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## PROJECT SUMMARIES

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### THE IMPACT OF DEPLOYMENT ON U.S. ARMY RESERVE UNITS

**Bob Barrios-Choplin, Visiting Assistant Professor**  
**Department of Systems Management**  
**Sponsor: Office of the Chief of the Army Reserve**

**OBJECTIVE:** To compare readiness, retention rates, turnover intention, job satisfaction, and stress levels in Army Reserve units that have had differing deployment experiences, to isolate the impact of deployment.

**SUMMARY:** This project began in October 1997. To date, contacts have been established with OCAR personnel, data have been requested, and a survey is being drafted. To date, there have been no research products from this study.

**DoD KEY TECHNOLOGY AREAS:** Manpower, Personnel, and Training, Other (Reserve Forces)

**KEYWORDS:** Deployment, Readiness, Retention, Stress

### DECISION TECHNOLOGIES

**Hemant K. Bhargava, Associate Professor**  
**Department of Systems Management**  
**Sponsor: Unfunded**

**OBJECTIVE:** This project involves the integration of decision technologies and Internet computing, resulting in development of decision technologies that can be accessed and used over the Internet.

**SUMMARY:** The Recycling DSS is a special case of a web-based decision technology, and is available at <http://dnet.sm.nps.navy.mil/webdss/>. DecisionNet, a virtual repository and electronic brokerage of such technologies, is available at <http://dnet.sm.nps.navy.mil/>.

#### PUBLICATIONS:

Bhargava, H.K., Krishnan, R., and Muller, R., "Electronic Commerce in Decision Technologies: A Business Cycle Analysis," *International Journal of Electronic Commerce* 1: 4, pp. 109-127, 1997.

Gunther, O., Muller, R., Schmidt, P., Bhargava, H.K., and Krishnan, R., "MMM: A WWW-Based Method Management System for Using Software Modules Remotely," *IEEE Internet Computing* 1:3, pp. 59-68, May-June 1997.

Bhargava, H.K., Krishnan, R., and Muller, R., "Decision Support on Demand: Emerging Electronic Markets for Decision Technologies," *Decision Support Systems*, 19:3, pp. 193-214, 1997.

Bhargava, H.K., Herrick, C.L., and Sridhar, S., "Desirable Features in Decision Analysis Software," *Proceedings of the Fourth Conference of the International Society for Decision Support Systems*, Lausanne, Switzerland, 21-22 July 1997.

Bhargava, H.K., Krishnan, R., Roehrig, S., Kaplan, D., Casey, M.P., and Muller, R., "Model Management in Electronic Markets for Decision Technologies: A Software Agent Approach," *Proceedings of the Thirtieth Hawaii International Conference on System Sciences*, pp. 7-10, Maui, HI, January 1997.

#### CONFERENCE PRESENTATIONS:

Bhargava, H.K. and Krishnan, R., "Brokering in Electronic Markets for Software Services: An Analysis," INFORMS National Meeting, Dallas, TX, 26-29 October 1997.

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Bhargava, H.K., Krishnan, R., Roehrig, S., and Muller, R., "DecisionNet: Global Access to Optimization Models and Algorithms," International Symposium on Mathematical Programming, Lausanne, Switzerland, August 1997.

Bhargava, H.K. and Krishnan, R., "Remote Execution of Computational Services on Internet and Intranets: Global Access to Decision Support Technologies," INFORMS National Meeting, San Diego, CA, 4-7 May 1997.

### **THESES DIRECTED:**

Broihier, Michael, "Applying Technology to Marine Corps Distance Learning," Master's Thesis, Naval Postgraduate School, September 1997.

Corgnati, Christopher, "Classification, Search, and Retrieval in a Multi-Variable, Multi-Level Taxonomy: Application to DecisionNet," Master's Thesis, Naval Postgraduate School, September 1997.

Herrick, Craig, "A Survey of Software for Decision Analysis," Master's Thesis, Naval Postgraduate School, March 1997.

Rehber, Devrim, "Model Management via Dependencies Between Variables: An Indexical Reasoning in Mathematical Modeling," Master's Thesis, Naval Postgraduate School, March 1997.

Tettelbach, Clayton, "Recycling Decision Support System: Design and Development of a Web-Based DSS," Master's Thesis, Naval Postgraduate School, March 1997.

**DoD KEY TECHNOLOGY AREAS:** Computing and Software, Modeling and Simulation

**KEYWORDS:** Distributed Decision Support, Internet, Distributed Modeling

### **HANDS-ON NETWORK LAB UPGRADE**

**LCDR Douglas E. Brinkley, Lecturer**

**Department of Systems Management**

**Sponsor: Naval Computers and Telecommunications Command**

**OBJECTIVE:** To develop a facility that supports hands-on instruction of Local Area Network design, installation and administration.

**SUMMARY:** With funding provided by NCTC, nine 486 class microcomputers were upgraded to Pentium 100 systems and networked using various Ethernet technologies. This was the first NPS laboratory designed to allow students to open up microcomputers typical to those used in the Fleet and install all of the components necessary to build a local area network. The experience gained from these exercises significantly enhances the conventional instruction provided in the classroom.

**DoD KEY TECHNOLOGY AREAS:** Other (Local Area Networks, Information Technology Management)

**KEYWORDS:** Ethernet, 10Base-T, Thin Net, Local Area Network (LAN), Microcomputer Network Installation, Network Configuration

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### GENERIC PRODUCT AND SERVICE QUALITY ECONOMICS

**David G. Brown, Visiting Assistant Professor**  
**Department of Systems Management**  
**Sponsor: Unfunded**

**OBJECTIVE:** This project is concerned with developing a general model that addresses the welfare economics of product and service quality, and which provides a framework for examining the quality of service between DoN and DoD units.

**SUMMARY:** Activity during 1997 was primarily concerned with continuing model development and starting to document the findings. The model development work included an extended analysis of total surplus maximization, further examination of alternative utility formulations, and analysis of welfare maximization based on income variation measures of consumer benefits.

The principal findings were: 1) a special class of utility functions which are both quasi-linear and demand-coincident; 2) that Willig's methodology for demonstrating the accuracy of ordinary consumer surplus can be applied with full price and demand-coincidence; 3) that maximization of income variation based welfare measures with one consumer yields the same product quality first order condition (FOC) as Quality Efficiency and the FOCs are very similar with multiple consumers; and 4) how previous authors erred in using quasi-linear utility functions with additional parameters such as product quality or a public good.

**DoD KEY TECHNOLOGY AREA:** Modeling and Simulation

**KEYWORDS:** Economics, Surplus, Product Quality, Service Quality

### SEANET INDUSTRY ASSESSMENT

**Rex A. Buddenberg, Lecturer**  
**Department of Systems Management**  
**Sponsor: Office of Naval Research**

**OBJECTIVE:** To assess practicality of extending the Internet to sea using commercial satellite communications channels.

**SUMMARY:** The assessment is that extending the Internet to sea is both feasible and useful. The usefulness is immediately evident to the oceanographic research community that heavily uses the Internet ashore. The potential usefulness to the merchant marine and other maritime communities is also there, but latent. This project also tracked the Navy's developmental work, principally Advanced Digital Network System (ADNS) for potential in converging technology and in avoiding duplicate development.

**CONFERENCE PRESENTATION:**

Buddenberg, Rex A., "Session Layer Requirements for Multicast Internets," MILCON 97, Quantico, VA, November 1997.

**DoD KEY TECHNOLOGY AREA:** Command, Control, and Communications

**KEYWORDS:** Internet to Sea

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### SEANET

**Rex A. Buddenberg, Lecturer**  
**Department of Systems Management**  
**Sponsor: Office of Naval Research**

**OBJECTIVE:** To build an Internet service provider that offers extension of the Internet to sea.

**SUMMARY:** This project is in collaboration with Woods Hole Oceanographic Institution, Lamont-Doherty Earth Institute, OMNET, and Joint Oceanographic Institution under NOPP funding. It is a derivative of the Seanet Industry Assessment and aimed at setting up the shoreside Internet service provider infrastructure and a limited number of at-sea installations, initially on oceanographic research platforms.

#### **THESES DIRECTED:**

Andalis, E.L., "Web-Based Network Management Tools for U.S. Navy Mission-Centric Applications," Master's Thesis, Naval Postgraduate School, September 1997.

Johnstone, G.S. and Williams, G.D., "Applied Reliable Multicast Using the Xpress Transport Protocol (XTP)," Master's Thesis, Naval Postgraduate School, March 1997.

Manhertz, C.M. "Cashless Ships: A Feasibility Study," Master's Thesis, Naval Postgraduate School, September 1997.

Rehard, B.D., "An Analysis of Quality of Service over the Automated Digital Network System," Master's Thesis, Naval Postgraduate School, September 1997.

Sullivan, J.A., "Management of Autonomous Systems in the Navy's Automated Digital Network System (ADNS)," Master's Thesis, Naval Postgraduate School, September 1997.

**DoD KEY TECHNOLOGY AREA:** Command, Control, and Communications

**KEYWORDS:** Internet to Sea

### **PUBLIC/PRIVATE VENTURES: HOW TO REMOVE BARRIERS AND INCREASE INCENTIVES FOR INSTALLATION COMMANDERS TO BE CREATIVE AND SAVE FEDERAL FUNDS**

**Sandra M. Desbrow, Assistant Professor**  
**Department of Systems Management**  
**Sponsor: Naval Submarine Base-New London**

**OBJECTIVE:** To produce an in-depth analysis of the statutes and regulations governing the use of public/private ventures to carry out the mission of the Federal Government in general and the agencies that make up the Department of Defense specifically; document the process necessary to implement Public/Private Ventures (PPVs) and Business Partnerships between the Navy and private industry; and make recommendations for effective change to remove barriers to the progressive management of installations to save much needed Federal funds.

**SUMMARY:** The only constant in today's DoD budgeting process is that each agency is being asked to streamline its operations by pursuing as many cost-cutting measures as possible. Privatization and outsourcing as management tools have historically been used successfully to further enhanced management and procurement streamlining objectives. PPVs, however, have ridden fluctuating tides of popularity over the years with their greatest usage tied to special legislation in such areas as contractor-built housing on Government land. Today this method is being touted as a way to increase facilities and services while decreasing costs. Unfortunately, when installation managers explore such ventures with private contractors and local and state governments, they soon run into roadblocks to their innovative and creative ideas.

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The first phase of the research will involve an historical analysis of the use of PPVs within the Federal Government. The second phase will analyze the legislative history of PPV statutes and regulations including those currently governing such business arrangements along with the interpretative position of DoD, the Navy, the other Services, and civilian agencies. The third phase will be a documentation of the approval process for PPVs starting with the Navy chain of command up through DoD and Congress. The fourth phase will be an analysis of the impact of both the legislation, regulations, and DoD and Navy policies on the creative use of PPVs by Navy installation commanders. The fifth and final phase will be recommendations for legislative, policy, and process changes to make PPVs a viable avenue for increased efficiencies and cost savings for Navy Installations.

### **CONFERENCE PRESENTATION:**

Desbrow, Sandra M., "Public/Private Ventures: The Government Provides Roadblocks Instead of Incentives," Acquisition Center of Excellence (ACE) Seminar, Monterey, CA, October 1997.

**DoD KEY TECHNOLOGY AREA:** Other (Public/Private Ventures)

**KEYWORDS:** Cost Savings, Federal Real Estate Management, Installation Management, Privatization, Outsourcing, Public/Private Ventures.

### **TRICARE CONTRACTING**

**Sandra M. Desbrow, Assistant Professor**  
**Department of Systems Management**  
**Sponsor: U.S. Navy Bureau of Medicine**

**OBJECTIVE:** The objective of this project was to create an organized body of knowledge on the topic of DoD healthcare contracting and relevant ethics issues and to produce a cutting-edge module that could be used for educating DoD Healthcare Financial Managers in the TRICARE system.

**SUMMARY:** Due primarily to the rapidly increasing cost of the Civilian Health and Medical Program of the Uniformed Services (CHAMPUS), DoD is in the process of implementing several initiatives to manage better both the health care for beneficiaries and the costs of services provided. These include increased managed care contracting, the greater use of fiscal intermediaries, and the conversion of the traditional CHAMPUS benefits structure to a system known as TRICARE. TRICARE converts the current fee-for-service based indemnity-type insurance plan into a three-option program that allows the beneficiaries to determine the plan that best meets the individual's needs. Because this is a new method of providing healthcare services within DoD, the procedures and vehicles used for contracting with private providers are in a constant state of change as lessons learned are incorporated into each new contract and existing contracts are modified. Accordingly, there is a dire need within the DoD healthcare community for instruction to provide all those involved in healthcare management with the most up-to-date training to ensure that all beneficiaries receive the best care at the lowest possible cost to the Government. A complete review of both the DoD healthcare system and contracts was performed along with an analysis of existing processes and contractual documents used by the private sector. An enhanced understanding of the current healthcare systems within the Government and private industry was achieved along with suggestions for improving the existing DoD healthcare system.

### **CONFERENCE PRESENTATION:**

Desbrow, Sandra M., "TRICARE: Contracting for DoD Managed Health Care," Annual Conference of the Office of the General Counsel, Department of the Navy, Arlington, VA, May 1997.

**DoD KEY TECHNOLOGY AREA:** Other (Managed Health Care)

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**KEYWORDS:** Bid Price Adjustment, CHAMPUS, Government Contracts, Health Care, Managed Care, Resource Sharing, TRICARE, Procurement Integrity

**DISPUTES ARISING UNDER DEPARTMENT OF THE NAVY SUPPORT SERVICES  
CONTRACTS: AN ANALYSIS OF THOSE LITIGATED FOR COMMON  
PATTERNS/ERRORS AND RECOMMENDATIONS FOR AVOIDANCE**

**Sandra M. Desbrow, Assistant Professor  
Department of Systems Management**

**Sponsor: Department of the Navy Organization Management and Infrastructure Team**

**OBJECTIVE:** The objective of this project was to analyze the final decisions rendered by the Armed Services Board of Contract Appeals and the U.S. Court of Federal Claims in claims appealed to them from disputes arising under Department of the Navy support services contracts looking for common patterns of procurement practices that once detected could be corrected to reduce the Navy's litigation caseload and save Federal funds.

**SUMMARY:** Government contracting officers are granted great discretion in resolving disputes arising under Federal contracts. Nevertheless, thousands of disputes are appealed to an administrative or judicial forum each year because the Government representatives and the contractor cannot arrive at a mutually agreed upon settlement. This research analyzes the decisions rendered in disputes arising under DoN support services contracts over the last five years in the U.S. Court of Federal Claims and the Armed Services Board of Contract Appeals. The goal of this research is to identify weaknesses in acquisition and contracting processes and procedures and execution practices that give rise to disputes that are not settled at the Contracting Officer level. The data was collected and analyzed for patterns in contract administration that gave rise to the disputes which reached the state of Federal litigation. Recommended changes in acquisition and contract management and administration will be provided based on the final outcome of the research.

**THESIS DIRECTED:**

Wardwell, Thomas C., "Analysis of Disputes Relative to Department of the Navy (DoN) Service and Support Contracts," Master's Thesis, Naval Postgraduate School, December 1997.

**DoD KEY TECHNOLOGY AREAS:** Other (Procurement Litigation)

**KEYWORDS:** Appeals, Claims, Contract Disputes, Litigation, Procurement, Settlement, Support Services Contracts

**CONVERTING CONVENTIONAL EXECUTIVE MANAGEMENT EDUCATION  
MODULES TO ASYNCHRONOUS NETWORK BASED LEARNING FORMATS**

**Richard B. Doyle, Associate Professor  
Department of Systems Management**

**Sponsor: Naval Postgraduate School-Institute for Defense Education and Analysis**

**OBJECTIVE:** To convert two Executive Management Education (EME) modules to an asynchronous network based learning format in order to: 1) determine the feasibility and cost-effectiveness of converting such EME modules to this format and 2) to identify the strengths and weaknesses of two competing private contractors involved in the conversion process, for use in determining the best approach for the conversion of other EME modules.

**SUMMARY:** The research, which will continue through the winter quarter 1998, has been undertaken as part of a broader effort by IDEA to identify and develop optimal mechanisms for employing the Internet (or intranets) to provide EME products within the DoN and DoD. This pilot project consisted of converting two different EME modules to an asynchronous network based learning format. Two private sector teams were selected by IDEA for the project, each of which worked with the PI to convert a single EME module. The PI, the author of and subject matter expert for both modules,

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collaborated with these teams to determine the appropriate network-user interfaces, course objectives and outcomes, feedback mechanisms, simulations, visual content, and chat room and website reference configurations. The contents of the course were first explained, followed by actual delivery of the course to the contractors. Visual and audio content was delivered and editing of textual content and architectural modification continues. Significant issues involving the architectural design of the courses for network delivery and the means of electronic collaboration on documents between the PI and the contractors have been and continue to be addressed.

When both contractor teams have completed their work, IDEA will evaluate each course to determine the viability of the approach upon which it was built and the capabilities of the responsible contractor. This data will be used to determine the module conversion policy for the other EME modules developed under the auspices of IDEA for BuMed. The experience of the PI in working with the contractors will also be used by IDEA to assist other EME faculty in preparing for the conversion process. The Air Force and Army have identified one of the two modules as an educational structure and platform which may be used, with some modification, to fulfill certain of their educational requirements.

**DoD KEY TECHNOLOGY AREA:** Manpower, Personnel, and Training

**KEYWORDS:** Network-Based Learning, Distance Learning, Internet, Distributive Learning

**AMERICA'S ALL-VOLUNTEER FORCE**  
**Mark J. Eitelberg, Associate Professor**  
**Department of Systems Management**  
**Sponsor: Office of the Assistant Secretary of Defense**

**OBJECTIVE:** The goal of this project is to chronicle the manpower policies and programs that succeeded—or failed—in sustaining the All-Volunteer Force (AVF), and to provide a “lessons learned” evaluation that will assist in setting a course for the future.

**SUMMARY:** Information has been gathered from four major sources: published research, Congressional reports and Department of Defense documents; data maintained by the Defense Manpower Data Center; and interviews with current and former officials in the Department of Defense who were directly involved in designing or executing manpower policies during the AVF era (1973-present). Contractor support was obtained for three phases of the research: a study of the evolution of the AVF; an assessment of the “effectiveness” of the military since the end of the draft; and an evaluation of the military’s experience in Operation Desert Shield/Desert Storm, a defining moment of the AVF. Students at the Naval Postgraduate School have also made important contributions—in the form of project papers and theses—to the research effort. This study is a multi-year effort that looks at ten major areas, including recruiting, compensation, population participation, changing missions, and other topics. Several related publications have been reported in research summaries from previous years.

**CONFERENCE PRESENTATIONS:**

Eitelberg, Mark J., “Selected Issues in Defense Human Resources,” Series of presentations for Hum-TP3, Panel on Military Human Resources Issues, The Technical Cooperation Program (TTCP), Portsmouth, United Kingdom, July 1997.

Eitelberg, Mark J., “Women and Minorities in the Military: Research Trends and Future Directions,” Defense Equal Opportunity Research Symposium, Defense Equal Opportunity Management Institute, Cocoa Beach, FL, December 1997.

**THESES DIRECTED:**

Bennett, Darlene R., “Sexual Harassment Policies and Programs in the Militaries of TTCP Countries,” Master’s Thesis, Naval Postgraduate School, June 1997.

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Espiritu, Emilson M., "Study of First-Term Attrition Among Racial/Ethnic Minorities in the Navy," Master's Thesis, Naval Postgraduate School, March 1997.

Etnyre, Robb P., "Naval Leadership and Society," Master's Thesis, Naval Postgraduate School, March 1997.

Friery, Margaret R., "Trends in Navy Officer Attitudes Toward the 'Don't Ask, Don't Tell' Policy," Master's Thesis, Naval Postgraduate School, March 1997.

Lo, Ping-Hsiung, "Study of U.S. Military Officers Commissioned through ROTC and the Service Academies," Master's Thesis, Naval Postgraduate School, March 1997.

Manning, Cheryl D., "Managing Diversity in the United States Navy," Master's Thesis, Naval Postgraduate School, March 1997.

Peterson, Michael A., "Homosexuality, Morality, and Military Policy," Master's Thesis, Naval Postgraduate School, March 1997.

Rea, Theresa M., "Unit Cohesion and the Military's 'Don't Ask, Don't Tell' Policy," Master's Thesis, Naval Postgraduate School, March 1997.

Sealy, Vicky D., "Study of Attrition Among Enlisted Women in the Navy," Master's Thesis, Naval Postgraduate School, March 1997.

### **OTHER:**

Laurence, J. H., "Performance of the All-Volunteer Force," Consultant Report, January 1997.

**DoD KEY TECHNOLOGY AREA:** Manpower, Personnel, and Training

**KEYWORDS:** Military Manpower, Personnel, Recruitment, Population Representation, Compensation, Force Management, Roles/Missions, Attrition, Military Accession Policy

### **STUDY OF SOCIOECONOMIC STATUS AND PERSONNEL PERFORMANCE IN THE MILITARY**

**Mark J. Eitelberg, Associate Professor**  
**Sponsor: Defense Manpower Data Center**

**OBJECTIVE:** The primary objective of this study is to analyze the relationship between a service member's socioeconomic status and his or her performance in the military. The study uses the results of the Department of Defense Survey of Recruit Socioeconomic Backgrounds (or "SES Survey"), which has been administered annually since 1989.

**SUMMARY:** A special database was created for this study. The database merges results from the SES survey with the Department of Defense Military Entrance Processing Command Cohort files and various performance-related data provided by the separate Services. The SES Survey sample includes approximately 106,000 recruits (from entry years 1989 through 1995). Initial data analysis compared the demographic composition of survey respondents, by year of entry, with the corresponding base population. This analysis indicated that the sample populations were reasonably representative of all recruits, with the exception of their gender composition. Data analysis will proceed in developing statistical models to examine the relationship between socioeconomic status and selected indicators of performance. The socioeconomic status variable in the statistical models will be based on two indices contained in the SES Survey database. Quantitative analyses may additionally explore the use of alternative socioeconomic measures developed from information contained in the

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survey database. Four students in the Manpower Systems Analysis Curriculum, Department of Systems Management, were engaged in thesis research directly related to this study at the close of 1997.

### **CONFERENCE PRESENTATION:**

Eitelberg, Mark J., "Women and Minorities in the Military: Research Trends and Future Directions," Defense Equal Opportunity Research Symposium, Defense Equal Opportunity Management Institute, Cocoa Beach, FL, December 1997.

**DoD KEY TECHNOLOGY AREA:** Manpower, Personnel, and Training

**KEYWORDS:** Recruit Backgrounds, All-Volunteer Force, Equal Opportunity, Population Representation, Performance Measures, First-Term Attrition

### **SYSTEMS MANAGEMENT RESEARCH SUPPORT FOR THE RAMP PROGRAM**

**Kenneth J. Euske, Professor**

**Alan W. McMasters, Professor Emeritus**

**Department of Systems Management**

**Sponsor: Naval Supply Systems Command**

**OBJECTIVE:** A project to facilitate implementation of the use of intelligent data in the acquisition and maintenance of weapon systems.

**SUMMARY:** Both defense and commercial sectors of industry are moving increasingly to the use of automated manufacturing. One potential benefit of automated manufacturing is the potential to develop a virtual inventory that exists in effect but not in physical form. As part of this project an analysis was conducted of the use of intelligent data to develop a virtual inventory for selected candidate parts for the New Attack Submarine. The analysis indicated that the Navy could generate savings through the creation of a virtual inventory. Additionally, selected DoD procurement initiatives were analyzed to evaluate the responsiveness of the initiatives to facilitate the availability of manufacturing capacity for the use of electronic exchange of technical product information. The results indicated the additional DoD effort is needed to unify the efforts to eliminate the obstacles to electronic data interchange.

**DoD KEY TECHNOLOGY AREA:** Other (Acquisition and Maintenance)

**KEYWORDS:** Computer Integrated Manufacturing, Inventory Management, Intelligent Digital Data, Virtual Parts Supply Base

### **INDIVIDUAL FIRM STRATEGIC CHANGE**

**Jane Feitler, Visiting Assistant Professor**

**Department of Systems Management**

**Sponsor: Naval Postgraduate School**

**OBJECTIVE:** The objective of this project is to extend a model of strategic change to investigate the types of specific strategic changes firms made over time and the performance implications of the decision to change or not change strategies over time. This project is a continuation of work begun in 1995.

**SUMMARY:** This continuing research further extends and investigates strategic changes found in the U.S. Motor Carrier industry's Less Than Truckload (LTL) segment. Applications of what firms did over an eighteen year time span (1976-1993) provides insight as to what strategic change actions managers are more likely to make when faced with external and internal changes, as well as the performance implications of those strategic actions. A set of managerial strategic changes that can be utilized by firms in the transportation sector was identified. The set of changes and their relationship to perfor-

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mance outcomes was also identified. Using a longitudinal data base, it was found that those firms that changed on one or more strategic dimensions and that evidenced prior poor performance, reaped positive performance benefits one and two years after the strategic change. Further analysis will be done to determine what specific types of changes brought about performance benefits.

### **PUBLICATIONS:**

Feitler, Jane, Corsi, Thomas M., and Grimm, Curtis M., "Measuring Firm Strategic Change in the Regulated and Deregulated Motor Carrier Industry: An Eighteen Year Evaluation," *The Logistics and Transportation Review, Transportation Research-E*, Vol. 33, No. 3, pp. 159-169, 1997.

Feitler, Jane, Corsi, Thomas M., and Grimm, Curtis M., "Does Strategic Change Bring About Performance Gains?" *Transportation Journal*, under review, 1997.

Feitler, Jane, Corsi, Thomas M., and Grimm, Curtis M., "Strategic Changes in the U.S. LTL Industry," *Journal of Transportation Management*, under review, 1997.

**DoD KEY TECHNOLOGY AREA:** Other (Strategic Change)

**KEYWORDS:** Strategic Change, Performance, Transportation

### **NAVAL POSTGRADUATE SCHOOL RESEARCH SUPPORT FOR NAVAL INVENTORY CONTROL POINT (NAVICP) - EVALUATION OF AUTOMATED NON-STANDARD REQUISITIONING SYSTEM (ANSRS)**

**Jane Feitler, Visiting Assistant Professor  
Department of Systems Management  
Sponsor: Naval Inventory Control Point**

**OBJECTIVE:** To evaluate and determine the cost/benefits of implementing the Automated Non-Standard Requisitioning System (ANSRS) use for Navy procurement activities.

**SUMMARY:** NAVICP's new automated procurement software, ANSRS, was developed to meet several objectives. They are: 1) to shift from a paper-oriented procurement system to a paperless one; 2) to emphasize ED/ED usage to capture demand information regarding fleet purchases so that forecasting for future acquisitions would be made with relevant, accurate data; 3) to make current procurement processes more efficacious; and 4) to make the Navy's procurement process from entry of purchase demand, through order fulfillment, replenishment, and restocking, one of total asset visibility. This research was conducted over the course of several months and included on-site interviews, a review of ANSRS publications and software, email, and telephone communications, and via interface with implementation teams. Sites visited include NAVICP-Mechanicsburg, FISC-San Diego, FISC-Honolulu, and NAS-Barbers Point.

Overall, the ANSRS software package is an excellent one and highly recommended for implementation across the fleet. At this time, there are only a few sites that have ANSRS installed. It is suggested that, prior to more implementations, the Windows version be completed, tested and verified to be user-friendly and "bug-free." Once a solid track record has been developed with current systems, ANSRS usage should have no problems being accepted and used by Navy personnel.

### **PUBLICATION:**

Feitler, Jane N., "The Navy Sails to Paperless Procurement: Using ANSRS, the Automated Non-Standard Requisitioning System," *Journal of Purchasing Management*, under review 1997.

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### CONFERENCE PRESENTATION:

Feitler, Jane N., "Even the Navy Can Go Paperless: Using ANSRS, the Automated Non-Standard Requisitioning System," Production and Operations Management Society (POMS) Annual Meeting, Santa Fe, NM, March 1998.

### THESIS DIRECTED:

Santacroce, Mark, "Evaluation of Submarine Inventory Levels and Their Affect on Mission Readiness," Master's Thesis, Naval Postgraduate School, December 1997.

**DoD KEY TECHNOLOGY AREAS:** Computing and Software

**KEYWORDS:** Automation, Non-Standard, Requisitioning, Procurement

### U.S. ALLIANCE AGREEMENTS, MILITARY SPENDING, AND INTERNATIONAL RELATIONSHIPS IN THE PACIFIC BASIN

**William R. Gates, Associate Professor**  
**Katsuaki L. Terasawa, Associate Professor**  
**Department of Systems Management**  
**Sponsor: Naval Postgraduate School**

**OBJECTIVE:** To examine the interaction between U.S. alliance agreements, military spending, and international relationships in the Pacific Basin and to adapt previous research concerning alliance burden sharing to examine the effect of U.S. military alliance agreements.

**SUMMARY:** Research was completed on two areas related to this objective. The first area addressed disproportionality in the burdens and benefits of alliance membership. Much of the previous research focused on determining the extent to which alliance members contributed a fair share of total alliance resources. Given a refined alliance model, it is possible to more accurately characterize alliance burdens and costs, which redefines measures of fairness. The research emphasizes the prospects for mutual gain as opposed to disproportionality measures across alliance members.

The second research area focused on the nature of public and private benefits from defense alliances. Previous models emphasized technology and defense strategy in determining the publicness of alliance contributions. This research emphasizes commonality of purpose and commitment. This research also included a threat parameter that reflects the adversaries' defense expenditures. The adversary was excluded from most previous alliance models.

Rather than focusing on disproportionality, as in the previous research, the revised alliance model can help predict the effects of alternative alliance structures. It can also better characterize the distribution of alliance burdens and benefits across alliance members.

**DoD KEY TECHNOLOGY AREAS:** Other (Economic Model)

**KEYWORDS:** Burden Sharing, Alliances, Public Goods

### LAYOUT AND DESIGN OF FREIGHT TERMINALS

**Kevin R. Gue, Assistant Professor**  
**Department of Systems Management**  
**Sponsor: Naval Postgraduate School**

**OBJECTIVE:** To investigate problems in the layout and design of freight terminals for the less-than-truckload (LTL) motor carrier industry. This is a continuation of a project begun last year.

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**SUMMARY:** The focus was on the exploitation of freight flow patterns in incoming trailers and the effects of those patterns on the optimal layout of the facility. Material flow models were constructed of these freight patterns and showed how to construct layouts that exploit these patterns. The results were tested using simulations, based on data obtained from a large LTL carrier. The results suggested that the model is effective in reducing labor cost in the terminal, especially when the number of destinations on incoming trailers is low.

### **PUBLICATIONS:**

Bartholdi, John J. and Gue, Kevin R., "Balancing Travel Cost and Congestion in an LTL Freight Terminal," submitted to *Operations Research*, 1997.

Gue, Kevin R., "The Effects of Scheduling on the Layout of Freight Terminals," submitted to *Transportation Science*, 1997.

### **CONFERENCE PRESENTATION:**

Gue, Kevin R., "Toward Good Structure in the Layout of Freight Terminals," Conference of the Institute for Operations Research and Management Sciences, Dallas, TX, 27 October 1997.

**DoD KEY TECHNOLOGY AREA:** Other (Logistics and Transportation)

**KEYWORDS:** Freight Transportation, Terminals, Scheduling, Layout

### **MILITARY-TECHNOLOGICAL POTENTIAL OF U.S. ADVERSARIES**

**Gregory G. Hildebrandt, Associate Professor**

**Department of Systems Management**

**Sponsor: Office of the Secretary of Defense (PA&E)**

**OBJECTIVE:** This study evaluated the potential of selected adversary nations to field technologically sophisticated forces that could effectively challenge U.S. forces in future scenarios. The types of capabilities that adversaries might develop and indicators that could serve as warnings to intentions were analyzed. There was also an evaluation of the potential ability of adversaries to achieve readiness levels commensurate with those needed to effectively challenge U.S. forces.

### **CONFERENCE PRESENTATION:**

Franck, R. and Hildebrandt, G., "Military-Technological Potential of U.S. Adversaries," Economic Indicators of Military Capability Conference, Alexandria, VA, September 1997.

**DoD KEY TECHNOLOGY AREA:** Other (International Security)

**KEYWORDS:** Reconnaissance-Strike Complex, Sensor-to-Shooter Networks

### **LAND-BASED SEARCH AND RESCUE (SAR) OUTSOURCING**

**Gregory G. Hildebrandt, Associate Professor**

**Department of Systems Management**

**Sponsor: Chief of Naval Operations (N88)**

**OBJECTIVE:** The purpose of the two-phased study is to analyze the disparate requirements of land based NAVAL SAR HELO's, consolidate those aircraft requirements, and conduct a cost-benefit analysis on outsourcing this mission. Phase two of this effort will focus on the execution of the recommended alternatives.

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## PROJECT SUMMARIES

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**SUMMARY:** The project was initiated on 1 October 1997. An NPS thesis on Land-Based SAR outsourcing is underway. Work has begun identifying the missions and functions performed by personnel assigned to SAR stations. A matrix depicting the time structure of both officer and enlisted activities is being developed and data gathering activities to complete this matrix are being organized. During November, meetings were held with Center for Naval Analysis researchers on work conducted in the area of privatization and the analysis of vertical replenishment (VERTREP). An analysis of the similarities and differences between VERTREP and the performance of the land-based SAR missions has begun.

**DoD KEY TECHNOLOGY AREA:** Other (Outsourcing)

**KEYWORDS:** Search and Rescue (SAR), Best Value to Government

### **ECONOMETRIC PROJECTION OF ARMY PERSONNEL STRENGTH**

**Gregory G. Hildebrandt, Associate Professor**

**Department of Systems Management**

**Sponsor: Office of the Deputy Chief of Staff, Personnel**

**OBJECTIVE:** This study, initiated 1 October 1997, will support the achievement of the required end strength using the Army's Strength Management System. Retention rates for various categories of officers and enlisted personnel will be projected using econometric forecasting models.

**DoD KEY TECHNOLOGY AREA:** Manpower, Personnel, and Training

**KEYWORDS:** Army's Strength Management System, Econometric Forecasting Model, Retention Rate

### **EXAMINING LARGE SCALE CHANGE IN TWO DON ORGANIZATIONS**

**Susan Page Hocevar, Assistant Professor**

**Department of Systems Management**

**Sponsor: Naval Postgraduate School**

**OBJECTIVE:** The goal of this work was to extend the work done with Naval Air Systems Team (NAST) and the Military Sealift Command (MSC) and identify generalizable conclusions regarding the implementation of Large Scale Change in DoD organizations.

**SUMMARY:** Two prior research efforts with organizations within the Naval Air Systems Team were further analyzed and the research generalized to broader DoD application. First, research on the prototype implementation of a Wide Area Network was analyzed for both its implications to systems development and the implementation of large-scale change. Two teaching cases were developed and published. Second, previous research on self-managed teams led to the existing theory and research on large-scale change and team-based design to the effective implementation of Integrated Program Teams within DoD. This research culminated in a publication that outlines specific recommendations for the design and use of IPTs. Finally, the earlier research with the Military Sealift Command was expanded to include the Civilian Mariners' perceptions of the large-scale changes being planned and implemented within this organization. Based on qualitative data gathered by Weigel (1997), a prototype attitude survey was developed for potential use with Civilian Mariners.

#### **PUBLICATIONS:**

Frew, B.A., Hocevar, S.P., and Bayer, V.C., "Stakeholder Analysis and Diffusion of Innovation as Requirements Determination Tools," *Systems Development Case Studies*, M. Gordon Hunter (ed.), Homewood, IL: Irwin, 1997.

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## PROJECT SUMMARIES

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Hocevar, S.P., Frew, B.A., and Bayer, V.C., "Implementing a Wide-Area Network at a Naval Air Station: A Stakeholder Analysis," *Cases on IT Management in Modern Organizations*, M. Khosrowpour and J. Liebowitz, (eds.), (73-83). Hershey, PA: Idea Group Publishing, 1997.

Hocevar, S.P. and Owen, W.E., "Team-Based Redesign as a Large-Scale Change: Applying Theory to the Implementation of Integrated Product Teams," *Acquisition Research Quarterly*, (forthcoming, 1998).

### **THESIS DIRECTED:**

Weigel, L.R., "The Civilian Mariners of Military Sealift Command: Preliminary Assessment of Organizational Culture and Values," Master's Thesis, Naval Postgraduate School, March 1997.

**DoD KEY TECHNOLOGY AREA:** Other (Organizational Change, Organizational Effectiveness)

**KEYWORDS:** Wide Area Network, Organizational Change, Team-Based Organization Design

### **LEADERSHIP AND RETENTION IN TROOP PROGRAM UNITS (TPU) PHASE IV: VALIDATION AND IMPLEMENTATION OF LEADERSHIP FEEDBACK**

**Erik Jansen, Visiting Associate Professor**

**Kenneth W. Thomas, Professor**

**Department of Systems Management**

**Sponsor: Office of the Chief of the Army Reserve**

**OBJECTIVE:** Retention in the Army Reserve has been a long-term problem, but research conducted at NPS suggests that effective Company Commanders can impact retention. The research focused on how to best conceptualize and leverage USAR Company Leadership to impact readiness and retention.

**SUMMARY:** Working closely with the USAR, research models were developed of USAR Company Commanders' leadership effectiveness, two questionnaires were constructed to assess critical attributes of commanders and their units, and teams of senior NCOs were trained to administer the instruments. The research was designed to validate measures of leader behavior (The Commander's Leadership Profile) as well as perceptions of the troops (The Command Climate Profile) against criteria of unit retention rates and readiness level.

**DoD KEY TECHNOLOGY AREA:** Manpower, Personnel, and Training

**KEYWORDS:** Readiness, Retention, Leadership Effectiveness

### **ANALYSIS OF BUDGET REDUCTION, COST-AVOIDANCE, AND FINANCIAL MANAGEMENT INITIATIVES IN COMNAVAIRPAC**

**Lawrence R. Jones, Professor**

**Jerry L. McCaffery, Professor**

**Department of Systems Management**

**Sponsor: Office of the Comptroller, COMNAVAIRPAC**

**OBJECTIVE:** To provide assistance to the Office of the Comptroller, AIRPAC in analysis of initiatives for improving command management and management control, cost-reduction and cost avoidance in the Flight Hour Program (FHP) and in accommodating budget reduction.

**SUMMARY:** The project provided analytical assistance to the Office of the Comptroller, AIRPAC in responding to the necessity for reviewing and assessing options for improving command management and management control, achieving

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cost-reduction and avoidance in the Flight Hour Program (FHP) and accommodating budget reduction in the period FY 1997 and beyond.

### PUBLICATIONS:

Jones, L.R. and Schedler, K., (eds.), *International Perspectives on the New Public Management*, Greenwich, CT, JAI Press, 1997.

Jones, L.R. and Schedler, K., "The Inaugural International Public Management Network Conference," *International Perspectives on the New Public Management*, L.R. Jones and Kuno Schedler, (eds.), Greenwich, CT, JAI Press, 1997.

Jones, L.R. and Thompson, F., "The Five R's of the New Public Management," *International Perspectives on the New Public Management*, L.R. Jones and Kuno Schedler, (eds.), Greenwich, CT: JAI Press, 1997.

Frew, B. and Jones, L.R., "Information Era Influences on the New Public Management," *International Perspectives on the New Public Management*, L.R. Jones and Kuno Schedler, (eds.), Greenwich, CT, JAI Press, 1997.

Jones, L.R., "Changing How We Budget," *Public Budgeting, Accounting and Financial Management*, 9/2 (Spring) 1997.

Jones, L.R. and McCaffery, J., "Implementation of the CFO Act and Related Federal Financial Management Reforms," *Public Budgeting & Finance*, 17/2 1997.

Jones, L.R., "Federal Budget Reform," *Policy Sciences*, 19/1 1997.

Johansen, C., Jones, L. R., and Thompson, F., "Management Control of Budget Execution," *Handbook of Public Budgeting*, 2nd ed. J. Rabin and R. Golembiewski, (eds.), New York, NY, Marcel Dekker, 1997.

Jones, L.R., "Strategic Budgeting," *The International Encyclopedia of Public Policy and Administration*, J. Shafritz, (ed.), New York, NY, Holt Publishers, 1997.

Jones, L.R., "Budget Control," *The International Encyclopedia of Public Policy and Administration*, J. Shafritz, (ed.), New York, NY, Holt Publishers, 1997.

McCaffery, J., "Budget Patterns," *The International Encyclopedia of Public Policy and Administration*, J. Shafritz, (ed.) New York, NY, Holt Publishers, 1997.

McCaffery, J., "Operating Deficit," *The International Encyclopedia of Public Policy and Administration*, J. Shafritz, (ed.), New York, NY, Holt Publishers, 1997.

McCaffery, J., "National Debt," *The International Encyclopedia of Public Policy and Administration*, J. Shafritz, (ed.), New York, NY, Holt Publishers, 1997.

McCaffery, J. and Wolfgang, D., "Performance Budgeting," *The International Encyclopedia of Public Policy and Administration*, J. Shafritz, (ed.), New York, NY, Holt Publishers, 1997.

McCaffery, J., "Revenue Budgeting," *The International Encyclopedia of Public Policy and Administration*, J. Shafritz, (ed.) New York, NY, Holt Publishers, 1997.

McCaffery, J., "Program Budgeting," *The International Encyclopedia of Public Policy and Administration*, J. Shafritz, (ed.), New York, NY, Holt Publishers, 1997.

## PROJECT SUMMARIES

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McCaffery, J., "Chief Financial Officer," *International Encyclopedia of Public Policy and Administration*, J. Shafritz, (ed.), New York, NY, Holt Publishers, 1997.

McCaffery, J., "Budgeting," *International Encyclopedia of Public Policy and Administration*, J. Shafritz, (ed.) New York, NY, Holt Publishers, 1997.

### CONFERENCE PRESENTATION:

Jones, L.R., "Responsibility Budgeting and Accounting," Conference on Transformation in the Public Sector, Sydney, Australia, April 1997.

Jones, L.R., "The New Public Management," Workshop of the International Public Management Network, Potsdam, Germany, June 1997.

Jones, L.R., "International Public Financial Management Issues," National Conference of the Association for Budgeting and Financial Management, Washington, DC, November 1997.

### THESES DIRECTED:

Banus, S., "Are We Properly Matching Resources with Requirements?" Master's Thesis, Naval Postgraduate School, June 1997.

Gosnall, J., "Assessment of Department of Defense Reinvention Laboratories," Master's Thesis, Naval Postgraduate School, June 1997.

Haruki, M., "Japanese Burden-Sharing of U.S. National Security Costs," Master's Thesis, Naval Postgraduate School, September 1997.

Jenkins, T., "Logistics Reform in Department of Defense Reinvention Laboratories," Master's Thesis, Naval Postgraduate School, December 1997.

**DoD KEY TECHNOLOGY AREA:** Other (Resource Management, Financial Management)

**KEYWORDS:** Resource Management, Reinvention, Financial Management

### ANALYSIS OF DOD REINVENTION, FINANCIAL MANAGEMENT EDUCATION, AND CFO ACT IMPLEMENTATION

**Lawrence R. Jones, Professor**

**Department of Systems Management**

**Sponsor: Office of the Comptroller, Department of Defense**

**OBJECTIVE:** To provide assistance to the Office of the Comptroller, DoD an analysis of DoD Reinvention, Financial Management education, and CFO/GPRA implementation.

**SUMMARY:** A project team was assembled to attend and write a report on the 1997 DoD Reinvention Conference with assessments of progress of the labs and their effect on DoD financial management.

### PUBLICATION:

Jones, L.R. and Thompson, F., "Reinvention Laboratories in the Department of Defense," A Report to the Office of the Comptroller, DoD, Naval Postgraduate School, May 1997.

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## PROJECT SUMMARIES

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### CONFERENCE PRESENTATION:

Green, M., Jones, L.R., and Thompson, F., "Local Heroes: Reinvention Labs in the Department of Defense," Fifth National Conference on Public Management, Atlanta, GA, November 1997.

**DoD KEY TECHNOLOGY AREAS:** Other (Reinvention, Financial Management)

**KEYWORDS:** Reinvention, Financial Management

### INVESTIGATION OF DOD INVENTORY MANAGEMENT

**Keebom Kang, Associate Professor  
Department of Systems Management**

**Sponsor: Deputy Under Secretary of Defense for Logistics**

**OBJECTIVE:** To investigate logistics cycle time and inventory reduction for DoD inventory management

**SUMMARY:** The causes of DoD excess inventory and the difficulties of implementing commercial practices to DoD inventory management were investigated. Computer simulation and graphics animation models have been developed to improve readiness for USN and USMC. These models could substantially reduce logistics cycle times and pipeline inventory, resulting in cost savings and eventually higher readiness.

### PUBLICATIONS:

Kang, K., "DoD Inventory Management Cultural Changes and Training in Commercial Practices," Research Report, delivered to the Deputy Under Secretary of Defense for Logistics, September 1997.

Kang, K. and Gue, K.R., "Sea Based Logistics: Distribution Problems for Future Global Contingencies," *Proceedings of the 1997 Winter Simulation Conference*, S. Andradottir, K. J. Healy, D. H. Withers, and B. L. Nelson (eds.), pp. 911-916, Atlanta, GA, December 1997.

### CONFERENCE PRESENTATIONS:

Kang, K., "Logistics Simulation Model of Maritime Prepositioning Ships Instream Offload," 65<sup>th</sup> Military Operations Research Society (MORS) Conference, Quantico, VA, 16-18 June 1997.

Kang, K., Gue, K.R., and Mooney, K.F., "NPS Research Panel," DoD Logistics Reengineering Conference, Monterey, CA, 17-19 November 1997.

Kang, K. and Gue, K.R., "Sea Based Logistics: Distribution Problems for Future Global Contingencies," 1997 Winter Simulation Conference, Atlanta, GA, 8-10 December 1997.

Kang, K. "Cycle Time Reduction to Improve Naval Aviation Readiness Using Modeling and Simulation," to be presented at the 66<sup>th</sup> Military Operations Research Society (MORS) Conference, Monterey, CA, 23-25 June 1998.

### THESES DIRECTED:

Cruz, D. F., "Repair Cycle Time Reduction at Naval Aviation Depots via Reduced Logistics Delay Time," Master's Thesis, Naval Postgraduate School, December 1997.

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## PROJECT SUMMARIES

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Mooney, K. F. and Sanchez, G. R., "Improved Aviation Readiness and Inventory Reductions through Repair Cycle Time Reductions Using Modeling and Simulation," Master's Thesis, Naval Postgraduate School, December 1997.

**DoD KEY TECHNOLOGY AREAS:** Modeling and Simulation, Other (Logistics)

**KEYWORDS:** Logistics, Inventory Management, Readiness, Cultural Change

### READINESS-BASED SPARING REPLENISHMENT MODEL FOR REPAIRABLE ITEMS

**Alan W. McMasters, Professor Emeritus**  
**Department of Systems Management**  
**Sponsor: Naval Supply Systems Command**

**OBJECTIVE:** This is a continuing project to develop a wholesale level inventory model for the Navy's Inventory Control Point to use to replenish its inventories of repairable items; the objective function of this model should be related to readiness.

**SUMMARY:** Recent simulation analyses have resulted in an approximate model for describing the inventory position and the net inventory at any instant of time as a function of the order quantity, repair quantity, and the maximum level of the inventory position under the assumption of Poisson and normally distributed demands for a given repairable item. From this model, formulas for the expected time-weighted backorders and the probability of being out of stock at any instant of time have been derived. This past year simulation modeling of the safety stock was conducted in an attempt to derive an approximate formula to describe safety stock. Statistical analysis of the results of over 60 simulation runs is currently under way.

**DoD KEY TECHNOLOGY AREA:** Modeling and Simulation

**KEYWORDS:** Inventory Management, Navy Repairable Items, Inventory Model

### CHAPTERS 1-6 AND 8 OF NAVY AND DEFENSE INVENTORY MANAGEMENT

**Alan W. McMasters, Professor Emeritus**  
**Department of Systems Management**  
**Sponsor: Naval Supply Systems Command**

**OBJECTIVE:** This continuing research project involves the research and writing of Chapters 1-6 and 8 of a new textbook called *Navy and Defense Inventory Management*. This textbook will replace NAVSUP Publication 553, *Inventory Management*, published in 1983. The new textbook will be used in two graduate courses in the Department of Systems Management at the Naval Postgraduate School and as a reference document by Navy and other supply system personnel. These chapters of the textbook include an introduction to military inventory management; an overview of inventory theory; descriptions of wholesale and retail provisioning processes in the Navy; descriptions of wholesale and retail requirements determination and management processes in the Navy Supply System; and an overview of Navy inventory management outside of the Navy Supply System.

**SUMMARY:** This year focused on detailing the actual process use by NAVICP to manage repairables. This included how their computer programs are used to help the process. In addition, the negotiation process between NAVICP and the depots, both organic and commercial, for the repair of the returned carcasses was documented.

**DoD KEY TECHNOLOGY AREA:** Modeling and Simulation

**KEYWORDS:** Inventory Management, Navy Supply System, Defense Logistics, Users' Manual, Planning, Collaboration, Crisis

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## PROJECT SUMMARIES

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### **MANPOWER SYSTEMS ANALYSIS (MSA) FACULTY RESEARCH TO SUPPORT N-1 (CHIEF OF NAVAL PERSONNEL)**

**Stephen L. Mehay, Professor**  
**Department of Systems Management**  
**Sponsor: Chief of Naval Personnel**

**OBJECTIVE:** The project provided umbrella funding within which individual projects were proposed and carried out by individual researchers. Professor Mehay coordinated the overall project and facilitated interactions between MSA faculty, thesis students, and N1/Bupers.

**SUMMARY:** The efforts under this umbrella project focused on analyzing the impact of the implementation of Surface Warfare Officer Retention bonus on the retention behavior of Surface Warfare Officers (SWO). One task involved collecting data to analyze the retention of SWOs in the period immediately following expiration of their minimum service requirement (MSR) and through the 10<sup>th</sup> year of commissioned service. The task built an Annualized Cost of Leaving (ACOL) model of retention behavior, then used the model to forecast retention differences when the SWO bonus is added to the military pay stream in the ACOL calculations.

A second task analyzed the relationship between moral waivers and criminal history on the performance of junior enlisted personnel. Data was collected from DMDC on arrest records and the disposition of arrest for recruits from the State of Illinois and similar data on recruits from the State of Florida. Several performance measures were analyzed, including attrition during the first term of service, being promoted to petty officer during the first term, achieving eligibility for reenlistment, and reenlistment for a second term. The analysis found that enlistees with criminal histories tend to perform significantly worse on all of the selected indicators than enlistees without such histories.

Finally, an attempt was made to collect the relevant data and estimate enlistment supply models for female enlistees in the U.S. Navy.

#### **THESES DIRECTED:**

Connor, Jeffrey, W., "The Effects of Pre-Service Criminal History on Recruit Performance in the U.S. Navy," Master's Thesis, Naval Postgraduate School, March 1997.

Nosal, David E., "An Analysis of the Proposed Surface Warfare Officer Career Incentive Pay (SWOCIP) Program Using an Annualized Cost of Leaving (ACOL) Model," Master's Thesis, Naval Postgraduate School, March 1997.

Rearson, Matthew G., "The Development of Career Naval Officers from the U.S. Naval Academy: A Statistical Analysis of the Effects of Selectivity and Human Capital," Master's Thesis, Naval Postgraduate School, March 1997.

**DoD KEY TECHNOLOGY AREA:** Manpower, Personnel, and Training

**KEYWORDS:** Officer Retention, Promotion, Annualized Cost of Leaving Model, Retention Bonus

### **OFFICE OF THE SECRETARY OF DEFENSE (OSD) SPECIAL PAY MODEL**

**Stephen L. Mehay, Professor**  
**Department of Systems Management**  
**Sponsor: Office of Undersecretary of Defense, Personnel and Readiness**

**OBJECTIVE:** The goal of this project was to develop decision models to predict the retention and skill-retention effects of the system of military special pay.

**SUMMARY:** There is a tremendous diversity within DoD of special skills for military positions, for both officers and enlisted. Supply and demand conditions for these positions vary greatly, yet officers and enlisted are paid from a single pay table regardless of these conditions. To staff the force efficiently requires a mechanism to adjust compensation to meet

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## PROJECT SUMMARIES

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occupation- or position-specific conditions. This effort builds a model that provides different types of adjustment mechanisms for each type of pay category: career incentive pay; skill incentive pay; and hazardous duty pay. The model will estimate the impact of pay on personnel retention using an ACOL methodology. Second, the model will predict the impact of career incentive pay on the willingness of personnel to acquire and retain special skills. Third, the model will adjust pay to account for inflation or changes in aggregate wage levels.

**DoD KEY TECHNOLOGY AREA:** Manpower, Personnel, and Training

**KEYWORDS:** Special Pay, Retention, Annualized Cost of Leaving Model

### RECRUIT STATION LOCATION PROJECT

**Stephen L. Mehay, Professor**

**Kevin Gue, Visiting Assistant Professor**

**Michael Cook, Visiting Assistant Professor**

**Department of Systems Management**

**Sponsor: Office of Undersecretary of Defense, Personnel and Readiness**

**OBJECTIVE:** The goal of this project is to build an optimization model that assists OSD and the Joint Recruiting Facilities Committee to locate military recruiting stations in specific geographic locations.

**SUMMARY:** OSD has been tasked by Congress to improve the process for locating recruiting stations and to increase the co-location of multiple services in each station. The Joint Recruiting Facilities location process has long examined station location on the basis of facility cost only. This project aims to bring the production potential of alternative station locations into the decision process. In addition, the analysis will examine the inter-relationship between the new contract production of one service based on the proximity of a second service's recruiters. The production model will be estimated using zip code level data. It will include information on the station which encompasses each zip code and on the location of each service's recruiters. A cost model will also be estimated that relates station costs to geographic location. The production and cost modules will be used to estimate region-level optimization models of the assignment of recruiters and the location of stations. Finally, the optimization results will be integrated in PC-based software, such as MAPINFO, for the display and retrieval of the station location

#### **THESES DIRECTED:**

Gundayo, Jennifer, "An Analysis of Vehicle Recruiting Costs Across Navy Recruiting Districts," Master's Thesis, Naval Postgraduate School, December 1997.

Munoz, Patricia, "An Exploratory Cost Analysis of Navy Recruiting Stations," Master's Thesis, Naval Postgraduate School, June 1997.

**DoD KEY TECHNOLOGY AREA:** Manpower, Personnel, and Training

**KEYWORDS:** Recruiting, Recruit Stations, Recruiter Assignment, Location Models

### THE ACQUISITION PROCESS - WHAT SHOULD IT BE?

**Janice M. Menker, Lecturer**

**Department of Systems Management**

**Sponsor: Naval Postgraduate School**

**OBJECTIVE:** The project was concerned with examining the acquisition process, its historical framework, and its function within the context of both administrative purpose and administrative reform. Within a strategic framework, the ac-

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quisition process is an administrative function intended to facilitate the tactical and operational mission of the Department of Defense and the Navy. In the performance of that function, a process has emerged over time that appears to be highly inefficient and/or ineffective. It is the goal of this research to examine the process, utilizing business process re-engineering concepts, and offer recommendations for increased efficiency and effectiveness.

**SUMMARY:** Authors Hammer and Champey introduced the concept of business process re-engineering, demonstrating the successes of the private sector in re-designing business processes as the tool to achieve increased productivity and in turn return on investment. Through a concentrated focus on each process, the non-value added dimensions could be eliminated. By asking the primary question, “What should the process look like?” managers could essentially start fresh and eliminate work tasks. Those companies such as General Electric, Ford, and others who had applied the principles had achieved higher levels of productivity and increased return on investment.

Initially, this researcher hypothesized that these same principles could be applied to the acquisition process. However, a clear distinction exists between the business sector’s industrial processes producing hardware and services to the governmental processes of policy formation and policy implementation and the direct linkage between revenue and expenditures. Without such direct linkages and information the process examination is incomplete.

Although, the direct principles of Hammer and Champey in business process re-engineering may not be directly applicable to governmental processes, additional research will explore aggregate modeling as a tool to better understand the issues and practices. Such research can support efforts to improve the business practice.

**DoD KEY TECHNOLOGY AREA:** Other (Acquisition)

**KEYWORDS:** Acquisition Process, Process Re-Engineering

### UNDERSTANDING THE ACQUISITION ISSUES IN INFORMATION SECURITY MANAGEMENT

**Janice M. Menker, Lecturer  
Department of Systems Management  
Sponsor: Unfunded**

**OBJECTIVE:** The initial phase of this research is focused on the outsourcing of public key encryption management as the mechanism to accomplish security management. A related task is the evaluation of commercial-off-the-shelf products to PKI or public key encryption.

**SUMMARY:** Outsourcing information technology management is widely supported by the private sector. Both State government and local governments as well are currently using commercial-off-the-shelf products to perform security management. However, federal government agencies are first required to comply with Office of Management and Budget Circular A-76.

**DoD KEY TECHNOLOGY AREA:** Other (Security Management)

**KEYWORDS:** Security Management, Outsourcing

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## PROJECT SUMMARIES

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### JOINT STAND-OFF WEAPON (JSOW) ALPHA CONTRACTING

Mark Nissen, Assistant Professor  
Department of Systems Management  
Sponsor: Naval Air Warfare Center

**OBJECTIVE:** To investigate the alpha contracting process as practiced on the Joint Stand-Off Weapon (JSOW) program.

**SUMMARY:** Alpha contracting represents an innovative extension of the integrated product team (IPT) concept into the domain of contract negotiation. This work involved in-depth field investigation of alpha contracting as practiced by the JSOW program, which was noted as a leader in this area. The fieldwork resulted in the development of a decision-making model to assess the relative merits of pursuing an alpha-contracting approach. The final report also included a descriptive case study for pedagogical use as well as a working paper in review for possible publication.

#### **PUBLICATION:**

Nissen, M.E., "JSOW Alpha Contracting Technical Report," Naval Postgraduate School Center for Acquisition Education, Training and Research Technical Report CAETR-97-01, November 1997.

#### **OTHER:**

Nissen, M.E., "JSOW Alpha Contracting Case Study (Software Version)," adopted for pedagogical use in MN3309, Embedded Software Acquisition, at the Naval Postgraduate School, November 1997.

Nissen, M.E., "Alpha Contracting JSOW Style," in review, December 1997.

**DoD KEY TECHNOLOGY AREAS:** Modeling and Simulation

**KEYWORDS:** Acquisition, Contracting, Negotiation

### KNOWLEDGE-BASED RE-ENGINEERING: INTELLIGENT TOOLS DEVELOPMENT AND TESTING

Mark Nissen, Assistant Professor  
Department of Systems Management  
Sponsor: Naval Postgraduate School

**OBJECTIVE:** To develop and test "intelligent" re-engineering tools (e.g., knowledge-based systems) to diagnose pathologies and faults in acquisition processes, and to generate innovative redesign alternatives.

**SUMMARY:** A study was conducted to survey and evaluate the many knowledge-based tools and development environments that are currently available on the marketplace. A real-time intelligent systems development environment was selected for this current and future projects along these lines. The feasibility of supplying intelligent re-engineering support through the Web on a real-time basis was demonstrated through a proof-of-concept prototype system.

#### **PUBLICATIONS:**

Nissen, M.E., "Re-engineering Support through Measurement-Driven Inference," *Intelligent Systems in Accounting, Finance and Management*, Vol. 6, 1997.

Nissen, M.E., "Re-engineering the RFP Process Through Knowledge-Based Systems," *Acquisition Review Quarterly*, Vol. 9, 1997.

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Nissen, M.E., "The Commerce Model for Electronic Redesign," *Journal of Internet Purchasing*, July 1997.

Nissen, M.E., "Toward Intelligent Web-based Redesign Support," *American Association for Artificial Intelligence Technical Report WS-97-02*, 1997.

### CONFERENCE PRESENTATION:

Nissen, M.E., "Toward Intelligent Web-Based Redesign Support," American Association for Artificial Intelligence Conference, Providence, RI, July 1997.

### THESES DIRECTED:

Baden, K.A. and Peters, G.A., "A Business Process Model and Reengineering Plan for the Student Services Department of the Marine Corps Institute," Master's Thesis, Naval Postgraduate School, September 1997.

Bushey, D.A., "A Conceptual Framework for Providing Requisite Variety in the Future Operational Forces of the United States Army," Master's Thesis, Naval Postgraduate School, December 1997.

St. Moritz, M.E., "The Application of Reengineering to the Acquisition Planning Process for a Major Weapon System: A Case for Information Technology," Master's Thesis, Naval Postgraduate School, June 1997.

**DoD KEY TECHNOLOGY AREAS:** Computing and Software, Manpower, Personnel, and Training, Modeling and Simulation

**KEYWORDS:** Acquisition, Artificial Intelligence, Reengineering, Systems Development

### INTERORGANIZATIONAL COLLABORATION

**Nancy C. Roberts, Professor**  
**Department of Systems Management**  
**Sponsor: United Nations Staff College**

**OBJECTIVE:** A continuing project that brings together donors, non-governmental organizations, and UN personnel from field and headquarter agencies for the purpose of planning relief and development efforts in crisis countries.

**SUMMARY:** The United Nations has sponsored an experimental project that brings together the major stakeholders who are intervening in a country in crisis for the purposes of joint planning. Afghanistan was the first country for which such planning was undertaken; it occurred in Islamabad, Pakistan with 86 representatives from various stakeholder groups in attendance. The purpose of the five-day planning session was to develop a strategic framework for relief and recovery efforts in Afghanistan. The strategic framework developed by field representatives was then sent to stakeholder counterparts at headquarters so a joint policy on Afghanistan could be issued. The lessons learned from this experiment in interorganizational collaboration are expected to inform planning efforts in other crisis countries.

### PUBLICATIONS:

Roberts, N.C., "Public Deliberation: An Alternative Approach to Crafting Policy and Setting Direction," *Public Administration Review*, 57(2), pp.124-132, 1997.

Roberts, N.C., and Menker, J., "Strategic Management in the Federal Government: Necessary and Sufficient Conditions," *Handbook of Strategic Management*, (2nd. ed), J. Rabin, G.J. Miller, W.B. Hildreth, (eds.) New York: Marcel Dekker, 1998.

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## PROJECT SUMMARIES

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Roberts, N.C., "Dialogue and Transformation," *International Journal of Organization Theory and Behavior*, (Guest Editor), forthcoming 1998.

### CONFERENCE PRESENTATIONS:

Roberts, N.C., "Peace Matters Most: Showcase Symposium," Academy of Management Conference, (Symposium Organizer), San Diego, CA, August 1998.

Roberts, N.C., "Stakeholder Collaboration and Planning in Crisis Countries," Academy of Management Conference, San Diego, CA, August 1998.

### THESES DIRECTED:

Cukor, D., "Marine Ground Intelligence Reform: How to Redesign Ground Intelligence for Threats of the Twenty-First Century," Master's Thesis, Naval Postgraduate School, December 1997.

Black, B., "Modeling Organizational Configuration and Decision Processes for Information Warfare Analysis," Master's Thesis, Naval Postgraduate School, March 1997.

### OTHER:

Roberts, N.C. "Radical Change by Entrepreneurial Design," submitted to *Acquisition Research Quarterly*.

**DoD KEY TECHNOLOGY AREAS:** Command, Control, Communications, Other (Planning)

**KEYWORDS:** Relief and Development Efforts, United Nations

### RELIABILITY MODELING FOR SAFETY CRITICAL SOFTWARE

**Norman F. Schneidewind, Professor**

**Department of Systems Management**

**Sponsor: Naval Surface Warfare Center-Dahlgren**

**OBJECTIVE:** To model software reliability prediction and risk analysis for safety critical software.

**SUMMARY:** Software reliability predictions are used to show they can increase confidence in the reliability of safety critical software such as the NASA Space Shuttle Primary Avionics Software System (Shuttle flight software). This objective was achieved using a novel approach to integrate software safety criteria, risk analysis, reliability prediction, and stopping rules for testing. This approach is applicable to other safety critical software. Only the safety of the software in a safety critical system was covered. The hardware and human operator components of such systems are not explicitly modeled nor are the hardware and operator induced software failures. The concern is with reducing the risk of all failures attributed to software. Thus, the use of the word safety refers to software safety and not to system safety. By improving the reliability of the software, where the reliability measurements and predictions are directly related to mission and crew safety, a contribution is made to system safety.

Remaining failures, maximum failures, total test time required to attain a given fraction of remaining failures, and time to next failure are shown to be useful reliability measurements and predictions for: 1) providing confidence that the software has achieved safety goals; 2) rationalizing how long to test a piece of software; and 3) analyzing the risk of not achieving remaining failure and time to next failure goals. Having predictions of the extent that the software is not fault free (remaining failures) and whether it is likely to survive a mission (time to next failure) provide criteria for assessing the risk of deploying the software. Furthermore, fraction of remaining failures can be used as both an operational quality goal in predicting total test time requirements and, conversely, as an indicator of operational quality as a function of total test time expended.

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Software reliability models provide one of several tools that software managers of the Shuttle flight software are using to provide confidence that the software meets required safety goals. Other tools are inspections, software reviews, testing, change control boards, and perhaps most important—experience and judgement.

### **PUBLICATIONS:**

Schneidewind, N.F., “Reliability Modeling for Safety Critical Software,” *IEEE Transactions on Reliability*, Vol. 46, No.1, pp. 88-98, March 1997.

Nikora, A.P., Schneidewind, N.F., and Munson, J.C., “IV&V Issues in Achieving High Reliability and Safety in Critical Control System Software,” *Proceedings of the Third International Society of Science and Applied Technologies Conference on Quality in Design*, pp. 25-30, Anaheim, CA, 12-14 March 1997.

Schneidewind, N.F., “Standard for Software Reliability Engineering,” *Proceedings of the International Symposium on Software Engineering Standards 1997*, p. 287, Walnut Creek, CA, 1 June 1997.

Keller, T. and Schneidewind, N.F., “Successful Application of Software Reliability Engineering for the NASA Space Shuttle,” *Proceedings of the International Symposium on Software Reliability Engineering*, ISBN 0-8186-8221-3, pp. 71-82, 3 Albuquerque, NM, November 1997.

### **CONFERENCE PRESENTATIONS:**

Schneidewind, N.F., “Standard for Software Reliability Engineering,” International Symposium on Software Engineering Standards 1997, Walnut Creek, CA, 1 June 1997.

Schneidewind, N.F., “Successful Application of Software Reliability Engineering for the NASA Space Shuttle,” International Symposium on Software Reliability Engineering, Albuquerque, NM, 3 November 1997.

Schneidewind, N.F., “Software Reliability Standards-Status and Progress,” International Symposium on Software Reliability Engineering, Albuquerque, NM, 3 November 1997.

Schneidewind, N.F., “Measuring our Progress: The Reliability of Reliability Prediction?” International Metrics Symposium, Albuquerque, NM, 5 November 1997.

### **OTHER:**

Schneidewind, N.F., “Risk Analysis of Safety Critical Software,” Siemens Stromborg-Carlson, Florida Atlantic University, Department of Computer Science and Engineering, Distinguished Lecture Series, Boca Raton, FL, 10 April 1997.

Schneidewind, N.F., “Space Shuttle Reliability, Metrics, and Data Analysis,” NASA Systems Measurement and Benchmarking Workshop, University of Alabama, Huntsville, AL, 10 December 1997.

Schneidewind, N.F., “Introduction to Software Reliability with Space Shuttle Example,” Dallas-Fort Worth Chapter of the IEEE Reliability Society, Dallas, TX, 11 December 1997.

**DoD KEY TECHNOLOGY AREA:** Computing and Software

**KEYWORDS:** Software Reliability, Software Quality Metrics, Modeling

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## PROJECT SUMMARIES

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### A BLUEPRINT FOR RESEARCH IN DEFENSE ACQUISITION

**Keith F. Snider, Assistant Professor**  
**Department of Systems Management**  
**Sponsor: Naval Postgraduate School**

**OBJECTIVES:** To accomplish foundational work to make possible the development of a sensible and coherent body of research in the emerging field of defense acquisition and to propose a strategy and framework for Department of Defense investments in the conduct of acquisition research.

**SUMMARY:** This is a continuation of the Research Initiation Project which began in 1996 and which will be completed in mid-1998. During 1997, the work involved several areas: first, investigation of past acquisition research initiatives and analysis of why they have been ineffective; second, analysis of current trends, particularly reform initiatives, to assess their influence on possibilities for acquisition research; and third, investigation into the potential for applying the methods of "action research" in acquisition. In this last area, work from the investigator's doctoral dissertation, defended in April 1997, has been valuable.

**DoD KEY TECHNOLOGY AREA:** Other (Systems Acquisition Management)

**KEYWORDS:** Acquisition, Acquisition Research, Acquisition Reform

### DECISION SUPPORT FOR COMMAND AND CONTROL USING THE WORLD WIDE WEB

**Suresh Sridhar, Assistant Professor**  
**Department of Systems Management**  
**Sponsor: Naval Postgraduate School**

**OBJECTIVE:** The objective of this research was to explore how the World Wide Web (WWW) can be used to support various decisions related to Command and Control.

**SUMMARY:** A recent trend in the field of Information Systems is to exploit WWW technology to support planning, administration and control internal to an organization. This research explored the possibility of using the WWW as an aid to decision-making. It investigated new and innovative uses of WWW to facilitate information dissemination and sharing. Prototypes were developed for Destroyer Squadron Six, Mississippi and for 40<sup>th</sup> Infantry Division (Mechanized) of the California Army National Guard.

#### **PUBLICATIONS:**

Sridhar, S., "Decision Support Using the Intranet," *Decision Support Systems*, 1997 (in print).

Sridhar, S., "Network Management Using the World Wide Web," *Proceedings of the Fifth International Conference on Telecommunication Systems*, 334-338, Nashville, TN, March 1997.

#### **CONFERENCE PRESENTATION:**

Sridhar, S., "Network Management Using the World Wide Web," Fifth International Conference on Telecommunication Systems, Nashville, TN, March 1997.

#### **THESES DIRECTED:**

Heckroth, N. and Olson, T.M., "Garrison Based Intranet Prototype for the 40<sup>th</sup> Infantry Division (Mechanized)," Master's Thesis, Naval Postgraduate School, September 1997.

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Lenderman, C.C., "Developing a Waterfront Intranet," Master's Thesis, Naval Postgraduate School, September 1997.

Loewen, E.D. and Lunn, R.H., "Intranet for the Systems Management Department," Master's Thesis, Naval Postgraduate School, September 1997.

**DoD KEY TECHNOLOGY AREAS:** Command, Control, and Communications, Computing and Software

**KEYWORDS:** Decision Support, Command and Control, World Wide Web

### **EVALUATION OF KNOWLEDGE-BASED SOFTWARE ENGINEERING (KBSA) TOOLS AND REQUIREMENTS ENGINEERING IN KBSA**

**Suresh Sridhar, Assistant Professor,  
Department of Systems Management  
Sponsor: U.S. Air Force Rome Laboratory**

**OBJECTIVE:** The objective of this research is to develop an environment to support the capture of design rationale in knowledge based software engineering environment.

**SUMMARY:** This research has resulted in the development of a system to retain design rationale knowledge during the development of software systems. A prototype collaboration support system was developed that will permit the retention and re-use of design rationale knowledge. This research has applicability in areas such as software engineering, concurrent engineering, and joint task force planning processes. This approach has been validated in the context of large-scale systems development to elevate the process of systems maintenance to the level of specifications and the rationale behind their creation. The results of the study have implications for organizational learning as well as the capture and reuse of design rationale.

#### **PUBLICATION:**

Ramesh, B., Stubbs, C., Powers, T., and Edwards, M., "Requirements Traceability: Theory and Practice," *Annals of Software Engineering*, Vol. 3, 1997.

#### **THESIS DIRECTED:**

Walters, A., "A Remap TMS: Capturing Design Rationale and Providing Automated Reasoning," Master's Thesis, Naval Postgraduate School, September 1997.

**DoD KEY TECHNOLOGY AREAS:** Computing and Software, Other (Design Automation)

**KEYWORDS:** Design Rationale, Process Knowledge, Systems Development

### **KNOWLEDGE MANAGEMENT, PROTECTION, AND GROWTH: MOVING FROM TANGIBLE ASSETS TO POTENTIAL TRAJECTORIES**

**Mark W. Stone, Assistant Professor  
Department of Systems Management  
Sponsor: Naval Postgraduate School**

**OBJECTIVE:** The goal of this project is to investigate the relationships between the Government and private industry as those relationships are affected by the laws and regulations that govern the acquisition, management, and use of technology. The goal of this research is to address emerging ideas of identifying and managing knowledge as an important and valuable asset of an organization, especially the Government.

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## PROJECT SUMMARIES

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**SUMMARY:** As our industrial society moves through the technology age and into the information age, the nature of products is changing. Companies see themselves as knowledge companies when their products or their methods of developing their products relies more and more heavily on the knowledge base that the company has developed and refined. The knowledge worker is an integral part of this changing environment and is the worker who exploits the company's collective knowledge to more effectively and efficiently perform. If companies are seeing such value in their knowledge base, how long until that knowledge becomes not merely the basis for developing products, but becomes a product itself?

Knowledge is starting to be seen as an internal asset. It is knowledge and the exploitation of knowledge that gives a competitive advantage to the company that has found a way to collect, disseminate, control and exploit information. This system of information and the ability to make decisions about and with the information is a company's knowledge base. It is contained in the heads of employees, in artificial intelligence systems, and spread throughout the information-gathering networks of each company. But if this knowledge base is an asset then it must share some of the characteristics of other assets that the company relies on to make its profits.

In an industrial age society, assets are easier to identify and exploit. They are the raw materials, machinery, tools, jigs, work-in-progress, and completed products that can be described, controlled and exploited. More complicated are the intangible assets that we know as patents, copyrighted works, trademarks and trade secrets. Yet each of these assets can also be described, controlled and exploited almost as definitely as the tangible assets. If not, our society (through the courts) will not recognize asset status and allow a company or individual the right to control or exploit to the exclusion of others.

How does this apply to knowledge? Read the literature on knowledge assets and knowledge workers and the lack of consistent definition is glaring. If knowledge cannot be defined as an asset and properly identified, then how is society to grant it status as property? A patent is well defined as is a copyrightable work. They are defined in statutes. Any invention or work of authorship can be held to those definitions and given the status as one of these categories of property. That status means protection. That status means that the owner can exclude others from the benefits of the use of that property. The owner can sell or license the use of that property and realize an economic benefit. Trade secrets are a little more difficult. While there appear to be clear definitions in statutes and the common law, the applications of those definitions are less certain. Yet, still companies claim asset status for their trade secrets and sell or license others to use their benefits. A secret, however, is only protectable and valuable as long as it is kept a secret. It is subject to reverse-engineering and to inadvertent disclosure.

If knowledge is to be a primary basis for economic growth and health in the future, if knowledge itself is to be a product that can be bought, sold or licensed, it must first be defined as a category of asset—of property—that society is willing to protect. Current forms of property are well defined, but each is a static representation. Knowledge is, by its nature, dynamic—ever growing. How can the static definitions of currently-recognized assets be applied to knowledge? Perhaps it is time to rethink definitions of products and services and to think about what society will want or need to protect as valuable.

### **THESES DIRECTED:**

Howell, Robert, "Using 'Other Transactions' as an Effective R&D Contractual Vehicle," Master's Thesis, Naval Postgraduate School, December 1997.

Randall, Susan, "An Analysis of Reasons Commercial Entities Prefer Not to Participate in Defense Business," Master's Thesis, Naval Postgraduate School, December 1997.

Trulock, Troy E., "Analysis of Consolidating Defense Acquisition Information on the Internet," Master's Thesis, Naval Postgraduate School, June 1997.

**DoD KEY TECHNOLOGY AREA:** Other (Acquisition Management)

**KEYWORDS:** Knowledge Management

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## PROJECT SUMMARIES

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### CONTINGENCY FORCE POOL UNIT READINESS GEOGRAPHIC INFORMATION SYSTEM (GIS) ANALYSIS AND MODEL AUGMENTATION

George Thomas, Associate Professor

Daniel Dolk, Professor

Department of Systems Management

Sponsor: Office of the Chief of the Army Reserve

**OBJECTIVE:** To increase Contingency Force Pool (CFP) readiness by providing analysis and an enhanced, updated GIS capability for the management of CFP unit readiness.

**SUMMARY:** An Army Reserve Installation Evaluation System (ARIES) has been developed. ARIES is a computer based Spatial Decision Support System (SDSS) for the U.S. Army Reserve Troop Program Unit (TPU) relocation problem. ARIES models the complex unit relocation decision process utilizing twenty factors related to site desirability. Tasks that once required weeks of effort (data extraction, alternative site evaluations, and report generations) can now be completed in weeks. In addition to being a powerful SDSS for improving the way in which the TPU relocation decision is made, ARIES provides a flexible structure that can be applied to a wide range of resource allocation problems.

#### **PUBLICATIONS:**

Dolk, D., Murphy, M., and Thomas, G., "Integrating Decision Models and Geographic Information Systems," *Proceedings of the Western Decision Science Institute*, February 1997.

Dolk, D., Thomas, G., Murphy, M., and Falk, P. "Combining a Decision Model and GIS for SITE Location Problems," *Proceedings of the Western Regional Science Association*, March 1997.

#### **CONFERENCE PRESENTATIONS:**

Dolk, D., Murphy, M., and Thomas, G., "Integrating Decision Models and Geographic Information Systems," Western Decision Science Institute, Kona, HI, February 1997.

Dolk, D., Thomas, G., Murphy, M., and Falk, P. "Combining a Decision Model and GIS for SITE Location Problems," Western Regional Science Association, Kona, HI, March 1997.

#### **THESES DIRECTED:**

Dill, R., "Data Warehousing and Data Quality for a Spatial Decision Support System," Master's Thesis, Naval Postgraduate School, September 1997.

Murphy, M., "An Automated Spatial Decision Support System for the Relocation of Army Reserve Units," Master's Thesis, Naval Postgraduate School, March 1997.

**DoD KEY TECHNOLOGY AREA:** Modeling and Simulation

**KEYWORDS:** Decision Support Systems, Geographic Information Systems, Data Warehousing, Site location, Army Reserve, Readiness

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## PROJECT SUMMARIES

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### **DIVERSITY ANALYSIS FOR USN LEADERSHIP CONTINUUM**

**George Thomas, Associate Professor**  
**Department of Systems Management**  
**Sponsor: Naval Education and Training Command**

**OBJECTIVE:** To provide assessment of the diversity component of the Intermediate Officer module of the Leadership Continuum.

**SUMMARY:** During 1997 a two-week session of the Intermediate Officer module was attended. Additional CNET Leadership Continuum training in Navy Rights and Responsibilities and Command Training Team courses were attended. Data was gathered at the Annual Command Managed Equal Opportunity (CMEQ) workshop.

**DoD TECHNOLOGY AREAS:** Manpower, Personnel, and Training

**KEYWORDS:** Leadership, Diversity

### **UNIT READINESS IMPACTS OF UNSATISFACTORY PARTICIPANTS**

**George Thomas, Associate Professor**  
**Bob Barrios-Choplin, Visiting Assistant Professor**  
**Department of Systems Management**  
**Sponsor: Army Studies Program**

**OBJECTIVE:** To provide new and revised accessions and personnel policies for managing unsatisfactory participants in the U.S. Army Reserve.

**SUMMARY:** This project is ongoing. It has three components: 1) to profile USAR unsatisfactory participants, 2) to identify the determinants of unsatisfactory participation, and 3) to provide policy recommendations for reducing unsatisfactory participation. Phase 1 and 2 were completed in CY 1997.

#### **THESIS DIRECTED:**

Kominiak, A., "Determinants of Nonparticipation in the United/States Army Reserve," Master's Thesis, Naval Postgraduate School, December 1997.

**DoD KEY TECHNOLOGY AREA:** Manpower, Personnel, and Training

**KEYWORDS:** Attrition, Personnel Readiness, Army Reserve

### **MULTIPLE-CHOICE TESTS IN CLASSICAL AND MODERN TEST THEORY**

**Ronald A. Weitzman, Associate Professor**  
**Department of Systems Management**  
**Sponsor: Unfunded**

**OBJECTIVE:** Instead of considering guessing in responding to multiple-choice items as a nuisance to be ignored or to be estimated away, this research has aimed at taking advantage of guessing in attempts to solve some of the problems of both classical and modern test theory.

**SUMMARY:** This project began in about 1967. The first product developed in 1968 and published in a technical report that year was a formula for estimating the reliability of a multiple-choice test. This work ultimately appeared in a journal

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article in 1984. Two subsequent works have led to the development of methods of incorporating guessing in modern test theory without losing important advantages of classical test theory.

**PUBLICATION:**

Weitzman, R. A., "Classical Test Theory: Tying Up Loose Ends," submitted for publication in 1997.

**DoD KEY TECHNOLOGY AREA:** Manpower, Personnel, and Training

**KEYWORDS:** Multiple-Choice Testing, Item Response Models, Rasch Model

### EFFICIENT ESTIMATION OF POPULATION PROPORTIONS

**R.A. Weitzman, Associate Professor**  
**Department of Systems Management**  
**Sponsor: Unfunded**

**OBJECTIVE:** This research aims at estimating population proportions from small samples or subsamples, such as might result from breaking down a moderately large sample by demographic variables.

**SUMMARY:** This research began in the early 1970s as a project supported by the Navy Personnel Research and Development Center (NPRDC). The project was originally called "pattern analysis" and produced a number of FORTRAN computer programs and NPS technical reports. The most recent product is a work submitted for publication this year and cited below. This work provides an efficient method of estimating population proportions from small samples. The method is Bayesian and involves both point and interval estimation, different from conventional methods. In an example of the savings afforded by the method, a margin of error ( $\pm 0.04$ ) requiring a sample of 702 conventionally is obtainable by this method from a sample of only 285.

**PUBLICATION:**

Weitzman, R. A., "An Auto-regression Approach to the Estimation of Population Proportions," submitted for publication in 1997.

**DoD KEY TECHNOLOGY AREA:** Manpower, Personnel, and Training

**KEYWORDS:** Survey Research, Estimation of Proportions, Measurement Theory

### SEQUENTIAL TESTING FOR SELECTION

**R.A. Weitzman, Associate Professor**  
**Department of Systems Management**  
**Sponsor: Unfunded**

**OBJECTIVE:** This research aims at developing sequential item-sampling methods for selecting a person for school or work with pre-established error probabilities of acceptance or rejection. These methods involve the use of the sequential probability ratio test (SPRT).

**SUMMARY:** This research produced a publication in 1982. The method described in that publication required the use of large samples. The latest research on this method makes use of the Rasch model to reduce considerably the size of the samples required. This research is in progress.

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**DoD KEY TECHNOLOGY AREA:** Manpower, Personnel, and Training

**KEYWORDS:** Sequential Probability Ratio Test (SPRT), Sequential Testing for Selection, Rasch Model

### **PART AND PARTIAL CORRELATIONS IN STANDARDIZED TESTING**

**R.A. Weitzman, Associate Professor**  
**Department of Systems Management**  
**Sponsor: Unfunded**

**OBJECTIVE:** Continuing a career-long interest in part and partial correlations and regression analysis, this research has aimed at developing and applying part and partial correlations in the context of test validity and test fairness in personnel selection.

**SUMMARY:** This research produced a well-received publication in the mid-eighties indicating through part-correlation analysis that the test validities of standardized tests used for college admissions might actually be considerably higher than the data appeared to show. The current research focuses on a flaw in that earlier work: The usual part-correlation formula does not apply when the control variable is categorical, rather than quantitative. The current research develops the correct formula and examines the effect of the correction on the results obtained previously. The derivations are completed; only the writing remains to be done.

**DoD KEY TECHNOLOGY AREA:** Manpower, Personnel, and Training

**KEYWORDS:** Part Correlation, Categorical Variables, Scholastic Aptitude Test

## PROJECT SUMMARIES

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**PROJECT SUMMARIES**

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