SWE is a construct that seeks to link various organizations involved in policy decisions and implementation of policy, including defining needs for and constructing, operating, and employing naval surface ships. The research concentrated on the Naval Surface Force (SURFOR) and its role in manning, training, equipping, and sustaining the Navy's surface fleet.

SURFOR headquarters was reorganized along the lines of a matrix organization with functional and product line managers. Functional managers mirror the performance management system based on five critical performance algorithms, producing "figures of merit" that correspond to personnel, equipment, supplies, training, and ordnance, or the acronym PESTO. Each functional manager oversees his respective PESTO area across all ship types. Product line managers are responsible for all PESTO areas for a given ship type. Called class squadrons (CLASSRONs), they are responsible for the overall readiness of one of four types of ship: frigate, destroyer, cruiser, and amphibious.

The organization's performance management system was designed to support the process of making ships ready with the expectation that the system could also drive the budgeting process. Their final measure of performance is a warship ready for tasking across multiple possible missions.

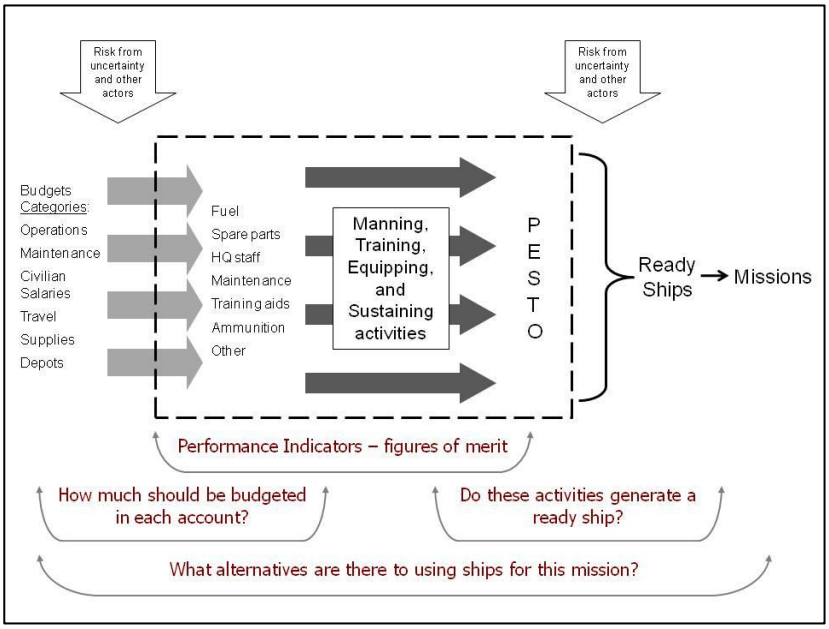


Figure 2. SWE Performance

The study examined this system in light of the literature on performance management in the public sector. Findings showed that the SWE's performance management system was logical, detailed, comprehensive, and reflected organizational structures and management practices. The common difficulties that were found among public-sector performance management systems are the following: the challenge of aggregating data into single meaningful measures, technical efficiency measures were not sufficiently supporting allocation decisions, budget data was being substituted for cost concepts, and insufficient consideration of extrinsic factors that affect ultimate outcomes.

Consistent with the literature, the SWE has found it difficult to create a useful outcome measure that can help drive budgets, but it has built a performance management system that provides detailed information about specific intermediate outputs. This case confirmed challenges noted in the literature associated with performance management and performance budgeting systems. Recommendations were offered for public officials considering such endeavors.

The Excessive Profits of Defense Contractors: Evidence and Determinants

[8]Chong Wang and Jose S. Miguel

(Sponsor: Program Executive Office Ships, PEO SHIPS)

A long controversial issue that divides academics, government officials, elected representatives, and the defense industry is whether U.S. defense contractors earn abnormal or excessive profits at the expense of taxpayers. The Aerospace Industries Association (AIA), the premier association representing the nation's best known names in the aerospace and defense industries, has consistently insisted that "Defense industry profitability lags significantly behind its industrial peers.[1] On the other hand, a General Accounting Office (GAO) report in the 1980s found that defense contractors normally earned a higher return on assets (ROA) than their commercial counterparts. One might expect that as a more independent and relatively free-of-conflict-of-interest source of research, the academic literature should have provided more concrete and scientific evidence on this critical issue. Unfortunately, this is not the case.

First, for whatever reason, there is a long history of avoidance of military-related research among academics. As a result, studies in this field are quite limited. Secondly, the already limited studies on this topic stopped in the 1990s, leaving a gap in studies for almost two decades. A detailed literature review up to the mid-1990s—which is available in the paper—indicated that there was no consensus among scholars on this issue either.

The objective of this paper is twofold. First, the paper fills the almost-two-decade gap that had been left in the literature. Specifically, using up-to-date data, the study investigates whether defense contractors earn excessive profits. The contribution to this goal is beyond a pure extension of the time line. An innovative measure of excessive profit is employed based on a three-dimension match of firms on industry, year, and size. This novel approach better captures the "excess" of the defense contractors' profitability, if any exists. Secondly, given that evidence was found supporting the existence of defense contractors' excessive profits and the lack of consensus on the explanation of excessive profits, the paper provides alternative predictors of excessive profitability.

Using an innovative industry-year-size matched measure of excessive profit, three findings are demonstrated. First, when compared with their industry peers, defense contractors earn excessive profits. This result is evident when profit is measured by return on assets (ROA), return on common equity (ROCE), and profit margin ratio (PMR). The evidence of excessive profit is less consistent if profit is measured by operating margin ratio (OMR). Secondly, defense contractors' excessive profit is more pronounced after 1992, consistent with the conjecture that the post-1992 significant industry consolidation enabled superior profitability due to both the improved bargaining power and increased political influence of the newly combined firms. Finally, defense contractors' excessive profitability increases with poorer corporate governance, as measured by the duality of the Chief Executive Officer (CEO) and the Chairman of the Board.

[1] "Ways to Reduce Costs Immediately," AIA, August 17, 2010.

The Excessive Profitability of 4,099 Defense Firm-Years during 1950-2010

Panel A: Size matched by Total Assets

	N	Mean	Min	Max	Std Dev	t	P-value
Excessive ROA(%)	3,809	1.12	-23.49	44.17	7.08	**9.77****	<0.0001
Excessive ROCE(%)	3,314	3.65	-143.64	175.57	25.73	**8.08****	<0.0001
Excessive PMR(%)	3,809	0.28	-31.82	74.56	7.87	**2.22**	0.03
Excessive OMR(%)	3,777	-0.09	-59.59	257.33	10.32	-0.52	0.60

** indicates 5% significance level, *** indicates 1% significance level, **** indicates less than 0.01% significance level. Excessive measures are derived based on an industry-year-size matching. Industry is defined as 4-digit SIC while the size is defined as total assets.

Panel B: Size matched by Revenue

	N	Mean	Min	Max	Std. Dev.	t	P-value
Excessive ROA(%)	3,825	1.04	-21.89	44.37	7.29	**8.80****	<0.0001
Excessive ROCE(%)	3,246	3.71	-142.09	178.70	26.08	**8.10****	<0.0001
Excessive PMR(%)	3,825	0.45	-31.82	74.91	7.23	**3.85*****	0.0001
Excessive OMR(%)	3,793	0.35	-48.23	69.29	7.80	**2.77*****	0.006

** indicates 5% significance level, *** indicates 1% significance level, **** indicates less than 0.01% significance level. Excessive measures are derived based on an industry-year-size matching. Industry is defined as 4-digit SIC while the size is defined as total revenue.

AN ANALYSIS OF THE LOGISTICS REQUISITION PROCESS

[9]Dawn A. Burson

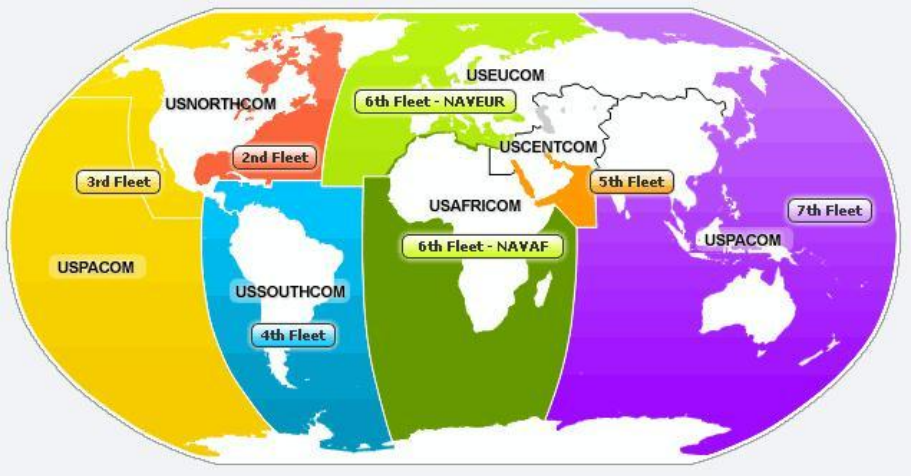
(Sponsor: Naval Supply Systems Command, NAVSUP)

The business of supporting a globally dispersed naval force is fraught with challenges and complexity. Services for warships of differing missions and sizes must be sourced and provided at ports all over the world. U.S. Navy ships use a formatted report called a logistics requisition (LOGREQ) to acquire those necessary services. The unconnected nature of the stakeholders that own specific portions of the process, which include the Naval Supply Systems Command (NAVSUP), numbered fleets, and type commanders (TYCOMs), increases in complexity as well. The objectives of this research are to analyze the LOGREQ process in its current implementation, make recommendations that will foster standardized procedures across the fleets, improve customer service to the deployed ships, provide cost controls for the TYCOMs, and facilitate increased communication among all LOGREQ participants.

Beginning in 2009, NAVSUP introduced new initiatives and information technology (IT) tools aimed at improving the LOGREQ experience for customer ships and service providers. Current LOGREQ procedures, NAVSUP initiatives, TYCOM policies, and Naval Warfare Development Command guidelines were reviewed for alignment and consistency.

Recommendations from the analysis include formally adopting language from NTTP 3-54M "Operations Security," updating the TYCOM Port Visit Cost Reporting requirements, completing detailed upgrades to the LogSSR website, and modifying contracting officer representative (COR) duties.

The research presents a list of measures that have been suggested for implementation between all commands involved in the LOGREQ process. However, the listed measures were not all-inclusive. Ultimately, common sense should prevail when drafting messages or sending e-mail or chat sessions that contain potentially sensitive information. If sensitive information must be transmitted via non-secure means, every effort should be made to minimize the amount of information put at risk.



Unified Combatant Command and Numbered Fleet Geographic Regions
(From U.S. Naval Supply Systems Command, 2010)

Evaluation of the Reformation of Navy Personally Procured Transportation

[10] **William Jacob Shultz**

(Sponsor: Naval Supply Systems Command, NAVSUP)

The Naval Supply Systems Command (NAVSUP) is seeking to simplify procedures and find efficiencies in the Personally Procured Move (PPM) program in response to a larger Department of Defense (DoD) effort to simplify defense travel policy. This thesis describes the weaknesses in the current PPM policies and procedures. An analysis of the PPM policies and procedures concludes that the root cause common to the weaknesses identified in the current PPM policies is an incentive structure that rewards a Service member in the form of a variable monetary incentive based on the amount of weight he or she transports. This thesis proposes a three-step pilot plan to address the weaknesses and to incentivize Service members to transport fewer household goods (HHGs). The first step implements a NAVSUP proposal to provide a financial charge card for Service members to charge their transportation expenses. The second step is a shift to a fixed monetary incentive based on the average government contract cost for a transportation service provider to ship HHGs. The third step is a shift to a simple electronic funds transfer (EFT) while maintaining the fixed monetary incentive.

Data revealed that the Navy should implement a three-step simplification plan for personally procured transportation (PPT). The NAVSUP should first move forward with the financial charge card in order to address some of the more serious PPM vulnerabilities such as fraud and inability to audit. Meanwhile, DPS Analytics ("DPS") data will capture an actual 400NG rate data for each Navy continental U.S. (CONUS) Permanent Change of Station (PCS). Second, after a one- to two-year period, these data should be used to determine the average cost of a PCS move for each rank, with and without dependents, for each CONUS transportation channel. These average costs should then be the amount authorized on the financial charge card in lieu of current policy of 95% of the government constructed cost of the estimated weight. The final step is a shift away from the charge card to further simplify the process into an EFT of a fixed monetary incentive to the member with no audit requirements.

Step 1. Financial Charge Card Implementation
The financial charge card should be implemented as drafted, with the exception of limiting the advanced allowance to 60%. In order to capture all the potential costs associated with a PPM on the financial charge card, the card should have authorized funds at 95% of the government-constructed cost for the estimated weight. Shifting from a cash advance to a financial charge card absorbs the risk associated with providing the entire allowance up front because the card is audited for authorized moving expenses before allowing the Service member to liquidate the balance of monetary incentive on the card. Once DPS captures sufficient historical cost data, Step 2 can be implemented.

Step 2. Shift to Fixed Monetary Incentive
A fixed monetary incentive that is based on average cost has a number of advantages. One advantage is the elimination of the need for obtaining and verifying weight tickets. An incentive that is not based on weight might be the best way to eliminate the high levels of fraud seen in current circumstances. Additionally, a system independent of weight is consistent with industry trends in the do-it-yourself category of HHG transportation such as PODS. The average cost for PCS HHG transportation will be determined annually or more frequently.

Specifically, the average transportation cost of PCS moves for each rank, with and without dependents, for each CONUS transportation channel, will be calculated. The source of the average HHG transportation cost will be the transportation contracted costs in the Defense Personal Property System. An alternative database to determine the average HHG transportation costs is that produced by the financial charge card. This alternative, however, would likely result in a less appealing monetary incentive amount because it is often less costly for a Service member to execute a PPM than it is for the government to contract a carrier through DPS.

Step 3. Shift to Simple EFT

A final simplification would be to shift from a financial charge card system to a simple up-front EFT. This would eliminate the need for auditing and provide more flexibility to the Service member. Examples of this transition have already occurred for allowances such as basic allowance for housing (BAH) and per diem. By implementing this three-step simplification plan for the PPT system, each weakness area of the current PPT system will be addressed. Not only will PPT simplification provide savings per se, but the incentive reforms associated with the recommended PPT simplifications will provide savings across the Navy and potentially the DoD by creating a culture that encourages Service members to maintain fewer HHG. Proper incentive management encourages Service members to transport fewer HHG, providing relief and cost savings to the DoD HHG transportation enterprise. The overall amount of weight shipped could be even lower if the DoD implements the "incentive for shipping and storing HHGs in less than average weights" provision from the 2001 Defense Authorization Act. Perhaps more important, Service members who desire a simplified PPM process are likely to be more satisfied when this plan is implemented, contributing to higher morale and welfare for Service members and their families.

Summary of Impact of PPT System Reform Proposals

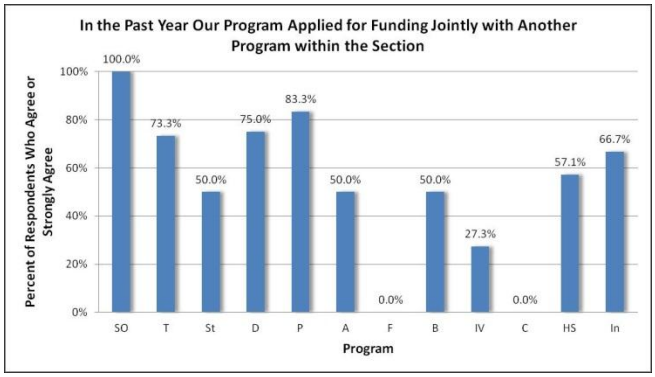
	Financial Charge Card	**Final Move Buy-out**	**Title 37 Average Weight Provision**	**Fixed, Cost-Based Incentive**	**Simple EFT**
Type of Move	PPM	PPM	Government Contracted	PPM	PPM
Population	Active Duty Navy	Separating and Retiring	Active Duty Military	Active Duty Navy	Active Duty Navy
Fraud and Abuse	Minimized	Eliminated	N/A	Eliminated	Eliminated
Weight Estimation	Still Required	Eliminated	Still Required	Eliminated	Eliminated
Multiple Shipment Methods	Not Allowed	N/A	Still Allowed	Not Allowed	Not Allowed
After-the-fact PPMs	No Change	N/A	N/A	Easier to Execute	Easier to Execute
Audit Process	Simpler	No longer required	N/A	Much Simpler	No longer required
Service Member Requirements	Fewer	Much Fewer	N/A	Much Fewer	Eliminated
Incentive Management	No Change	Greatly Improved	Greatly Improved	Greatly Improved	Ideal

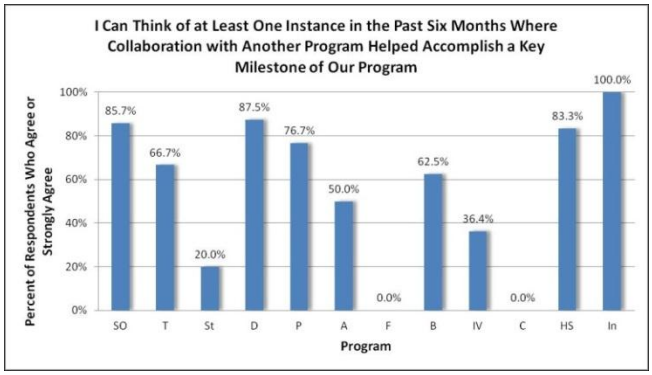
MAPPING COOPERATION AMONG MULTIPLE ORGANIZATIONS

Deborah E. Gibbons

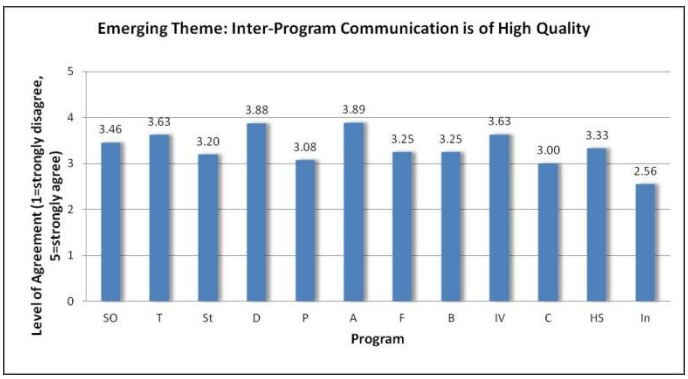
Integration among programs within a state-level public health department has been underway for about four years. A survey was conducted early in the process (May 2009) to map the patterns of cooperation within and between programs, to measure members' attitudes, and to gather ideas about integration. The current assessment used a November 2011, survey to follow up with measurements of organization members' relevant opinions and cooperative relationships. Some measures were repeated, and new questions were asked about integration processes, expected and experienced outcomes, and Communities of Practice in which people from discrete programs routinely meet to share ideas.

Participants were asked several evaluative questions about integration and Communities of Practice. Most were measured using a five-point scale that ranged from "strongly disagree" to "strongly agree" with each of a set of statements. Factor analysis identified several themes among these questions, and items that produced reliable scales were combined by averaging. The survey also measured the frequency of interaction, the extent of collaboration to get work done, and the extent of trust between organization members. Many people in the organization have collaborated with colleagues from other programs to pursue funding and reach milestones.





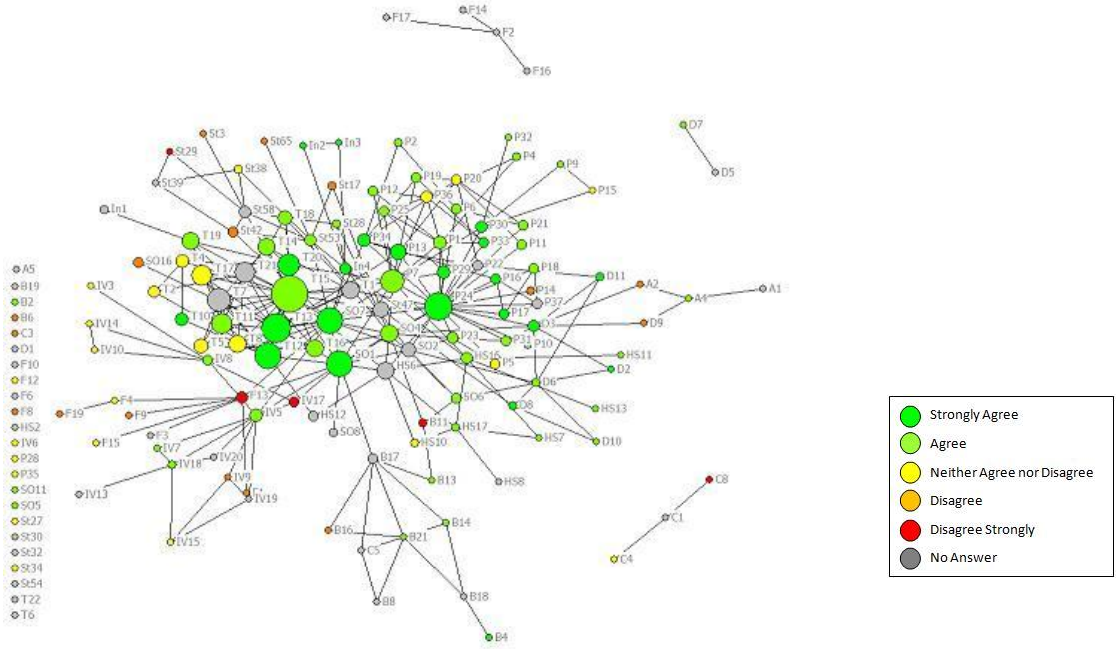
Inter-program communication quality was perceived to be neutral or positive, on average, by members of most programs (Organization mean = 3.34 out of 5). Means are broken out by program below.



Inter-program Communication Quality

Network maps generated from the survey provide visual evidence of working relations, and they enable analysis of the gaps in communication and cooperation. In a network map, each node represents a person or entity, and each line represents a relationship.

The following figure depicts extensive collaboration, with the nodes sized by eigenvector centrality. This centrality measure includes one's own relationships and the relationships of one's contacts, so a person with high eigenvector centrality in a collaboration network is collaborating with several others, who also collaborate with many people. The colors of the nodes indicate each person's response to the survey question that assessed whether or not collaboration with another program has helped accomplish a key milestone of their program in the past six months. We have used a stoplight metaphor, ranging from red (strong disagreement) through orange to yellow (uncommitted) through chartreuse to green (strong agreement). Grey nodes indicate individuals who failed to answer the question.



The study determined that several of the programs are collaborating, and many have accomplished tangible milestones together. Further, the level of trust among organization members is quite high, and it is likely to support future collaborations. Weaknesses in the network were identified, and strategies were developed to help the organization increase the benefits that they obtain through collaborative work.

Analyzing Political Space through Discourse: Case of the United States Coast Guard and the Live Fire Zones on the Great Lakes

[11]**Gail Fann Thomas and Kimberlie Stephens**

(Sponsor: The U.S. Coast Guard Headquarters authorized the study and provided access for interviews)

Many leaders use a communication strategy of decide-announce-defend and are surprised when their initiatives fail. This was the U.S. Coast Guard's communication approach when it was required to add automatic weapons on small crafts to patrol the Great Lakes. Six months after the Coast Guard announced their training proposal in the *U.S. Federal Register*, it had to withdraw its proposal and create an alternative plan. What seemed like a routine action turned into an unexpected, large-scale crisis. To better understand the communication dynamics that led to the Coast Guard's withdrawal of their proposal, our study was set out to answer the following questions:

1. How did the Coast Guard frame its proposal?
2. What frames did the stakeholders use in response to the proposal?
3. What was the effect of the communicative deliberations on the Coast Guard?

In-depth qualitative analyses were conducted on more than 900 individual public comments that were logged in the public docket, media accounts, and transcripts from nine public meetings. Interviews were also conducted with the Coast Guard's management team. Data were coded for themes, sentiment, types of argument, sources of power, and overarching frames. The purpose of the analysis was to create a picture of the changing communicative space over four punctuated time points: the announcement, the public's response to the announcement, the public hearings, and the ultimate withdrawal of the proposal.

Findings from the study revealed that the Coast Guard predominately used a legal, regulatory frame, assuming that they were simply promulgating requirements from USCG headquarters. It was not until the formal proposal withdrawal, six months later, that the Coast Guard portrayed a genuine participatory stance. Key stakeholders included non-profits, local associations, the general public, government representatives, and business owners. Their overarching themes included a direct request for public participation, transparency, and a demand that stakeholders' concerns be taken into consideration. Specific legitimate arguments were raised about economic, recreational, environmental, and legal issues.

In the end, the stakeholders' seemingly disparate themes coalesced around a complex argument that was able to resist the Coast Guard's proposal. The study offers suggestions for a proactive, strategic approach to communication that includes anticipatory environmental scanning, stakeholder analysis, communication planning, and formative and summative evaluation that would help mitigate the risk of failure.

Entrepreneurial Thinking: Affordable Loss

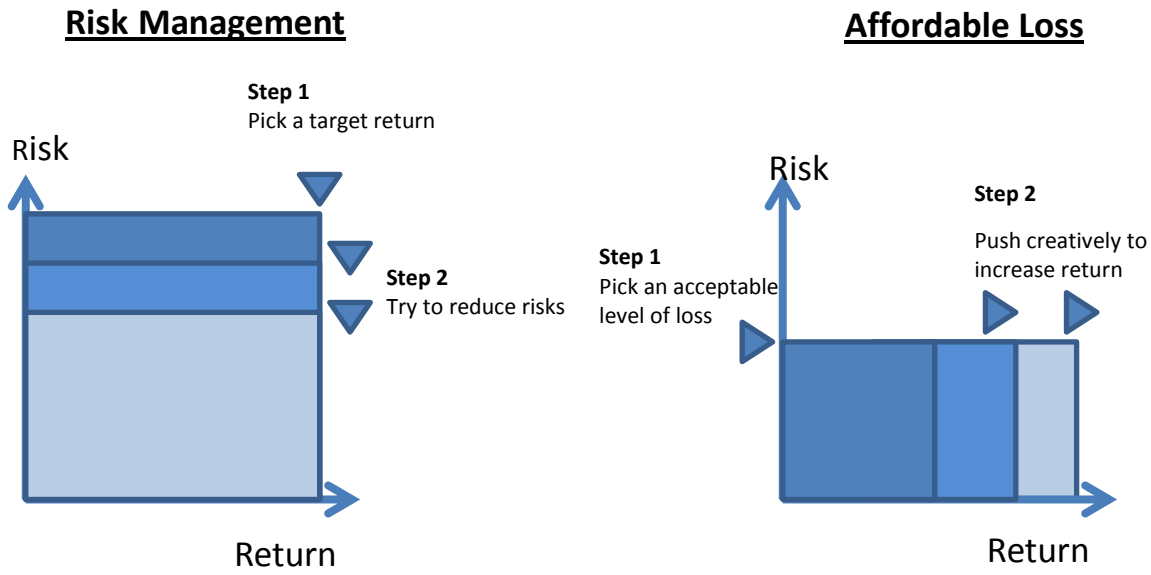
[12]**Nicholas Dew**

Professor Nicholas Dew has conducted various DoD-related research projects, including some on radio frequency identification (RFID) implementations and the Private Security Contractor (PSC) industry as well as projects on innovation and technology transfer at the Defense Advanced Research Projects Agency (DARPA) and the Department of the Navy (DoN).

The main body of research he has pursued over the past 10 years is about expert entrepreneurial thinking. Professor Dew has worked with colleagues in the U.S. and Europe, and, together, they have found patterns in the ways expert entrepreneurs think about the challenges of running a new venture or project. One of the most interesting findings is about the way entrepreneurs think about managing risk. Entrepreneurs are often imagined to be big risk takers, but prior research showed that this image is false: They are no different from managers on measures of risk-taking propensity. Higher education management programs around the world (e.g., the MBA classroom) commonly teach that individuals should try to calculate the optimal way of executing a project and then manage down the risks inherent in that choice. Expert entrepreneurs do not use this approach either, neither do they appear to apply more highbrow and elaborate financial models than managers (i.e., they do not appear to use sophisticated financial models such as "real options").

Instead, expert entrepreneurs tend to use a simple rule of thumb (or heuristic) called *affordable loss*, in which they evaluate opportunities based on whether the downside is acceptable to them, rather than on the attractiveness of the predicted upside. They carefully bind the downside risks of the opportunities they pursue, de-emphasize anything that involves predicting the upside, and then do what they actually can to create an upside for these opportunities, rather than trying to manage their risks in conventional ways.(See figure 1)

Figure 1



This approach used by expert entrepreneurs marked a significant shift in thinking—from models that emphasize risk management to models that emphasize designing within constraints (i.e., designing something that is doable from your current location and then pushing iteratively and creatively to increase returns). The empirical results collected over the past few years supported the suggestion that expert entrepreneurs do reason using affordable loss, and that approach is valuable in the following ways:

- Lab experiments: Statistics have shown that expert entrepreneurs are highly prone to consider affordable loss when making decisions than either expert corporate managers or novice MBAs.

- Field research: Over 1,000 investments in entrepreneurial firms made by wealthy private equity investors ("angels") were studied. Results revealed that those who used the expert entrepreneurial approach incorporating affordable loss invested less and had fewer failures than investors who bet big but had the same proportion of successes.

- Data on over 2,000 sales of private firms to public firms found a distinct pattern in investing approaches that can be described as "Earn it" versus "Burn it." Findings reported that some entrepreneurs grow firms by investing heavily in them to get fast results. They burn through cash on the way. However, about 40% of entrepreneurs pay in astonishingly little—an average of around $43,000—in order to build a very successful venture that they go on to sell to a public company. These ventures "earn" their way to an exit while taking a fraction of the financial risk that "burners" take.

These results are consistent with the general thrust of contemporary entrepreneurial activity (ideas such as *lean start-ups* that are currently popular among both for-profit and social entrepreneurs) but—in the current climate of projected fiscal austerity—have much to offer to DoN and Department of Defense (DoD) decision-makers who are looking for original ways to approach new business techniques.

Technological Transformation of Logistics in Support of Crisis Management

[13]Richard A. Braunbeck III and Michael F. Mastria

This study identifies and explores logistical frameworks that leverage technology to overcome problems associated with coordinated logistics operations during crisis management. Over the past 10 years, there have been significant advances in Radio Frequency Identification (RFID), satellite, and other related asset visibility technologies. These advances are mature enough to significantly increase the probability of achieving a useful common operational picture during emergency response activities. Recent crisis response operations that would have benefited from improved asset visibility include the Indian Ocean tsunami, the Pakistani earthquake, Hurricane Katrina, and those related to the Global War on Terror. In each of these cases, multi-agency involvement, both foreign and domestic, compounded the complexity of asset tracking and communication protocols. The establishment of a logistics tracking framework that provides adequate asset visibility, while maintaining operational security, will greatly increase the effectiveness of future crisis response operations.

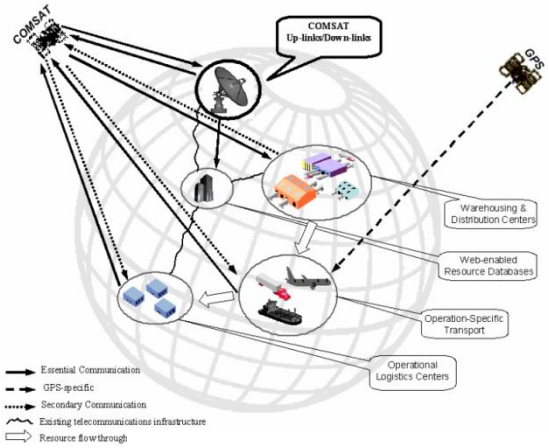


Figure 9. Communications Model (adapted from DSCC, 2005)

The framework identified concepts, technologies, and protocols that can be used to improve crisis operations on a global scale. (The paper develops a model for better logistics during crises.) The proposed logistics framework served as a viable solution for common logistical problems encountered by the U.S. and other industrialized nations while conducting crisis response operations.

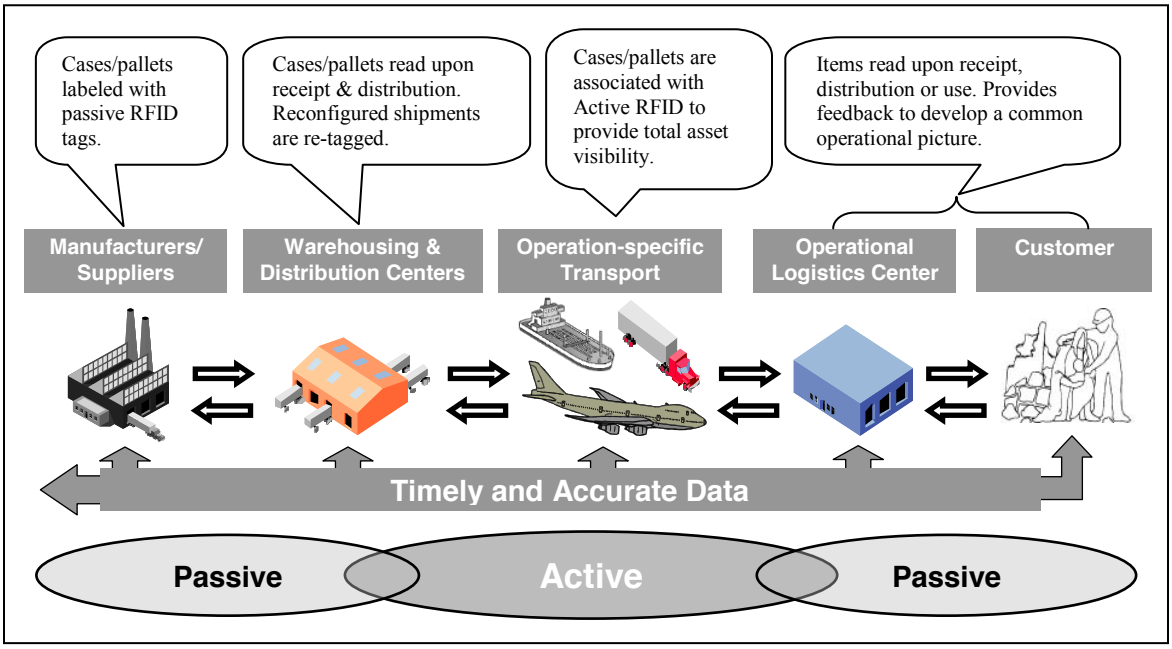


Figure 10. Integrated Supply Chain (adapted from DSCC, 2005)

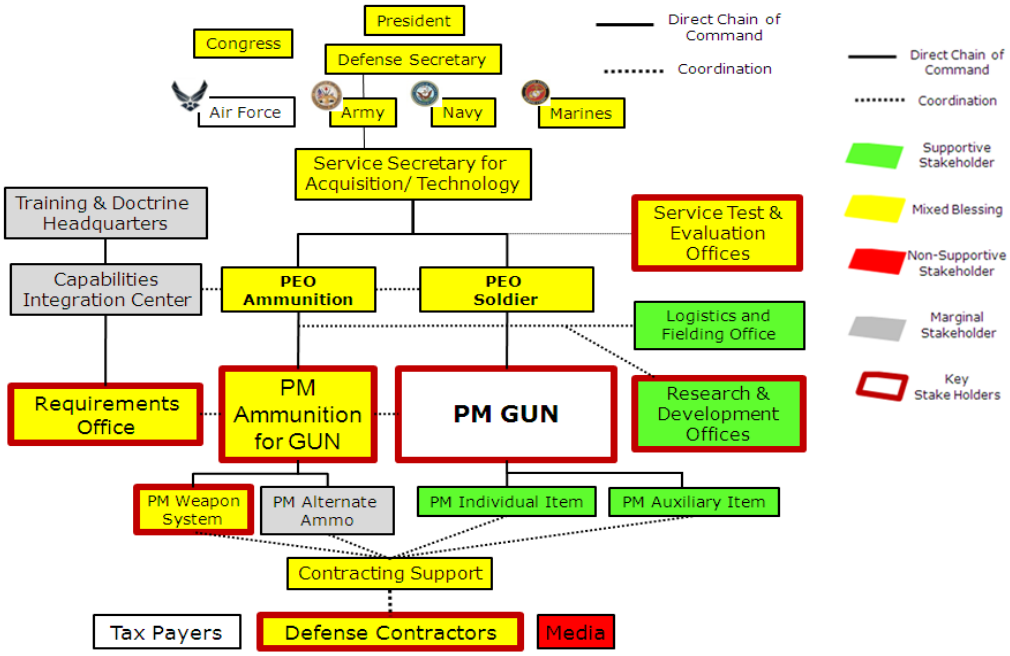
An Acquisition Leader's Model for Building Collaborative Capacity

[14]Louis M. Bauer and Mark M. Meeker

An Acquisition Leader's Model for Building Collaborative Capacity aggregates current research to develop a three-step model for analyzing, assessing, and improving collaborative capacity in an acquisition environment. It endeavors to answer the following question: How can DoD acquisition leaders improve their collaborative capacity to improve key acquisition metrics of cost, schedule, and performance? The report provides a model for addressing collaboration challenges and a methodology for assessing areas such as organization, stakeholders, relationships, and networks. These methods are demonstrated by applying the process to a hypothetical program management office. The report also provides tools applicable to any Department of Defense (DoD) agency or command where collaboration proves necessary. DoD acquisition leaders can improve their collaborative capacity by analyzing their current situation, assessing stakeholders, and developing a plan of action in accordance with current research models. This study showed that if applied correctly, the results of effective collaboration will be evident in cost, performance, and schedule.

Leaders must determine the degree of direct control they have, as less control indicates a greater need for collaboration. It is the leader's responsibility to determine how much collaboration is required, and the leader must promote collaboration and facilitate improvement. Leaders must establish a strategy for collaborative improvement. A lack of collaboration can have negative effects on an organization's ability to achieve its goals. An organization should begin by looking internally at existing collaborative capacity through the five domains of Jay Galbraith's Star Model. The leader must also assess networks and modes of network governance to understand the environment that the organization must operate in. Data confirmed that determining "key" stakeholders allows a leader to focus on those people with the most direct impact on mission accomplishment and shared goals. Collaborative capacity surveys can be used as tools to assess outside key stakeholders as well. Initial surveys provide benchmarks from which improvement can be measured. The model presented in this study is applicable across a wider spectrum as well. Many organizations in the DoD and the business world find that direct control of external agencies (and often direct control of sub-entities within the organization itself) is extremely difficult to achieve. Collaboration is a necessity, and building collaborative capacity is a necessary skill. (See figure 8)

Figure 8: Categorized stakeholder analysis for a typical program management office

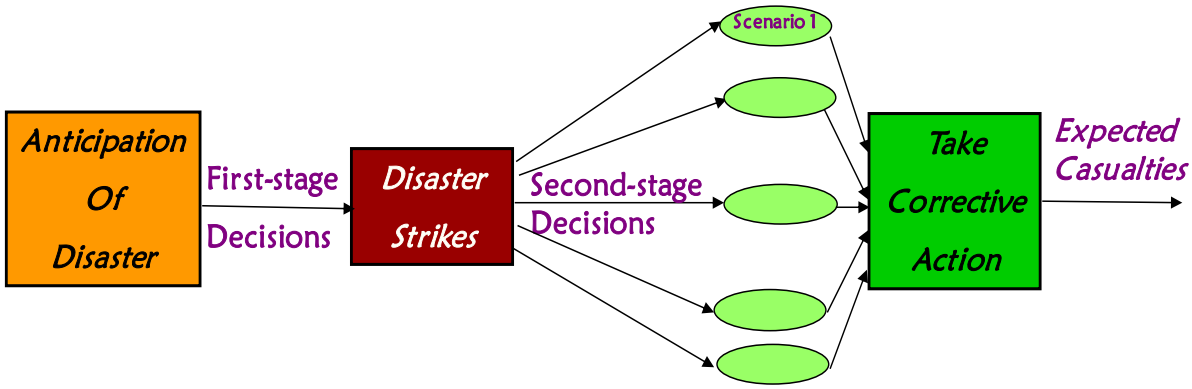


STOCHASTIC OPTIMIZATION FOR NATURAL DISASTER ASSET PREPOSITIONING

[15]Aruna Apte and Javier Salmeron

With the objective of minimizing the expected number of casualties, the research investigates the problem of pre-allocation of resources for humanitarian responses to future disasters. This study focuses on sudden disasters, which include natural events such as floods and hurricanes and man-made disasters such as a terrorist attack. This research develops a two-stage stochastic optimization model to address key strategic issues in current pre-disaster planning for humanitarian logistics, especially the pre-establishment of adequate capacity and resources that enable efficient relief operations.

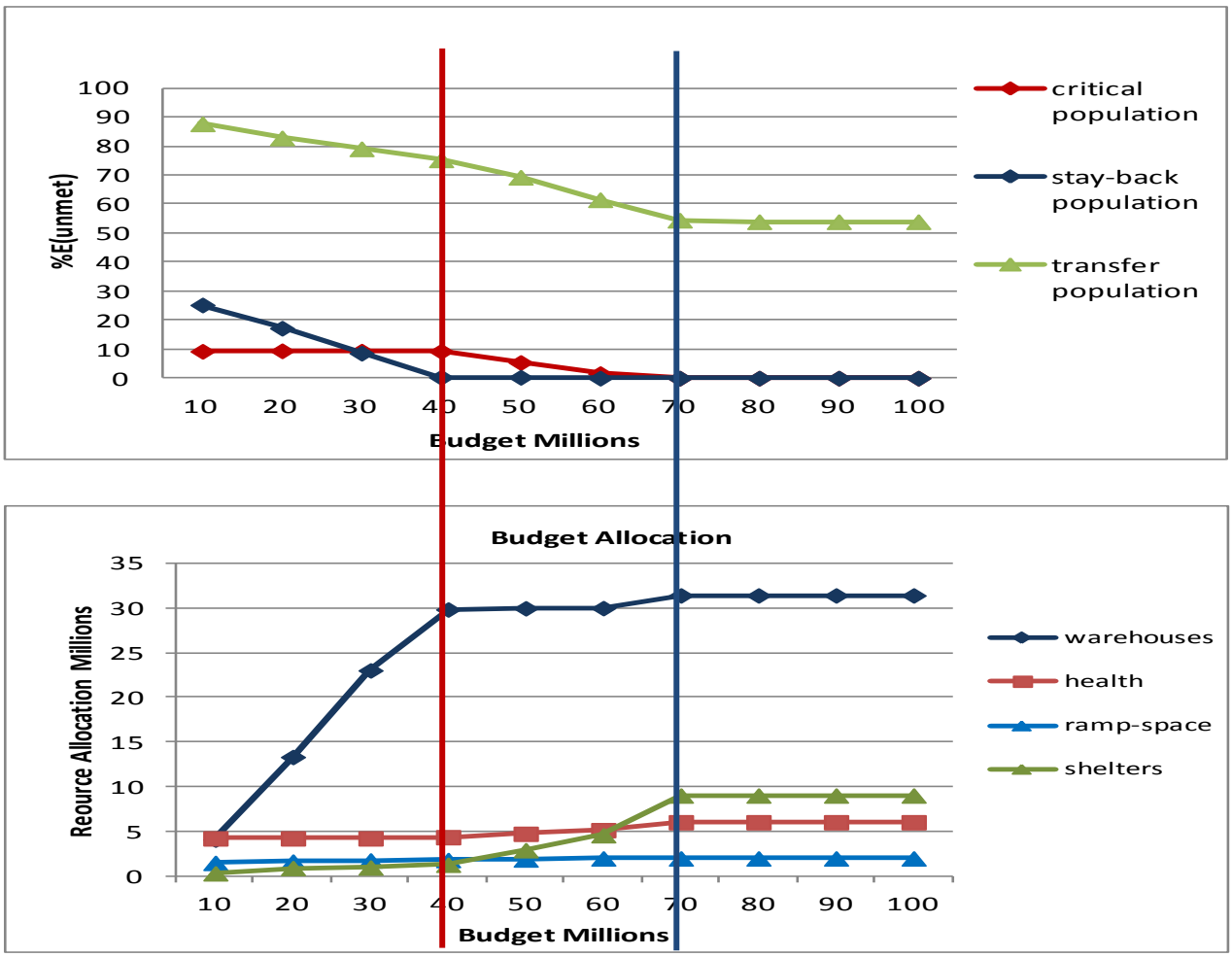
The optimization focuses on minimizing the expected number of casualties, so the model includes first-stage decisions to represent the expansion of resources such as warehouses, medical facilities with personnel, ramp spaces, and shelters. Second-stage decisions concern the logistics of the problem, where allocated resources and contracted transportation assets are deployed to rescue *critical population* (in need of emergency evacuation), deliver required commodities to *stay-back population*, and transport the *transfer population* displaced by the disaster. Because of the uncertainty of the event's location and severity, these and other parameters are represented as scenarios. Computational results on notional test cases provide guidance on budget allocation and proved the potential benefit of using stochastic optimization.



The study creates a prototype numerical example that posits a hurricane striking six possible areas with different severities according to five scenarios. The said operation spanned three days following the event. Data is generated by estimations originating from different public sources. The baseline case budget is $30 million, but the budget was varied from $10 million to $100 million in increments of $10 million, holding all other input values constant since variation in budget is an important management lever.

Finally, the study assesses the benefit of the stochastic model by using "Wait-and-See" (perfect information model) analysis and "Value of Stochastic Solution" (averaging scenarios model) analysis. Results show that the stochastic model reduces the expected number of casualties compared to deterministic models that are based on perfect information and the average of all scenarios.

Graph 1 Baseline Case: Unmet Goals



Graph 2. Baseline Case: Budget Allocation

An RFID Application in Large Job Shop Remanufacturing Operations

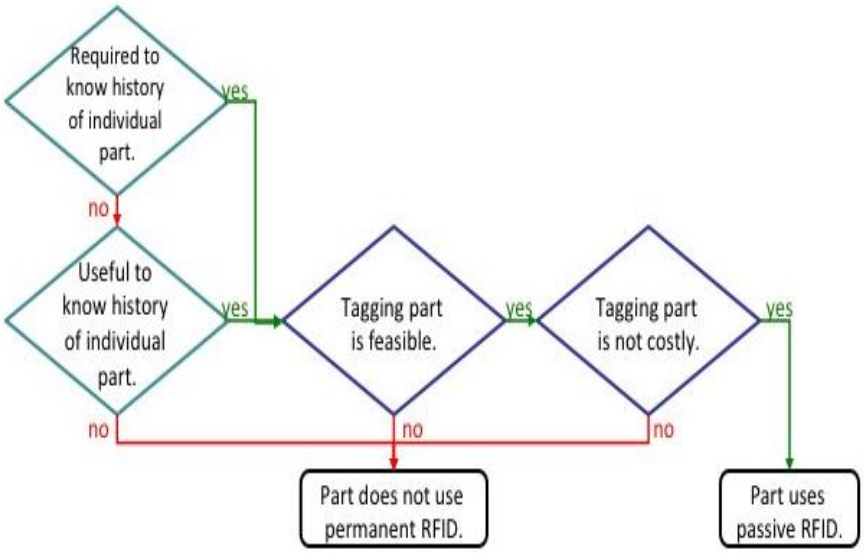
[16]Geraldo Ferrer, Susan Heath, and Nicholas Dew

(Sponsor: Naval Sea Systems Command, NAVSEA)

The objective of this study was to find how radio-frequency identification (RFID) technology may generate value in remanufacturing operations. This research focused on two issues pertaining to RFID implementation: which parts to tag in the remanufacturing facility and whether to use permanent RFID tags on components or to use RFID within the remanufacturing facility only.

Passive lifetime RFID tagging is beginning to happen in the commercial aircraft industry but is not yet embraced by the Department of Defense (DoD). However, as manufacturers start to adopt permanent tagging, the opportunities may change, which leads to the framework in Figures 1 and 2: if tagging individual items is not feasible, it may be desirable to tag the containers that carry the components through the repair processes.

Figure 1

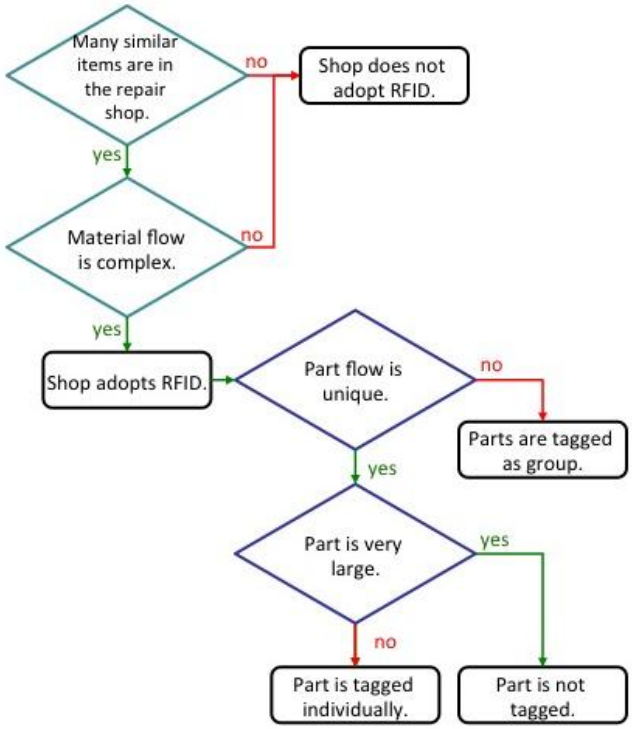


Active RFID systems (including Real Time Location Systems [RTLS]) have proven their effectiveness in several applications. The study simulated its adoption using a model inspired by the Army depot in Tobyhanna, PA, where remanufacturing flow-times are measured in months and components travel long distances between workstations.

It is clear that substantial savings were garnered by introducing RTLS at Tobyhanna, although the simulation study showed only moderate benefits. Findings revealed that if better component tracking enables the elimination of components with process times greater than average, waiting time prior to reassembly is greatly reduced, with substantial impact in total flow-time. Yet results do not explain all the efficiency gains at Tobyhanna.

In trying to show how, when, and why RFID technology produces improvements in manufacturing productivity, data shows that there is a significant gap between the savings predicted by the simulation model (an 11%–15% reduction in flow-times) and the actual savings, as reported by a Tobyhanna manager (a 62% reduction).

Figure 2



This presents an important theoretical implication: RFID technology should be conceptualized as part of an "innovation bundle" that includes low-visibility process improvements that are concurrently adopted, rather than as an isolated technology adoption. The theoretical lesson is that researchers must build an understanding of RFID by analyzing how it can be combined with a collection of process improvements or redesign, rather than looking at the technology as a standalone entity. Based on these observations, the study found the possibility for some additional process changes that might have enriched this theoretical implication. The first change involved worker scheduling. At Tobyhanna, worker overtime costs are particularly prominent. It may be that RTLS creates information that enables managers to address issues such as scheduling and overtime, thus adding production flexibility and creating cost savings. Another possibility was that the implementation of RTLS in remanufacturing processes requires substantial housekeeping and reorganization, which can only be obtained with *unrestrained commitment from top management*. This benefit is the same as is often observed during the implementation of Just-In-Time or Lean Six Sigma programs.

Practitioner implications from the study are also evident. Many practitioners lament that they cannot justify RFID adoption based on the current economics of tags and readers. The study highlights that a key reason for this may be that the payback from adopting an RFID system may come through its spillover effects, which (a) are not part of the business case analysis for implementing the technology and (b) involve other process or technology changes. Final results disclosed that a main cause of the difficulty in finding the return on investment (ROI) for RFID adoption may be because the payoffs lay in areas outside the scope of traditional payback models and may not be obvious without actually implementing the technology.

Analysis and Improvement of Information-Intensive Services: Evidence from Insurance Claims Handling Operations

[17]Uday M. Apte, Richard A. Cavaliere, and Shailesh S. Kulkarni

Information-intensive services (IIS), such as financial services, business services, health care, and education, form a large and growing part of the service sector in the U.S. economy. For example, Apte, Karmarkar, and Nath (2008)[1] estimate that in 1997, the information-intensive services (IIS) accounted for 56% of gross national product (GNP) in the U.S. This paper presented a classification of service occupations based on their operational characteristics (see Figure 1 and Table 1).

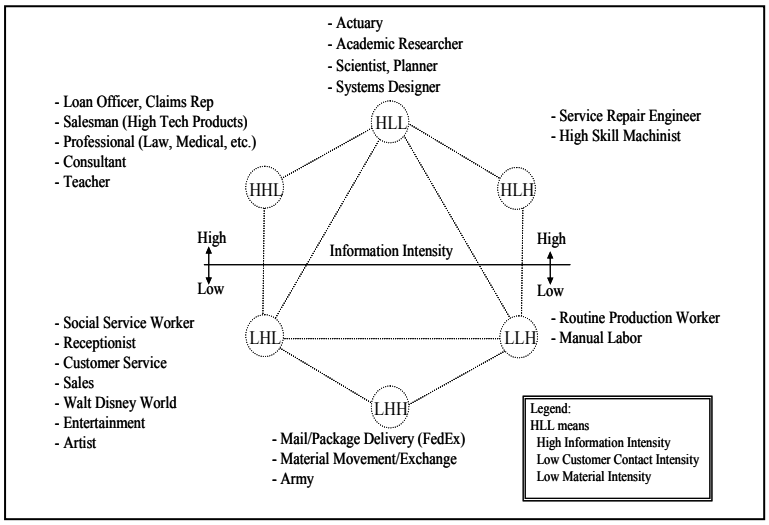


Figure 1: Activity Based Classification of Service Occupations Based on Information, Customer Contact and Material intensity

Table 1: Nature of Work and Challenges Associated with Service Classification

	Information-intensive	Customer Contact Intensive	Material Intensive
Nature of Work	Intellectual Activity; Contemplation, analysis, interpretation, comparison, discussion, decision-making; Deal with Information (Collect, Transform, etc.); Creation, Organization and Use of Knowledge about process.	Highly Interpersonal in Nature, Social Context is Important, Location Bound, Deal with Customer Flow, Manage Personal Experience (State of Mind)	Deal with Materials (Carry, Move, Transform, Rearrange, Test), use machines and other automation technology
Operations Management Challenges	Quality of Information; Managing Information Creation, Incentives, and Markets	Manage Employee-Customer Interaction and Experience; Scripting is Important	Factory as a Laboratory to acquire Empirical Knowledge; Lean Operations; Quality Mgmt.; Managing Supply Chains
Structure	Collegial Not Hierarchical, Campus Like Offices	Location and People Bound; Good Ambiance	Organization Design is Closely Linked to Physical Flow of Materials
Selection	Intellectual Abilities, Level of Education	Personable, Appearance, Outgoing Personality, People Person	Physical Dexterity, Manual Strength, Tactile Skills
Training	How to Think/Solve Problems, Continuing Education, Tools/Techniques	Scripting	Drill, Process Rules, Safety
Incentives	Outcome-based Incentives	Outcome-based Incentives	Output-based Incentives
Measures	Performance is Difficult to Measure; Indirect measures	Customer Satisfaction Measures, Time/Input Measures	Output Performance Measures, Statistical Process Control

This study evaluated the fundamental characteristics of IIS such as intangibility and co-production and found that these characteristics make it particularly challenging to manage and improve IIS. The traditional tools and concepts of operations management, such as productivity, quality, and cost, depend crucially on the ability to measure and quantify the inputs and outputs of an operational process. However, the intangibility and co-production characteristics of IIS cause a fundamental difficulty in the quantification of IIS inputs and outputs. Consequently, it becomes hard to rely on traditional tools of operations management in managing and improving IIS. Hence, there exists the need for sound conceptual analysis and a prescriptive framework for operations improvement.

This research adopted a process-centric viewpoint to propose empirically grounded *conceptual analysis* and *prescriptive frameworks* useful for the improvement of certain types of IIS. The paper argues that the service creation process in IIS should be managed through indirect process measures. Specifically, the study suggests that suitable *process indicators*, which can convey if the process is functioning properly, be identified, measured, and monitored. The conceptual analysis of IIS depicts the service creation process, the factors influencing performance, and the service outcomes, along with the interrelationships between them. The critical factors influencing performance are designated as *performance drivers*. The study also embraced the notion that if some performance drivers (specifically, process indicators) are *adjustable*, it is particularly advantageous to identify actions affecting those performance drivers since they represent a significant opportunity for the service provider to favorably influence service performance and outcomes.

The prescriptive framework for process improvement takes advantage of the conceptual analysis in two ways. First, it prescribes a procedure that a service provider can use to identify a set of performance drivers that critically influence the process performance. Here, the identification of adjustable performance drivers assumes particular importance. Second, within each party's production process, information plays a crucial role. Consequently, the paper suggested that the service provider identify and adopt the specific actions that can improve the quality of information. These are the two paths to process identified improvement in the prescriptive framework. It should be noted that there is symmetry of roles in the service creation process induced by co-production. Thus, the service provider as well as the customer can equally well seek to improve her production process and take preemptive actions to influence service outcomes.

The research illustrated and formalized the conceptual analysis through an application to a specific information and customer contact intensive service (ICCIS)—the insurance claims handling process. By conducting statistical analyses of data for 1,442 claims from one of the largest property and casualty companies in the United States, the study isolated key drivers of service performance and identified preemptive actions that can favorably impact performance metrics. Specifically, it investigated the impact of various claim characteristics on three important performance metrics: claim loss payout, work hours needed to close a claim, and claim closing age. Two of the most significant findings useful to managing and improving the CHP are as follows. First, attorney presence was the key performance driver that has the largest impact on process performance. Second, early claimant contact could significantly reduce the chance of attorney presence. Early contact can also facilitate the claimant's cooperation and improve information quality. Since high-quality information is crucial for successful claims investigation and assessment, process performance and outcomes were improved.

The preceding results demonstrate the direct operationalization of the proposed frameworks with primary data. The conceptual analysis, empirical findings, and the prescriptive framework that follow provide an action plan that can lead to a systemic improvement in the performance of information and customer contact intensive services. To the best of our knowledge, this is the first methodical attempt at understanding the performance metrics and factors affecting those metrics for P&C insurance claims handling—an important information intensive service in the U.S. economy. Moreover, the CHP application represents one of the early attempts at understanding and representing an IIS with the aid of a conceptual analysis and formalizing it more fully by developing a complementary prescriptive framework that targets process improvement.

Avenues for future research are numerous and include extension of this research to other types of IIS. Data showed that any case-based ICCIS, such as governmental social service or loan processing in banking, can profit from the proposed conceptual analysis and prescriptive framework. As other instances of IIS are analyzed and theory developed further, extension and refinement on this subject is anticipated.

An Analysis of U.S. Navy Humanitarian Assistance And Disaster Relief Operations

[18]Cullen M. Greenfield and Cameron A. Ingram

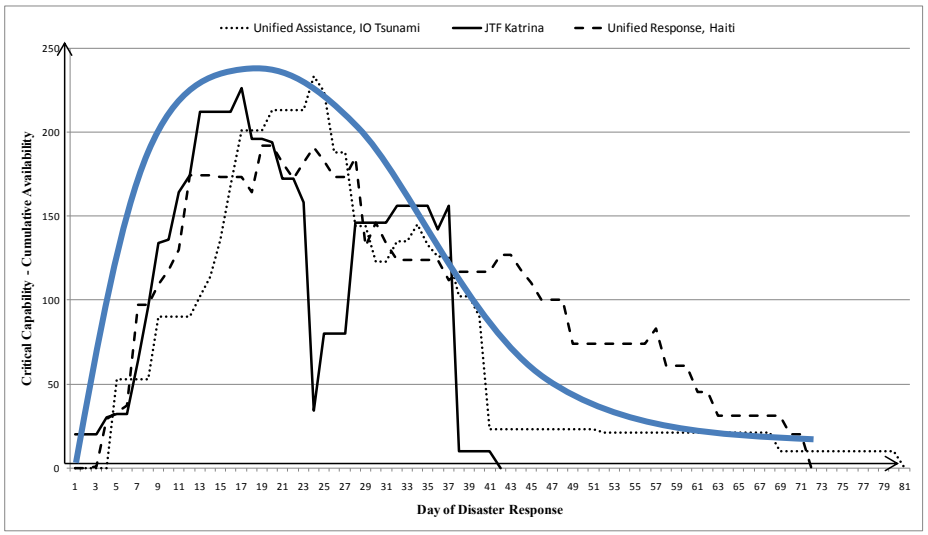
(Sponsor: Program Executive Office Ships, PEO SHIPS)

Creating a coherent national strategy for dealing with humanitarian assistance and disaster relief (HADR) operations requires addressing a variety of issues, including interagency relationships, the role of the military in humanitarian aid, and the delicate link between aid and foreign policy goals. The U.S. Navy (USN) has acknowledged HADR competency as one of the core capabilities required for the successful implementation of *A Cooperative Strategy for 21st Century Seapower*, adopted by the leaders of the USN, U.S. Marine Corps (USMC), and U.S. Coast Guard (USCG). This project investigates the response of the USN and Military Sealift Command (MSC) to different types of natural disasters and identifies the types of assets deployed as well as the dwell times for those assets. The data was collected on the following disasters:

- Indian Ocean tsunami (2004)
- Hurricane Katrina (2005)
- Haiti earthquake (2010)

Using the recent history of USN HADR operations, this paper explores opportunities to shape the fleet force structure to adapt to the increased mission importance of HADR operations and identifies current hard power assets that may be effective in achieving soft power goals. By analyzing disaster characteristics and USN platform capabilities, we can determine which assets are better suited for mission requirements brought on by disasters. Knowing the best possible asset to assign to a disaster will improve the Department of Defense's effectiveness in regaining stability, both monetarily and logistically, within the affected region when disasters occur. Further, understanding which assets are better suited for disaster response will help the USN make future force structure and fleet composition decisions.

Evaluating responses to a tsunami, a hurricane, and an earthquake yielded surprising consistency in USN and MSC responses. One hospital ship was used in each response. More MSC than USN assets were employed in each response. The number of amphibious assets employed was usually much larger than cruise destroyers (CRUDES), and the one occurrence where it was not larger is explained by the strict CSG and expeditionary strike group (ESG) structure used for the response.



The number of ships used in each response varied little. The peak levels of mission capabilities did not vary greatly from one response to another. Typically, USN and MSC mission support start peaking two weeks into a response effort, fully peak at three weeks, then rapidly decline, and finally taper off until the end of an operation.

Organizational Analysis of Food Service Management

[19] **David A. Schultz and Russell L. Ellis**

(Sponsor: Naval Supply Systems Command, NAVSUP)

Excellence in food service is essential to the health and morale of Navy members and to the overall readiness of the operating forces. Because food is a major item of expense, use of the best food management practices (conservation, preparation, and serving) is necessary. Navy food management teams (NFMTs) use on-the-job training to provide food service personnel with skill in preparing and serving food. This effort significantly improves the overall Navy food service program. This study analyzed the NFMT alignment under the leadership of Commander, Fleet, and Industrial Supply Centers (COMFISCS) in fiscal year (FY) 2011 and the inability for the Naval Supply Systems Command (NAVSUP) food service to directly coordinate with teams in the seven different assigned regions. This separation raised difficulties to gauge the effectiveness of training, budgeting, team make-up, fleet trends, policy implementation, and instruction reviews and re-writes.

The lack of continuity and consistency across Navy food service operations was the main driver of the research behind this project, with the ultimate goal being recommendations that led to an organizational structure that would provide better customer service to all fleet. The data set available to the research team included NFMT manpower levels, annual budgets, Supply Management Certification scores for FY2008–2011, training assist visit percentages, and ship visit periodicities in each geographical area of responsibility. An extensive cost analysis was also performed, which covered salaries, basic housing allowances for team members by location, travel costs, and facilities and office expenses in an attempt to provide a recommendation for the most efficient, cost-effective team management for the future.

Site	Role	Year 2003		Year 2011		Gap
		Level	Manning	Level	Manning	
Norfolk	Officer in charge	O-3	1	W-5	1	0
	Senior instructor	E-8	1	E-9	1	0
	Mess mgmt. specialists	E-8	4	E-8	1	-3
	Mess mgmt. specialists	E-7	1	E-7	2	+1
	Army staff veterinarian	E-6	1	E-7	0	-1
	Machinist mate	E-4	1	E-7	0	-1
San Diego	Officer in charge	W-4	1	W-5	1	0
	Senior instructor	E-9	1	E-8	1	0
	Mess mgmt. specialists	E-9	3	E-8	1	-2
	Mess mgmt. specialists	E-8	1	E-7	2	+1
	Mess mgmt. specialists	E-7	1	E-7	0	-1
	Army staff veterinarian	E-7	1	E-7	0	-1

Site	Role	Year 2003		Year 2011		Gap
		Level	Manning	Level	Manning	
Pearl Harbor	Officer in charge	W-3	1	W-5	1	0
	Senior instructor	E-9	1	E-9	1	0
	Mess mgmt. specialists	E-8	2	E-8	1	-1
	Machinist mate	E-8	1	E-8	1	0
	Mess mgmt. specialists	E-7	0	E-7	1	+1
	Army staff veterinarian	E-7	1	E-7	1	0
Mayport	Officer in charge	E-9	1	E-9	1	0
	Senior instructor	E-8	1	E-8	1	0
	Mess mgmt. specialists	E-8	1	E-7	1	0
	Machinist mate	E-8	1	E-7	0	-1
	Mess mgmt. specialists	E-7	1	E-7	0	-1
	Army staff veterinarian	E-6	1	E-6	1	0
	Machinist mate	E-5	1	E-6	1	0
Puget Sound	Officer in charge	E-9	1	E-8	1	0
	Senior instructor	E-8	1	E-8	1	0
	Mess mgmt. specialists	E-7	1	E-7	2	+1
	Electrician mate	E-7	1	E-7	0	-1
	Army staff veterinarian	E-6	1	E-7	0	-1
Yokosuka	Officer in charge	E-9	1	E-8	1	0
	Mess mgmt. specialists	E-8	1	E-7	1	0
	Machinist mate	E-7	1	E-6	0	-1
New London	Officer in charge	E-7	1	E-8	0	-1
	Senior instructor	E-7	0	E-8	1	+1
	Mess mgmt. specialists	E-7	1	E-7	1	0
	Army staff veterinarian	E-6	1	E-7	0	-1

A critical observation was the change in manpower levels at NFMTs from 2003 to 2011, shown in the table. It indicates a general reduction in both the numbers and the experience of the personnel assigned to NFMTs, which compromises their ability to support and train food delivery personnel in Navy facilities and ships or on shore. As a consequence, assist visits by NFMT teams was reduced in some regions, while all regions generally performed fewer than one visit per 18 months (ship) or evey 2 years (shore installation), as required. These visits last 3 to 14 days and are the main activities performed by each NFMT.

With this concern in mind, the research team expected demand for NFMT services in each region, which is summarized in the table on page 41:

Team	Ships	Shore	Avg. visits/yr	Current personnel	Avg. visits/man-yr
San Diego	56	13	44	5	8.77
Puget Sound	20	3	24	4	5.88
Pearl Harbor*	32	4	24	6	3.89
Yokosuka	19	12	19	2	9.33
Norfolk	43	10	49	5	7.13
New London	21	2	15	2	7.50
Mayport	36	15	32	5	6.30

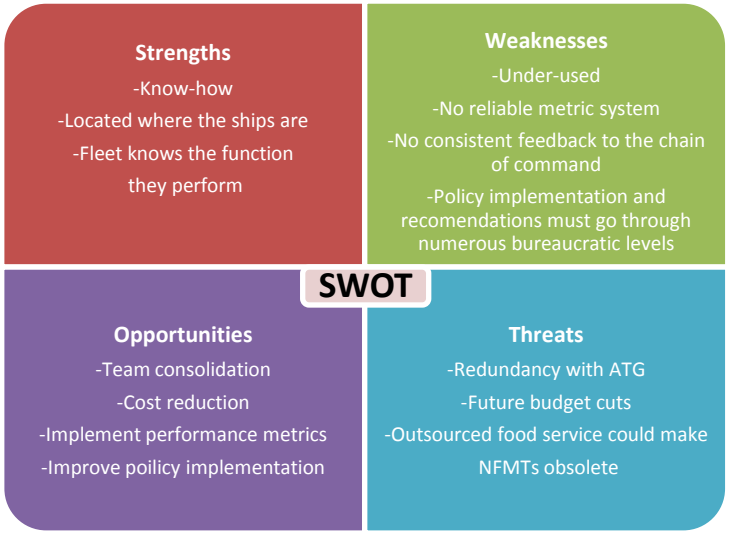
The table shows a quite different resource workload in each region. The research team performed a SWOT analysis, which is summarized in the table below:

Upon financial analysis, the research team determined that a possible improvement would be the consolidation of seven teams down to a total of three. The three teams that would remain in this proposal would be located in the high fleet concentration areas of Norfolk, San Diego, and Pearl Harbor. The primary benefits of consolidation would be potential cost savings, as well as an easier-to-manage system that allows for greater efficiency in instructional reviews, policy implementation, and training feedback.

The new units proposed would operate out of the primary fleet concentration areas, have a reduced number of overall team members, and be made up of motivated personnel in lower pay grades that are striving for further advancement.

Increased estimated travel costs were accounted for, as they would accrue due to larger areas of responsibility. The findings show that consolidation would lead to valuable cost savings for the Navy.

SWOT Analysis



Among several recommendations, two suggestions stood out. First, develop a standardized process for data collection, analysis, and archiving. During the course of this research, the need for a centralized data collection point that would enable a continuous monitoring program (CMP) became painfully clear. Historical records should be kept covering statistics that are relevant to team performance over the course of at least 10 years. Second, make a billet assignment working with a NFMT a career-enhancing role. Too often, the NFMT is viewed as a "twilight" tour, the final job before retirement. In the present make-up, the most experienced culinary specialists from the fleet run the teams, control their allotted budgets, conduct assist visits, and train junior personnel on the best techniques for proper galley operation.

This arrangement has been the standard mode of operation during the existence of the teams—and one that has been, for the most part, quite successful. To gain absolute efficiency, motivation, effectiveness, and an infusion of new energy, the research team proposed making the NFMT a highly sought after, "competitive" tour. If completed successfully, these billets should lead to strong evaluations that enhance individual advancement prospects due to the importance of the mission conducted.

APPLYING FIXED HIERARCHICAL SEGREGATION MODELS

[20]Dina Shatnawi, Ronald Oaxaca, and Michael Ransom

This study provides a framework for evaluating decompositions in a panel setting using the hierarchical segregation methodology originally developed by Baldwin, Butler, and Johnson (2001). The study develops a variation of wage decompositions that takes into consideration an unbalanced panel design and extends the literature by explicitly formalizing the inclusion of the unobserved heterogeneous effects.

The objective of this paper is twofold. First, unique firm level data are utilized to evaluate panel methodologies that incorporate wage decompositions with the standard human capital specification. Particularly in unionized firms, the rules for setting wages require that individuals of the same experience level and job title be paid the same wage. In such a setting, standard practices such as specifying the Mincerian variables in a wage model lead to misspecification and misinterpretation of the relationship between wages and other factors. As a result, the paper examines the robustness of this hierarchical segregation model in an institutional setting in which overt wage discrimination within unionized job titles is nonexistent. Second, the model of hierarchical segregation is extended to be used in a panel setting. The advantage of modeling hierarchical segregation using panel methods is that it allows one to control for omitted variables that differ between workers but are constant over time. In a cross-sectional analysis, these omitted variables can bias coefficient estimates, especially if they are themselves an outcome of discrimination. Assuming wages follow a lognormal distribution, the study estimates and decomposes changes in hierarchical segregation over time using fixed effects.

The Oaxaca (1973) decomposition is easily extended in the panel framework to measure the contribution of wage discrimination and human capital accumulation on the gender wage gap over time. In the context of fixed effects, researchers have built upon the decomposition by using the within coefficient estimates and the overall mean (overtime and individuals). However, the within transformation of the data dispenses with the constant term. As a result, the sample mean wages differs from the predicted value of wages by a constant and yielded biased decomposition results. Individual fixed effects are utilized, which are particularly important when executing wage decompositions with unbalanced panel data.

Our data spans the years 1977 through 1985 and came from a regional grocery store that faced a title VII class-action lawsuit alleging gender discrimination in job assignment and failing to promote women into the managerial positions—a lawsuit much the same as Costco and Wal-Mart face today. The firm was found guilty of discrimination in 1984 and negotiated a settlement that required payment of "back pay" as well as the implementation of affirmative action policies for promotion and job assignment. Although the affirmative action policies were not implemented prior to the year-end of 1986, Michael Ransom and Ronald Oaxaca (2005) found evidence that the employer was already taking corrective action after the filing of the lawsuit in 1982. This study exploits the panel nature of the data to examine any structural change resulting from the filing of the lawsuit. However, prior to answering the question of interest, the paper first explores the special decomposition issues that arise in a panel setting as well as determine the robustness of the Mincerian specification in a setting where both the institutional details of the firm and the outcome of the court decision are known. The evaluation is approached from the perspective of a researcher who does not know the institutional details governing the actual wage and job assignment structure. Theoretically, the entire wage gap should be attributed to some combination of hierarchical segregation and worker heterogeneity since the hierarchical wage structure of the firm is set by gender-neutral union contracts for hourly wage workers.

Table 1-Fixed Effects Estimates and Decomposition Before and After 1982

	Before 1982		After 1982	
	Male	**Female**	**Male**	**Female**
Constant	-6.395	-8.629	-2.579	-2.803
	[0.147]***	[0.448]***	[0.310]***	[0.373]***
Age	0.315	0.326	0.186	0.163
	[0.008]***	[0.015]***	[0.014]***	[0.013]***
Age^2	-0.002	-0.001	-0.001	-0.001
	[0.000]***	[0.000]***	[0.000]***	[0.000]***
Tenure	0.066	0.02	0.007	0.029
	[0.006]***	[0.014]	[0.013]	[0.012]**
$Tenure^2$	-0.002	-0.001	-0.001	-0.001
	[0.000]***	[0.000]***	[0.000]***	[0.000]***
σ^2	0.0150	0.0074	0.0062	0.0048
γ	-	2.0288	-	1.2968
N	5168	3327	4285	2942

Notes: standard errors in bracket

* Significant at the 10 percent level (** at the 5 percent, and *** at the 1 percent)

Wage Level Decompositions

	Before 1982		**After 1982**	
	Wage Gap	**Percentage of Gap**	**Wage Gap**	**Percentage of Gap**
Endowment	2.383688	7.7866622	-6.1822746	-7.3230588
Discrimination	-23.065135	-75.345608	-1.4968494	-1.7730556
Segregation	21.05452	68.777642	8.5414333	10.117541
Non-Linear	-0.06694847	-0.21869688	-0.01808904	-0.02142692
Total	0.30612449	1	0.8486616	1

The Effects of Recessions and Weak Economic Periods on Health and Social Outcomes

[21]**Jeremy Arkes**

(Sponsor: The National Institute of Drug Abuse (National Institute of Health) the study "Does the Economy Affect Teenage Drug Use?")(Arkes, 2007)

Recessions and other weak economic periods, such as what the U.S. is experiencing today, have harsh effects on families. Families experiencing unemployment, under-employment, or even just lower incomes as a result of the weak economy could struggle to make mortgage or rent payments and perhaps to provide enough food for their children. But beyond these standard effects, a weak economy can cause several social and health problems among youth and adults. Professor Arkes has written several research articles that demonstrate how a weak economy causes greater substance use among teenagers and young adults, weight gain for teenage females, and a greater risk of divorce for some couples. Arkes (2007 and 2011) examined how a weak economy affects youth drug and alcohol use. For the primary sample of 16–18-year-olds, findings showed that a one-percentage-point increase in a state unemployment rate increases the probability of using marijuana in the past year by four percentage points. Likewise, there is evidence that the use of other drugs and alcohol was higher when the unemployment rate is higher (i.e., the economy is weaker). The effects are smaller but still significant for an expanded sample of 15–19-year-olds and for a sample of 20–24-year-olds.

A similar theme can be found in Arkes (2012), in which a set of 15–19-year-olds and 20–24-year-olds were found to have significantly higher cigarette use when the state unemployment rate was higher. Besides substance use, another health indicator for teenagers is affected by the economy. In Arkes (2009), data revealed that a higher state unemployment rate leads to more weight gain and an increased risk of obesity for females. Conversely, teenage males gain weight when the economy is stronger. While determining the mechanisms for these relationships was beyond the scope of these studies, there are several potential explanations. For the substance use outcomes, likely mechanisms revolved around free time and depression/anxiety. With a weak economy, being less likely to work, youth may have more free time than during a stronger economy, so they may seek exciting ways to fill their time. Trying drugs, alcohol, or cigarettes may be their way of adding excitement. Regarding depression/anxiety, it was expected that teenagers would be affected, as they may be upset about their own lack of employment or from any extra tension at home from their families' economic troubles. Substance use may be their way of medicating their depression or anxiety, and, depression/anxiety could help explain why teenage females gain weight when the economy is weak. For drug use, there is an additional potential explanation. The primary costs of drug use for youth include the risks of sanction if caught and the danger involved with buying drugs. In weak economic periods, there are more youth selling drugs, which make it more likely that a given youth would know someone selling drugs, which makes for safer transactions.

One other study (Arkes & Shen, 2010) focuses on married couples and examines whether a weak economy increases the risk of divorce. While there is no significant effect when all couples are grouped in one analysis, separate analyses of couples based on the year of marriage shows that couples who were in their sixth to tenth year of marriage had higher risks of divorce when the economy was weaker. This was likely due to any financial strain associated with the weak economic period causing stress on the couple. Younger marriages may be more immune from a weak economy due to being less likely to have financial obligations (children or mortgage payments). And, couples married for more than 10 years may have experience working through difficult times and so may be better able to withstand the stresses from financial problems. The research findings regarding youth substance use show implications for the military.

Typically it is inferred that a weak economy creates a good environment for recruiting, as potential recruits would have fewer civilian sector employment opportunities. But, the results of this analysis indicate that those youth may have greater substance use, which could be an indicator of a lower quality of the recruits.

Effects of OEF/OIF Deployment on Incidence of Mental Health Conditions: Analysis of Active Duty Personnel in U.S. Military

[22]Yu-Chu Shen, Jeremy Arkes, and Thomas V. Williams

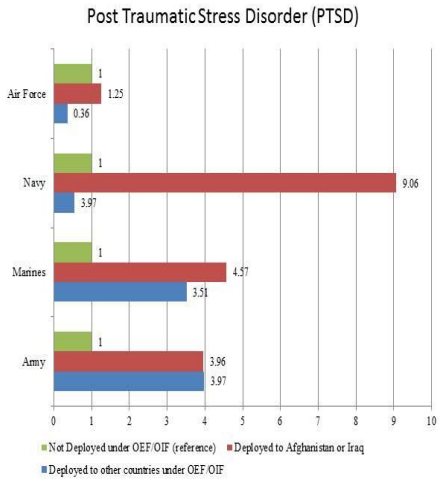
(Sponsor: Manpower, Personnel, Training, and Education, MPTE)

Military personnel serving in Operation Enduring Freedom (OEF) and Operation Iraqi Freedom (OIF) have been exposed to an increased risk of a host of mental health problems, such as PTSD, major depression, and substance use disorders. Yet, no study has used a proper comparison group to estimate the effect of deployment intensity on the risk of these mental health conditions. This project estimates the effect of deployment location and length on the risk of developing these conditions, relative to what it would be from normal military operations. Data come from a random sample of active duty, enlisted personnel serving between 2001 and 2006 (approximately 680,000 unique enlisted personnel). The study identifies PTSD, major depression, and substance use disorder cases from TRICARE medical records and links deployment information from Contingent Tracking System. The study compares rates of these three diagnoses based on deployment locations across Services and estimates logistic regressions to assess the effect of deployment intensity on the rate of PTSD.

Results show that compared to those in other duties around the world, deployment to Iraq/Afghanistan increased the odds of developing PTSD substantially, with the largest effect observed for the Navy (Odds Ratio [OR]=9.06, $p<0.01$) and the smallest effect for the Air Force (OR=1.25, $p<0.01$). A deployment longer than 180 days increased the odds of PTSD by 1.11 times to 2.84 times, depending on the Service, compared to a tour less than 120 days.

For Army and Navy, a deployment to Iraq/Afghanistan further exacerbates the adverse effects of tour length. Findings also highlight that deployment under OEF/OIF increased the risks of being diagnosed with either major depression and substance use disorders substantially, although the magnitude of the effect varied somewhat across Services and across deployment locations.

Logistic Regression Results: Odds Ratio by Location



Deployment to Iraq or Afghanistan increases the odds of these two mental health conditions more than deployments to other locations (OR ranges from 1.5 in the Air Force to 4.5 in the Army), and the adverse effect is much larger in the Army and Marine Corps compared to the Navy and Air Force. Lastly, longer cumulative deployment length is associated with a higher rate of these two mental health conditions, especially for the Navy. The research identifies the extent of three major and costly mental health conditions across Services and quantified the risks associated with OEF/OIF deployment intensity. Further research is needed for effective monitoring and preventive measures of these conditions on the active duty population. It would be important to assess whether the current public health system has adequate resources to handle the increasing need of mental health services from this population.

The Effect of Deployment Effect The Effects of Deployment Frequencies on the Military Divorce Rate

[23]Stacy J. Arenstein

(Sponsor: Manpower, Personnel, Training, and Education, MPTE)

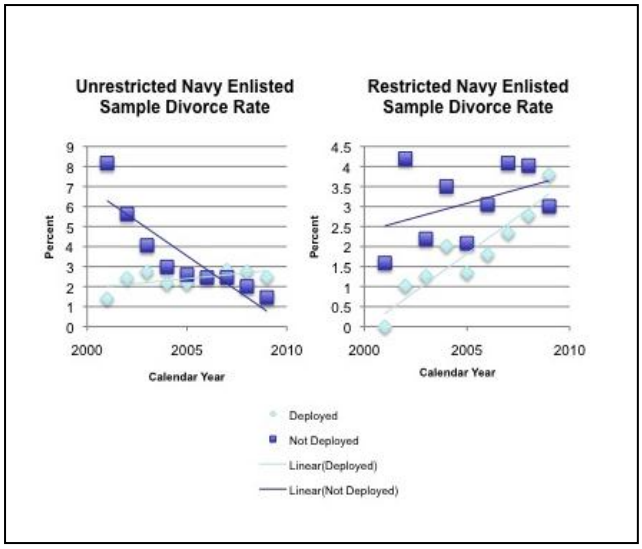
In fiscal year 2009, the Department of Defense (DoD) recruited 168,900 active-duty troops—a number that exceeded the 100% recruiting goal by 3% (Tyson, 2009). To fully take advantage of the number of qualified military applicants provided, the military needs to retain as many trained and qualified members as possible. The majority of new military members are single. However, as members progress through their career, many make the decision to marry.

Over 50% of the enlisted members past the age of 25 are married—20% more than the equivalent civilian population. When introducing Presidential Study Directive-9, President Barack Obama stated that "with millions of military spouses, parents and children sacrificing, the readiness of our Armed Forces depends on the readiness of military families." President Obama recognizes that by improving personnel policies that anticipate the needs of married Service members, the military can increase retention and readiness and ultimately increase the return on initial recruiting and training investments. The military's continued refinement of personnel policies will be an advantage over competing employers in both recruitment and retention.

The military divorce rate can be looked at as a measure of the ability of military families to cope with the stress of military life. By knowing what factors influence the divorce rate, the military can determine if it is feasible (fiscally or otherwise) to change aspects of the military job requirements. The primary goal of this research is to investigate whether the length and frequency of deployments affect the likelihood of divorce. The study uses data from the Contingency Tracking System (CTS) and the Active Duty Military Personnel file. The sample includes all active duty Navy and Marine Corps members from 2000 to 2009.

The unrestricted sample includes all married, active duty Navy and Marine Corps Service members from October 31, 2000, to September 30, 2009. The divorce rate trends show that members not deployed to Operation Enduring Freedom (OEF)/Operation Iraqi Freedom (OIF) had a decreasing divorce rate while members deployed to OIF/OEF had an increasing divorce rate.

The restricted sample included all married, active duty Navy and Marine Corps Service members with observable marital and deployment histories. The divorce rate trends again show that members not deployed to OIF/OEF generally had a decreasing divorce rate while members deployed to OIF/OEF had an increasing divorce rate (see graphs on the right).



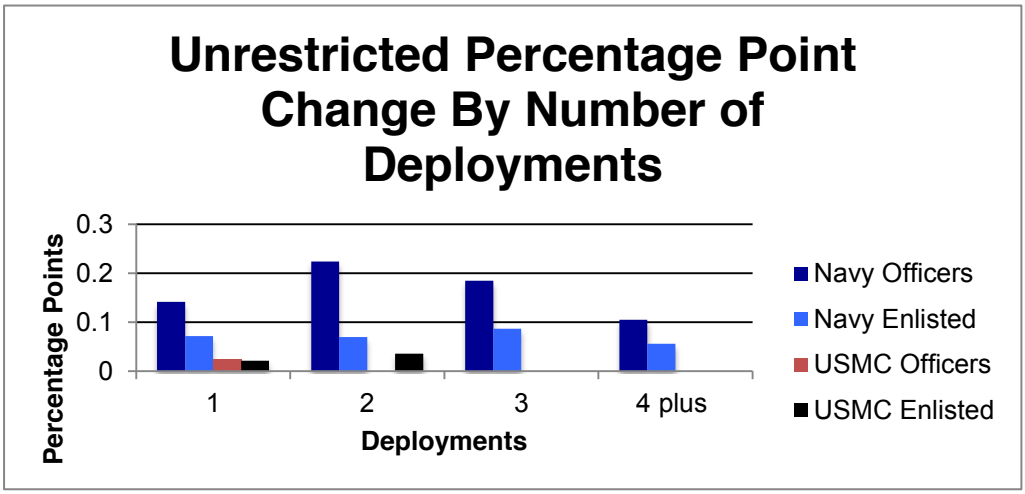
Three models of divorce are estimated, each with a different control for the stress of deployment on the family: length of deployment, number of deployments, and a combination of both. With the data provided, all models have the following common control variables: deployment location, gender, number of dependents, spouse in the military, prior marital status, rank, race, occupation, year of entry into the military, and faith. The restricted sample also included variables controlling for the length of marriage, age at the time of marriage, and year of marriage. The key variables used to assess the impact of deployment on marital status were number of days deployed, number of deployments, and deployment to Afghanistan, Iraq, or another Middle Eastern country while married.

Model 1: *P* (divorce = 1|x) = Φ (β_0 + β_1 *total days deployed* + β_2 *control variables + e*

Model 2: *P* (divorce = 1|x) = Φ (β_0 + β_1 *number of deployments* + β_2 *control variables + e*)

Model 3: *P* (divorce = 1|x) = Φ (β_0 + β_1 months deployed + β_2 number of deployments + β_3 control variables + e)

The results suggest that in the general active duty population, the frequency of deployments instead of the length of deployments induced the greatest level of marital conflict.



The above graph is the percentage point associated with one through four deployments when the number of months a member was deployed was controlled for. The Navy Enlisted coefficients were positive and statistically significant at the 1% level; greater than three deployments were positive and statistically significant at the 10% level. Respectively, this represents a 45%, 44%, 55%, and 36% increased likelihood of divorce than that of the member who was not deployed.

Effect of Being an Aviator on Promotion to O-5 in the USMC

[24]Jacob L. Reynolds

(Sponsor: Deputy Commandant, Aviation)

Marine Corps aviation is an imperative component of the storied Marine Air-Ground team. Marine aviation is a perishable skill, however, not only in tactical employment but also in operational and strategic planning. The senior leadership of the Marine Corps needs the technical and tactical experience of Marine aviators. In July 2009, the Marine Corps Deputy Commandant for Aviation (DCA) proposed a quantitative study of the decreased promotion rates of aviator majors (O-4) to lieutenant colonel (O-5). If true, decreasing promotion opportunity of Marine aviators presents risk to the Marine Corps warfighting institution through the loss of valuable aviation technical and tactical experience in senior leadership.

The study is organized to answer the DCA's research question and to provide recommendations for how officers of the aviation component can be more competitive for promotion to O-5. The study draws upon nine years of Total Force Data Warehouse (TFDW) and Marine Manpower Support Branch (MMSB) data of Marine O-4s eligible for promotion, resulting in a dataset of 8,271 observations. The study's sample closely replicated the above and in-zone population of O-5 promotion cohorts from fiscal years 2004 through 2012. Analysis of the sample demonstrated that Marine aviators had a decreased selection opportunity for O-5 compared to all other MOSs, 62.3% versus 67.3% (Figure 1).

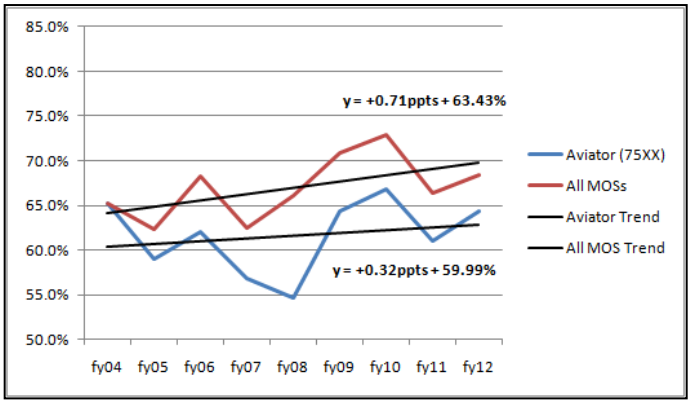


Figure 1. MOS Promotion Selection Rate (0-5) Trend: Aviator & All MOSs

Additionally, multivariate analysis was accomplished on the sample, which revealed a statistically significant and negative "aviator" effect of approximately 7.6 percentage points on promotion probability through various econometric model specifications (Figure 2).

Figure 2. Econometric Model Estimating Promotion Selection O-5

$$P(\text{promotion selection}) = G(\beta_0 + \beta\ \text{MOS} + \beta\ \text{performance} + \beta\ \text{training \&}$$
$$\text{education} + \beta\ \text{experience} + \beta\ \text{demographics} + \beta\ \text{promotion board})$$

Traditional promotion selection notions are also affirmed in statistically significant and positive effects in individual performance, combat experience, professional military education, and post baccalaureate education. Finally, a restricted model was designed to analyze the factors that differentiated those aviators selected for promotion and those not selected. Statistically significant factors for aviator promotion selection to O-5 included being part of the fixed-wing community, holding an additional measure of suitability (MOS) as a Weapon and Tactics Instructor (WTI), and completion of Intermediate Level School and the Special Education/Advanced Degree Programs.

Research Commissioned By Other Than The Navy

Research at the GSBPP is supported by a variety of sponsors, with the U.S. Navy being one of its primary promoters. Naval sponsors include the following: the United State Marine Corps; the Office of the Assistant Secretary of the Navy; the Naval Supply System Command; the Office of the Secretary of Defense; the U.S. Navy Office of Budget; Defense Supply Center, Richmond; the Under Secretary of Defense; the U.S. Navy Office of Budget; and more.

The GSBPP also features research commissioned from non-naval sponsors, such as the following: the U.S. Army Center for Analysis, the Office of the Assistant Secretary of the Army, the U.S. Army Center for Analysis, the Director of National Intelligence, the Office of the Secretary of Defense, the Office of Acquisition Resources and Analysis, the Central Intelligence Agency, the Robert Wood Johnson Foundation, and several others. The GSBPP's partnership with universities, government agencies, and non-government agencies is another way for the school to keep its research academically rigorous and operationally relevant to continuously improve Department of Defense/Department of the Navy processes and solve problems of military interest.

The following study illustrates research commissioned by non-naval sponsors—in this case, the U.S. Air Force.

SPACE PLUG AND PLAY ARCHITECTURE (SPA) STUDY PHASE II

[25]**Raymond Franck, Dan Nussbaum, Captain Marcus Rodriguezarchilla**

(Sponsor: Air Force Research Lab (AFRL), Kirtland AFB, NM)

Captain Rodriguez's thesis, entitled *Space Plug-and-Play Technology Business Case Analysis,* was completed in December 2011 and will be available at the NPS Knox Library and through DTIC after processing. The NPS participants who authored this study were led by the AFRL Space Vehicle Division (AFRL/RV) tasked with a comprehensive analysis of the Space Plug-and-Play Architecture (SPA) initiative.

Project Summary

A team of NPS faculty members participated in a study by the AFRL at Kirtland AFB, NM. The study involved a comprehensive assessment of an AFRL technical initiative to provide a plug-and-play architecture (including standards) for space vehicles—comparable to plug-and-play peripherals for personal computers with connections through USB ports and standards.

The effort began for the Naval Postgraduate School (NPS) team in April 2011 and continued through October—with follow-on actions after the final report was published in late October. The NPS study group members included Chip Franck (GSBPP), Dan Nussbaum (Operation & Research Department), Captain Marcus Rodriguezarchilla (a resident U.S. Air Force [USAF] MBA student), and NPS-resident subject-matter experts (primarily from the Space Systems Academic Group).

The study group had over 20 members, including AFRL personnel, contractor support, and the NPS members. Its charter included both a systems engineering study (SES) and a business case analysis (BCA). The NPS team had primary responsibility for the BCA, which focused on return on investment (ROI) analysis, plus industrial base capability and readiness to implement the SPA initiative.The final report was a comprehensive review of the SPA initiative and was intended to provide useful insight regarding continued funding (or not) of this initiative. The entire report consisted of seven chapters. Nussbaum and Rodriguezarchilla took the lead for the chapter on return on investment (Chapter 6); Franck led the effort for the chapter on industrial base assessment (Chapter 7).

On September 20–21, 2011, the study group briefed an independent review board—a panel of space experts from government, industry, and academic institutions. The board wrapped up its deliberations on September 23 and provided recommendations that are now being implemented. In October, the final version of the study report was completed. Both the briefing and the report were well received. One senior S&T executive assessed the report as "the benchmark approach for future (space vehicle) investment decisions."

Rodiguezarchilla's work on the ROI analysis provided a foundation for his MBA professional report. Rodriguezarchilla graduated in December 2011 and was nominated for an Outstanding Thesis award. The entire study team has been nominated for an Air Force Achievement award. Part of the justification included the following: "Performed first-ever (space vehicle) BCA – utilized ROI and industrial base criteria – addressed resources, strategy and capacity."

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[25] Study results are documented in an AFRL report completed in October 2011 classified as for official use only (FOUO), with distribution limited accordingly.

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