

# *SUMMARY OF RESEARCH 1997*

**Department of  
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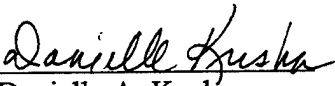
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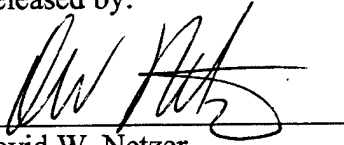
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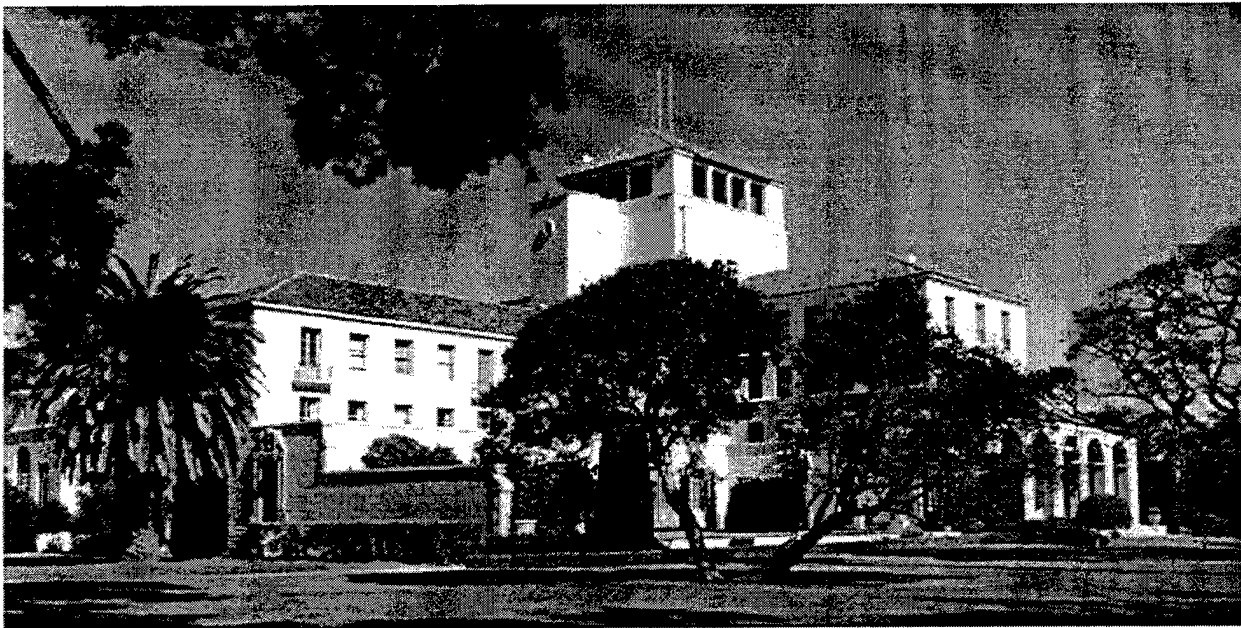
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## PREFACE

Research at the Naval Postgraduate School is carried out by faculty in the School's eleven academic departments, four interdisciplinary groups, and the School of Aviation Safety. This volume contains research summaries for the projects undertaken by faculty in the Department of Systems Management during 1997. Also included is an overview of the department, faculty listing, a compilation of publications/presentations, and abstracts from theses directed by the department faculty.

Questions about particular projects may be directed to the faculty Principal Investigator listed, the Department Chair, or the Department Associate Chair for Research. Questions may also be directed to the Office of the Associate Provost and Dean of Research. General questions about the NPS Research Program should be directed to the Office of the Associate Provost and Dean of Research at (831) 656-2098 (voice) or [research@nps.navy.mil](mailto:research@nps.navy.mil) (e-mail). Additional information is also available at the RESEARCH AT NPS website, <http://web.nps.navy.mil/~code09/>.

## INTRODUCTION

The research program at the Naval Postgraduate School exists to support the graduate education of our students. It does so by providing militarily relevant thesis topics that address issues from the current needs of the Fleet and Joint Forces to the science and technology that is required to sustain the long-term superiority of the Navy/DoD. It keeps our faculty current on Navy/DoD issues, permitting them to maintain the content of the upper division courses at the cutting edge of their disciplines. At the same time, the students and faculty together provide a very unique capability within the DoD for addressing warfighting problems. This capability is especially important at the present time when technology in general, and information operations in particular, are changing rapidly. Our officers must be able to think innovatively and have the knowledge and skills that will let them apply technologies that are being rapidly developed in both the commercial and military sectors. Their unique knowledge of the operational Navy, when combined with a challenging thesis project that requires them to apply their focussed graduate education, is one of the most effective methods for both solving Fleet problems and instilling the life-long capability for applying basic principles to the creative solution of complex problems.

The research program at NPS consists of both reimbursable (sponsored) and institutionally funded research. The research varies from very fundamental to very applied, from unclassified to all levels of classification.

- **Reimbursable (Sponsored) Program:** This program includes those projects externally funded on the basis of proposals submitted to outside sponsors by the School's faculty. These funds allow the faculty to interact closely with RDT&E program managers and high-level policymakers throughout the Navy, DoD, and other government agencies as well as with the private sector in defense-related technologies. The sponsored program utilizes Cooperative Research and Development Agreements (CRADAs) with private industry, participates in consortia with other government laboratories and universities, provides off-campus courses either on-site at the recipient command or by VTC, and provides short courses for technology updates.
- **NPS Institutionally Funded Research Program (NIFR):** The institutionally funded research program has several purposes: (1) to provide the initial support required for new faculty to establish a Navy/DoD relevant research area, (2) to provide support for major new initiatives that address near-term Fleet and OPNAV needs, (3) to enhance productive research that is reimbursable sponsored, (4) to contribute to the recapitalization of major scientific equipment, and (5) to cost-share the support of a strong post-doctoral program.
- **Institute for Joint Warfare Analysis (IJWA) Program:** The IJWA Program provides funding to stimulate innovative research ideas with a strong emphasis on joint, interdisciplinary areas. This funding ensures that joint relevance is a consideration of research faculty.

In 1997, the overall level of research effort at NPS was 151 faculty workyears and exceeded \$32 million. The Department of Systems Management's effort was 24.92 faculty workyears and exceeded \$4.1 million. The sponsored research program has grown steadily to provide the faculty and staff support that is required to sustain a strong and viable graduate school in times of reduced budgets. In FY97, over 87% percent of the NPS research program was externally supported. In the Department of Systems Management 87% was also externally supported.

The department's research sponsorship in FY97 is provided in Figure 1.

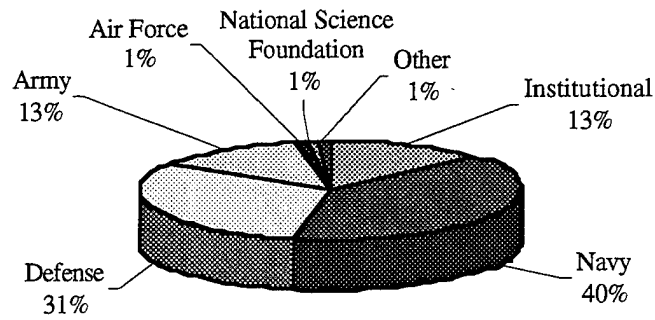


Figure 1. FY97 Sponsor Profile of the Department of Systems Management

These are both challenging and exciting times at NPS and the research program exists to help ensure that we remain unique in our ability to provide graduate education for the warfighter.

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January 1999

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## DEPARTMENT SUMMARY

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Systems Management is the largest academic department at the Naval Postgraduate School (NPS), with approximately 70 full-time faculty and 30 support staff. At any given time, there are over 400 students enrolled in one of Systems Management's graduate education programs. The department's mission is to "improve the managerial capabilities and leadership qualities of Naval and other officers, as well as government executives, through graduate education, research, and professional service"; further, Systems Management strives to "conduct a variety of research that supports military decision making, problem solving, and policy setting, improves administrative processes and organizational effectiveness, contributes knowledge to academic disciplines, and develops the quality of graduate education." Faculty research is an important component of System Management's mission, and it is integrated to the greatest possible extent with the educational process. Students are encouraged to participate in faculty projects, and faculty research results are typically incorporated in classroom instruction. The department's research efforts are augmented through its affiliation with the Institute for Defense Education and Analysis (IDEA) and by the participation of adjunct professors in many specialty areas.

### Functional Areas

The Department of Systems Management has primary responsibility for four academic programs. The largest program is a group of curricula in Systems Management. These curricula include Acquisition and Contract Management, Systems Acquisition Management, Financial Management, Manpower Systems Analysis, Material Logistics Support, Systems Inventory Management, Transportation Logistics Management, and Transportation Management. Graduates of curricula in the Systems Management Program receive the degree of Master of Science in Management, which is accredited by the National Association of Schools of Public Affairs and Administration. The other three programs for which the department is responsible are the Information Technology Management Curriculum, whose graduates receive the degree of Master of Science in Information Technology Management; the Resource Planning and Management for International Defense Curriculum, which awards the degree of Master of Science in International Resource Planning and Management; and a graduate program in Leadership Education and Development (for Company Commanders at the U.S. Naval Academy), which awards a Master of Science in Leadership and Human Resources Management. In 1998, academic divisions were reorganized and the Information Systems curriculum was transferred to the Division of Computer and Information Sciences and Operations. This discussion provides an overview of research in the Department of Systems Management during 1997.

In addition to resident graduate education programs, the Department of Systems Management also offers off-site educational programs through teleconferencing and on-site instruction. In 1997, course offerings via distance learning included programs in Acquisition Management, Information Technology Management, and Fundamental Management. Additionally, course modules were delivered as part of the department's BuMed Executive Management Education Program and the TRICARE Financial Management Executive Education Program.

Systems Management faculty are drawn from a wide variety of academic disciplines—including management, business and public administration, political science, economics, education, accounting, law, information systems, psychology, operations research, and other fields—to meet the demands of the department's diverse curricula. In addition, faculty represent a number of sub-disciplines within academic areas. For example, in 1997, faculty with doctorates in economics specialized in labor economics, econometrics, microeconomics, political economy, and public finance; faculty with graduate degrees in psychology included those with specialization in psychometrics, industrial/organizational psychology, clinical psychology, experimental psychology, social psychology, and military psychology. In total, there are over 100 academic sub-disciplines represented within the Department of Systems Management.

The department's diverse, multidisciplinary character is similarly reflected in the breadth and depth of issues addressed by faculty research, which has historically been concentrated in applied areas of interest to the Departments of Defense and Navy. The department's research program may touch upon 50 or more distinct topics within the course of a year. These topics and issues can be grouped into six functional areas, based on the department's curricula. In 1997, the department's six functional areas included the following:

*Acquisition and Contracting*  
*Logistics and Transportation*  
*Information Technology Management*  
*Financial Management*  
*Manpower Systems Analysis*  
*Organization, Management, and Policy Analysis.*

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### Planning For the Future: General Guiding Principles

As noted, research in the Department of Systems Management is multidisciplinary and often widely diverse; but, all research is directed toward a common set of goals. As stated in the department's mission statement, the department conducts a variety of research to:

- \*support military decision-making, problem-solving, and policy-setting;
- \*improve administrative processes and organizational effectiveness;
- \*contribute knowledge to academic disciplines; and
- \*develop the mission of graduate education.

The primary goal of the department's research program is to provide the Navy and DoD with the capability of managing defense systems efficiently and effectively. This includes the efficient and effective utilization of resources, which derive from an existing base of knowledge or may require the development of new concepts and theory. Thus, the department recognizes the importance to the Navy and DoD of both basic and applied research; and it seeks to create a balance of both types of research in its research program.

The department's research program goals are further specified as follows on the Systems Management "web" page ([http://web.nps.navy.mil\\_sm/research.html](http://web.nps.navy.mil_sm/research.html)):

- \*to apply the foundations of existing knowledge in support of resource utilization decisions;
- \*to develop new concepts or theory where no foundation of knowledge exists to support the policy decision-making process;
- \*to enhance the relevance of the department's instructional programs; and
- \*to involve the students in research, through their thesis work or class projects, in a manner that will enhance their decision-making capability.

Concepts, theory, and existing knowledge can generally be identified with a particular functional area or discipline. Actual resource utilization decisions or policies often require information or perspectives drawn from a variety of functional areas. Consequently, in addition to pursuing functional area research with a critical mass of faculty, the department actively seeks to engage in cooperative, interdisciplinary research. Such research places the department in a strong position to assist defense policy makers, since it allows for a coordinated, broad-based program under "one roof"—where researchers from diverse fields can share information and findings in a unified and truly systematic fashion.

### Planning for the Future: Research Opportunities by Functional Area

As the department prepares for the challenges of the future, it is appropriate to consider research fields that would help Systems Management achieve its program goals and simultaneously assist defense decision-makers. Potential fields of inquiry, or research opportunities for the future, are discussed below by each of the department's six functional areas.

*Acquisition and Contract Management.* Defense acquisition represents a process of critical importance to the military, not only to reduce taxpayer costs, but to ensure the quality and performance of today's increasingly sophisticated weapon systems. Nevertheless, negligible academic research has been applied to systematically investigate, understand, and model the acquisition process; and current innovations in this domain—such as process reengineering and acquisition reform—are uncoordinated, ad-hoc, and performed largely on a trial-and-error basis. This is the case because many acquisition policy makers and executives have little or no benefit of theory for practice.

The acquisition group's primary objective is outlined as a five-year program of multidisciplinary research, designed to address this dearth of acquisition theory. Generally, research objectives are directed at the following:

- \*basic theory-building research into critical questions;
- \*fundamental dimensionality and key attributes associated with defense acquisition; and
- \*exploring the integrated reengineering and reform of acquisition processes through the development of empirical models, prototyping of advanced technologies, and rigorous analysis of process innovations and regulatory reform.

This research represents seminal scholarly work in the area of defense acquisition and draws from expertise in accounting, contracting, economics, information systems, law, organizational design, public policy, and other academic disciplines. The research program also plans for contributions not only from the NPS faculty, but through collaborative research with other top-ranked universities outside DoD. This initial work can also help to establish both a precedent and the stan-

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ward for other research institutions to follow in terms of acquisition research; and it complements similar efforts by the department and NPS to reach beyond the customary, defense-oriented pool of researchers.

*Logistics and Transportation.* The primary mission of the Logistics and Transportation group is to educate military officers and DoD civilians in state-of-the-art concepts of logistics and transportation management. Emphasis is placed on understanding both military and non-military applications, so that students will be prepared to perform effectively in a military environment and interact efficiently with civilian contractors and suppliers. The general research perspective of the group is focused on improving DoD logistics and transportation performance as well as management effectiveness. Major research areas for the future include:

- \*DoD inventory policy;
- \*inventory and cycle time reduction;
- \*defense transportation and distribution systems;
- \*Total Asset Visibility (TAV) and real-time logistics/Transportation control;
- \*modeling and simulation for logistics decision support;
- \*reduction of manpower in aircraft and ship maintenance;
- \*aircraft Component Improvement Program (CIP); and
- \*sea-based logistics for the Navy and the Marine Corps.

*Information Technology Management.* The importance of information technology is widely recognized in DoD and the Navy. For many technical, economic, demographic, and political reasons, the U.S. must emphasize improved quality rather than quantity in its military force structure. Applications of computer technology offer one of the most important avenues for achieving such quality. This is manifested in the growing proliferation and power of "smart" weapons; and in increased reliance on command and control systems. Further, any fundamental improvements in the efficiency and effectiveness of managing the military services—for example, in logistics, human resource management, and financial control—will almost certainly require the use of computer-based systems. The most recent Defense Critical Technologies Plan selects 20 areas of technology that are regarded as the most critical in supporting the military needs of the U.S. Information technology is a direct or indirect ingredient in practically all of these critical areas.

The unique character and scale of DoD makes it especially difficult to implement successful information systems. There is yet a great deal to be learned about how systems can be improved, about how to develop them more rapidly and economically, and about how to cope with required organizational changes. Potential areas for future research by the information technology management group are aimed at resolving such issues. Specifically, three major research areas are targeted for the future:

- \*applied research in software engineering;
- \*decision support systems; and
- \*economics and management of information.

Applied research in software engineering continues to be an important field of study and particular strength of the Information Technology Management (ITM) group. The group's area of expertise comprises the following: project management, risk management, traceability, and the human and economic aspects related to software engineering. In the field of decision support systems (or DSS), the group has recently migrated its well-established expertise to developing multimedia, internet-deployable DSS components to support geographically-distributed organizations. The major research focus of the faculty in DSS centers on modeling and simulation, group decision and negotiation, and expert systems development. DSS technology is also being used to develop intelligent, computer-based education and training systems. Several of the ITM faculty are engaged in research relating to the economics and management of information. A number of quantitative and qualitative methods are used based on microeconomics, statistics, and social science to perform economic evaluation of information systems, ranging from cost-benefit analysis to reengineering of information technology.

*Financial Management.* Research in the area of financial management has become increasingly important since the end of the Cold War, as defense organizations "downsize" and policy makers exercise renewed efforts to gain maximum utility of

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shrinking resources at minimum cost. The Financial Management (FM) group has identified three major functional areas as targets of opportunity for future research. These are:

- \*financial resource policy formulation, analysis and management;
- \*financial management and budgeting; and
- \*cost analysis.

The first of these functional areas—financial resource policy formulation, analysis, and management—covers a range of sub-areas: national defense and national security resource policy and management; resource planning, programming, budgeting, and policy under the Planning, Programming, Budgeting System; and relationships between financial management, contracting, acquisition, and other policy fields. Financial management and budgeting includes the following: federal, DoD, and Navy budget formulation and execution; impacts of budget allocation, reallocation, and reduction; implementation of Defense Resource Management Systems; and the Chief Financial Officer Act and federal financial management reforms. The research area of cost analysis, in turn, covers the following: weapon systems and software cost estimation; resource requirement analysis; the cost of new technologies; and cost analysis of major system modifications.

*Manpower Systems Analysis.* As noted above, the primary goal of the department's research programs is to provide defense policy makers with the capability of utilizing resources with maximum efficiency and effectiveness. This includes *human* resources, the focus of research in the Manpower Systems Analysis (MSA) group. Defense manpower policy makers have been faced with many challenges since the end of the Cold War. Key among these challenges were a reduction of the active-duty force by over 30 percent, budget reductions in recruiting and advertising, a steady operational tempo and deployment schedule with fewer people, new missions, declining levels of public and congressional support for the military, increasing pressure to change the culture" of military service, renewed efforts toward population representation of women and racial/ethnic minorities throughout the force, a seemingly immovable, high rate of first-term attrition among new recruits, declining levels of personnel retention in certain critical areas, a number of high-profile "scandals," and others. As the active-duty force was reduced and missions changed, it soon became clear that a smaller military had to be even more skilled and adaptable than the one that witnessed the end of compulsory service and performed so successfully throughout the early 1980s and early 1990s. These challenges confronting defense manpower policy makers are recognized by the MSA group as opportunities for research that will have a lasting impact on the future of the force. MSA research areas for the future can be summarized as follows:

- \*manpower supply and force requirements;
- \*improvements in selection and classification of enlisted personnel;
- \*improvements in selection of officers and pre-commissioning programs;
- \*effectiveness of equal opportunity and diversity management programs;
- \*training effectiveness and efficiency;
- \*innovations in instructional technologies;
- \*personnel retention in critical fields;
- \*reduction of first-term attrition rates among enlisted personnel;
- \*force management programs and planning;
- \*force structure and cost analysis;
- \*career-force modeling;
- \*officer promotion and performance;
- \*civil-military relations and the All-Volunteer Force; and
- \*manpower management in Reserve components.

The MSA group also expects to continue looking at the future manpower needs of the military, similar to its previous research for the Army, the Office of the Secretary of Defense, and the Navy.

*Organization, Management, and Policy Analysis.* Faculty in this functional area pursue basic and applied research on key management issues at a variety of organizational levels. Faculty bring a strategic perspective to this work, seeking to identify courses of action that will best achieve organizational goals in a given setting. Individual faculty are acknowledged experts who publish leading-edge research on a variety of issues. Top management issues include strategic planning, stakeholder analysis, organizational design (including the use of self-managing groups), downsizing, and the development of culture. Human resource management issues include the design of strategic reward systems, managing gender and diversity issues, managing stress, forming career identities, and alternative strategies to training and education (including

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distance learning). There is a strong expertise in leadership at all organizational levels. Leadership issues studied by faculty include leadership development, the identification of key leadership skills, innovation and change, motivational strategies, empowerment, coaching, communications strategies, conflict management, entrepreneurship, and constructive uses of power. Faculty are also experts in a variety of research methodologies from highly sophisticated quantitative to in-depth qualitative analyses.

In addition to their subject area and methodological expertise, faculty have developed considerable knowledge of current military organizations through their research. Most of this work has been with Navy organizations, such as the Military Sealift Command, NAVAIR, CNET, Bureau of Medicine, and CINCLANTFLEET. However, faculty have also worked with organizations in other service branches, including extensive work with the U.S. Army Reserve Command and Coast Guard Headquarters. Recent DoD-wide research includes work for the 8th Quadrennial Review of Military Compensation. (Individual faculty have also consulted with state government agencies, the United Nations, and private-sector organizations.) Supervising student theses has broadened this knowledge even more. This organizational expertise increases the value of faculty as applied researchers for DoN and DoD organizations.

Generally, several research areas will be pursued in the future. These include:

- \*management of change in complex organizations;
- \*management of base closures and downsizing;
- \*diversity management;
- \*assessment of core values in a changing environment;
- \*organizational issues related to involvement in nontraditional missions or operations other than war;
- \*implementing Total Quality in DoD and the Navy;
- \*issues relating to managerial communication;
- \*leadership;
- \*intrinsic motivation (work-derived rewards);
- \*managing stress and emotion in organizations;
- \*strategic planning and management; and
- \*issues related to "reinventing" government.

### Research Labs and Centers

In 1997, the Department of Systems Management operated seven research labs: the Software Metrics Lab, the DecisionNet Lab, the Interoperability and Integration Lab, the Center for Organizational Computing, the Hands-On Networking Lab, the Database and Expert Systems Application Lab, and the Internet-to-the-Sea Lab. It is anticipated that these laboratories will be maintained.

In addition, during 1997, the Department of Systems Management was the "home" of five research centers: the Center for Information & Policy Analysis, the Software Metrics Center, the Center for Diversity Analysis, the Decision and Information Systems Center, and the Military Economic Strategy Center for Asia. The department expects to maintain these research centers over the near term; and it is likely that new centers will be established as the department's research program continues to develop.

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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

## PROJECT SUMMARIES

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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, 1977.

**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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**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.

## 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.

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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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### 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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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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### 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.

Reardon, 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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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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### 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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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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### **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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## PROJECT SUMMARIES

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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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**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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### 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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### 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 (CMEO) 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.

## PROJECT SUMMARIES

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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

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## 1997 THESIS ABSTRACTS

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### **USING WEB-BASED TECHNOLOGIES FOR NETWORK MANAGEMENT TOOLS**

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**Master of Science in Information Technology Management-June 1997**

**Advisor: Suresh Sridhar, Department of Systems Management**

**Second Reader: Rex Buddenberg, Department of Systems Management**

This thesis examines the recent developments in the application of Internet technology to the field of network management. Network management has become increasingly important and even critical for large organizations. The current solutions offered by the main network management vendors are very expensive, demand a lot of training, and have been implemented only in a centralized paradigm of management. New solutions to current network management tools problems may be found in the increasingly popular World Wide Web, Internet tools such as Java, and remote database access through the Internet, as well as an established user interface, which can be easily learned. The main advantage of this paradigm shift is the ability to provide any user in the organization with information about the network, as well as the ability to allow authorized users to handle a network problem from any machine or location. These new methods are examined with regards to the requirements of an ideal network management system, and the feasibility of implementing these methods, given current network configuration. A web-based network management prototype implementing a configuration management tool is described. New network management protocols are also investigated.

### **PLRS AND EPLRS: A CASE STUDY IN SYSTEM DEVELOPMENT AND POST DEPLOYMENT SOFTWARE SUPPORT**

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**Master of Science in Information Technology Management, December 1996**

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**Magdi Kamel, Department of Systems Management**

Software development and acquisition have been the Achilles' heel within the Department of Defense for many years. In spite of considerable oversight and the control exercised by many regulations and standards, there still exists significant problems in cost, schedule, and delivered capability within programs. This thesis looks at the acquisition of two software and firmware intensive programs, the Position Location and Reporting System (PLRS) and the Enhanced PLRS (EPLRS). Its primary focus is the transition of life cycle management of the software to the government post deployment software support (PDSS) activity. The acquisition of PLRS by the U.S. Marine Corps involved the acquisition of an unprecedented new technology and system capability never before attempted. As a result, the configuration management, testing, and transfer of the software maintenance support functions caused considerable problems at the PDSS activity. A number of the lessons from this experience were applied to the acquisition and development of the Army's EPLRS resulting in a more thorough statement of contractual requirements for the contractor, better understanding of the configuration management by the government, and the testing of the system under more realistic conditions to validate its abilities. The recommendation of this thesis will result in a smoother acquisition process, a more mature system at time of delivery to the government, and a more capable

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### **DEVELOPING WORLD-CLASS CUSTOMER SERVICE AT NAVY FIELD CONTRACTING ACTIVITIES: AN ASSESSMENT OF THE FISC SAN DIEGO REGIONAL CONTRACTS DEPARTMENT**

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**Master of Science in Management-June 1997**

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**Mark W. Stone, Department of Systems Management**

This thesis assesses the customer service ability of the FISC San Diego Regional Contracts Department. Utilizing both archival research and interviews, a service quality benchmark is determined and then applied to FISC San Diego Regional Contracts Department to assess service ability and identify areas for possible improvement. This assessment process highlights the recent emphasis on improved service quality both in the Federal Government and the private sector. The thesis defines world-class customer service and then describes various aspects of service quality including the customer's perspective on service, how service is delivered, how to effectively communicate with the customer, and how organizations can implement change to enhance their service quality.

### **PAST PERFORMANCE IN SUPPLIER CERTIFICATION PROGRAMS: A STUDY OF CURRENT CERTIFICATION AND INCENTIVE PRACTICES IN CERTIFIED SUPPLIER PROGRAMS**

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**Walter E. Owen, Department of Systems Management**

Since the mid 1980s both Government and private sector buying organizations have used certified supplier programs to improve the quality of their supplier base. Certified supplier programs improve a company's suppliers by requiring and recognizing excellent quality practices and by eliminating poor quality suppliers. This study examines current commercial and Government certified supplier programs, including the Army Contractor Performance Certification Program CP (2), in order to find successful certification techniques and recommend improvements to CP (2). Some of the better practices currently in use are: requiring a high level of past quality performance for certification, giving certified contractors more future business as an incentive for participation, and using ISO 9001 as the common standard for quality management processes. By adopting these techniques, the Army can improve CP (2) and make it an even more valuable program.

### **WEB-BASED NETWORK MANAGEMENT TOOLS FOR U.S. NAVY MISSION-CENTRIC APPLICATIONS**

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The purpose of this thesis is to propose a Web-based interface solution to the Navy's mission-centric network management needs. A Web-based interface provides an easy to manipulate, universal client that can be accessed from any desktop that is connected to the Internet. A Web-based interface can be designed to show decision-makers and managers the status of network-centric information and how it affects the mission of Navy units.

This thesis also briefly describes basic network management techniques and the use of the Navy's Automated Digital Networking System (ADNS). As the Navy adopts a network-centric approach for every day business, including warfighting, network management becomes extremely critical. Commercial products can't fulfill all Navy specific requirements. The

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use of the Web is a solution to provide mission-centric network management information to the manager and decision-maker in an easy-to-use environment.

### **THE FEASIBILITY OF IMPLEMENTING A PRIME VENDOR PROGRAM FOR LABORATORY SUPPLIES AND RELATED MATERIAL**

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**and**

**Francis E. Hanley-Lieutenant, United States Navy**

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**James A. Scaramozzino, Institute for Defense Education and Analysis**

In 1993, the Department of Defense (DoD) implemented an inventory reduction program for medical treatment facilities referred to as Prime Vendor (PV). This program was a new approach to the procurement and management of pharmaceutical and medical/surgical supplies. The results have been documented as an overwhelming success.

Typically, a medical treatment facility's laboratory department has the same type of inventory issues as a pharmacy. The products have a predictable usage rate and usually a short shelf life, overstocking typically occurs, a considerable amount of man power is applied to maintaining the stock, and information technology is not used to expedite order processing.

This research provides insight into the feasibility and effects of implementing a prime vendor program for laboratory supplies and related material. The findings show that many of the benefits realized in civilian industry and in the Pharmaceutical and Medical/Surgical Prime Vendor Programs can be realized in the medical treatment facility's laboratory departments with the creation and implementation of a Laboratory Prime Vendor Program.

### **EXPLOSIVE ORDNANCE DISPOSAL ASSOCIATE- AN EXPERT SYSTEM FOR LANDMINE IDENTIFICATION**

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Today there are over 110 million mines scattered across 60 countries, and these mines kill or injure more than 26,000 people annually. In order for deminers to remove these mines, they must be able to quickly and accurately identify them. Existing methods for landmine identification involve tedious searching through reference books.

This thesis presents an expert system for landmine identification, based on the set of thirty Bosnian mines from the MineFacts landmine database. The user is queried about the landmine, and heuristics are applied to the answers which are then used to calculate other information about the mine. This information is then filtered through decision trees to generate a small group of candidates which are displayed with a photo and confidence factor.

The system was modeled and tested using a Microsoft Excel spreadsheet. The system can narrow candidates to within two choices when all queries are correctly answered and to within three candidates when 70% of the queries are correctly answered. The results show that this technique has potential for all types of ordnance identification. A similar system could be implemented to cover all UXO for EOD use and as a reconnaissance tool by non-EOD trained individuals.

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### **THE PEACE PROCESSES OF COLOMBIA AND EL SALVADOR: A COMPARATIVE STUDY**

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Colombia and El Salvador, two Latin American countries, have developed similar counterinsurgency processes and started similar processes of peace negotiations, between the insurgent armies and the forces of order. One peace process was concluded in 1992, when El Salvador ended the war through a political solution (Peace Accords). Salvadoran insurgent force agreed to demobilize its Army and to become a legal political party, while the government accepted to make changes in the social and political structure. Colombia, after forty years of guerrilla warfare and after some failed peace talks during the last decade, is still trying to set conditions to gain peace through negotiations.

The thesis, while contrasting both general contexts, emphasizes their differences to explain the success of the peace process in El Salvador and the failure in Colombia. After comparing the political actors involved-the military and the guerrillas-, after studying the intensity of the conflict, and after analyzing the outcomes of the different peace processes, the conclusion was that the Salvadoran model of negotiation cannot be applied entirely to the Colombian case. Similarly, no government should try to copy the Salvadoran recipe as the remedy for its social and political problems. Any simplistic interpretation should be avoided, because it could lead to some fallacies that could also generate dangerous interpretations by the key actors in the process.

### **COST-BENEFIT ANALYSIS OF THE ENHANCED TRANSPORTATION SERVICE PROGRAM**

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This thesis is a cost-benefit analysis of the Enhanced Transportation Service (ETS) Program, which is a proposed initiative under the Marine Corps' "Precision Logistics" concept. The general focus of "Precision Logistics" is to provide the warfighter with the right thing, at the right place, at the right time, with the least amount of effort and cost (Hamilton, 1996). The specific focus of the ETS Program is to utilize premium transportation service (i.e., next day air) to reduce order ship time (OST), which will result in lower stockage levels. The intent of this study was to determine if the benefit derived from reduced stockage levels outweighs the additional cost of air shipment. This is intended to be the first in a series of studies of the ETS Program. The study was based on the requisitioning objective (RO) stockage level. A computer spreadsheet model of the RO formula was built and two Monte Carlo simulation runs conducted to determine if the ETS Program is cost effective. Results of the analysis suggest that the cost of premium transportation service is significantly less than the cost of additional inventory that would have to be carried if premium transportation were not utilized. Therefore, further research of the ETS Program is warranted. Recommendations on the direction of future studies are provided.

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### **PRIVATIZATION OF UTILITIES IN GOVERNMENT OWNED HOUSING: A MODEL APPROACH**

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**John E. Mutty, Department of Systems Management**

This thesis examines the option of privatizing electricity and gas utilities, requiring residents of Navy Family Housing (NFH) to pay for all consumption. To assist in the payment, an Utility Housing Allowance (UHA) would be provided to residents based on the average consumption of local Private Sector Housing (PSH) residents. The goal of this thesis is to determine if implementing an UHA would reduce the overall energy consumption in NFH. Specifically, it determines the historical usage of electricity and gas in the Naval Postgraduate School's La Mesa housing village (LMV) area and the local PSH areas. It then develops forecasting models for both areas to predict the future consumption of utilities, sets a baseline consumption rate for LMV residents, and identifies the savings that would be generated from implementing the UHA program.

After validating the forecasting models and comparing costs under the UHA concept, this study concludes that the UHA concept would save approximately \$268,300 annually at LMV alone. Additionally, in meeting the Navy's Year 2005 goal of reducing energy consumption by 30% per square foot, by implementing an UHA concept, the projected savings in LMV alone are approximately 50% per square foot/month. Although the study focuses on LMV, it is assumed that similar energy inefficiencies are being demonstrated in other NFH areas. Therefore, this study provides the necessary steps to conduct comparative analysis in other NFH areas.

### **A BUSINESS PROCESS MODEL AND REENGINEERING PLAN FOR THE STUDENT SERVICES DEPARTMENT OF THE MARINE CORPS INSTITUTE**

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This research is part of a year long project commissioned by the Marine Corps Institute to develop the architecture and supporting migration plan to transition from an existing legacy system to an open, client/server based relational database management system (DBMS) for the Student Services Department (SSD). The objective of this thesis is to develop the As-Is process model, redesign the processes to increase efficiency and reduce costs, and develop a To-Be process model to improve the current business processes. Additionally, data flow diagrams of the To-Be processes are developed to assist in prototype design and implementation. The DoD standard IDEF0 modeling technique is used for developing the process models. Implementation recommendations include: (1) adopting an ongoing reengineering strategy at MCI supported by the information Systems architectures, methodologies and CASE tools, and (2) utilizing a single database to facilitate data sharing among MCI departments, streamline processes, facilitate automaton, eliminate data redundancy, and improve customer service.

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### **APPLICABILITY OF SUBSISTENCE PRIME VENDOR TO CONTINGENCY RATIIONS**

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This study evaluates the Subsistence Prime Vendor program in the Armed Services and the Department of Defense (DoD). This thesis provides an assessment of Prime Vendor successes, concerns, and whether this program can be implemented for contingencies and contingency rations. Additionally, this study explores the use of Total Asset Visibility (TAV) in defining the interface between the military and commercial sectors.

Prime Vendor (and Direct Vendor) programs were initiated in 1993 to achieve cost savings in the supply and distribution of subsistence to DoD customers. The intent of the Prime Vendor program is to provide the military with an exceptional distribution and inventory control methodology. However, several critical issues remain unaddressed. Force preparedness and readiness in wartime remain nagging questions. Despite the momentum that this and other privatization efforts have gained, many of the benefits, specifically with respect to cost-savings, have not been fully identified or realized in "real" terms.

Current Total Asset Visibility (TAV) ventures and projects still fail to identify and articulate the interface between commercial and military logistics systems. Subsequently it is proposed that the interface between the military and civilian logistics structures must occur in CONUS (Continental United States) or at the wholesale level in-theater. The aggressive use of EDI (Electronic Data Interchange) can promote high levels of administrative efficiency and accuracy once this interface is established.

### **POTENTIAL IMPROVEMENTS IN DEFENSE COMMISSARY AGENCY (DeCA) DECISION MAKING IF GROCERY INDUSTRY FINANCIAL REPORTING FORMATS AND METHODOLOGY ARE UTILIZED**

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The Defense Commissary Agency (DeCA) holds a unique position within the Department of Defense (DoD) by being the only agency that runs a self-sustaining operation. As such, its operations run closely to that of the private sector, in particular the grocery industry.

DeCA currently utilizes a standardized federal reporting format for its three principal statements, per Office of Management and Budget guidelines. The Statement of Cash Flows is the only statement of the three whose format is conducive to providing beneficial information to an external user (Congress, citizens, etc.). The Statement of Financial Position and Statement of Operations (and Changes in Net Position) formats, on the other hand, provide useful information to the Office of Management and Budget, but not to the external user.

This thesis examines DeCA's financial statements and discusses the shortcomings of the two statements' formats. It further proposes new formats which are more aligned with grocery industry formats and conducts comparative analysis with two grocery firms and the grocery industry as a whole.

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### **FINANCING CONTINGENCY OPERATIONS IN THE NEW STRATEGIC ENVIRONMENT: ARE WE PROPERLY MATCHING RESOURCES WITH MISSION REQUIREMENTS?**

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The purpose of this study is to assess risks associated with the way in which U.S. armed forces contingency operations are financed. This assessment includes: (1) an analysis of the strategic operating environment. This analysis reveals significant post Cold War trends that suggest past methods of financing contingency operations are no longer appropriate. (2) A study of how contingency operations are currently financed and an assessment of the risks associated with these methods. This section tracks the flow of funds for three recent contingency operations. (3) A new approach to financing contingency operations to mitigate the risks associated with a changing strategic environment and more efficiently allocate resources.

The major findings are that the post-Cold War strategic environment is changing in ways that are likely to increase the frequency and scope of contingency operations. Current methods of financing contingency operations are highly controlled, inflexible and inadequate for meeting national security needs. Mission financing is an approach to resourcing contingency operations that facilitates adaptation to the needs of a changing strategic environment to provide a better match between resources and mission requirements.

### **THE EFFECTIVENESS OF VIDEOTELETRAINING AS A LEARNING MEDIUM**

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The Department of Defense (DoD) is implementing distance learning to augment and replace current military education and training programs.

Distance Learning (DL) methods using technology such as video teleconferencing (VTC) and the Internet are expected to provide immense cost and time savings when properly implemented and supported. Implementing a successful DL program requires a clear understanding of the unique interactions and characteristics of the technology, the environment, the roles of the instructor and students, and the appropriate instructional methods. Gaining a clear understanding of a successful program necessitates a framework to assess the effectiveness of distance learning programs. This research proposes a learning effectiveness model for distance learning. Model constructs include the learning effectiveness of instructor/students, interactivity, organizational characteristics, goals and technology. These constructs form the basis for the distance learning model. Three Naval Postgraduate School (NPS) DL courses are analyzed using the model to illustrate its flexibility and predictive nature. This analysis showed that the model's constructs interact to produce a system that supports a complex relationship. Interactions between technology, the environment, instructional techniques, student effectiveness combine to produce different outcomes. Feedback is an important system mechanism that allows verification that the course learning objectives are being achieved.

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## 1997 THESIS ABSTRACTS

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### COMMUNICATION APPREHENSION AND CONTRACT NEGOTIATIONS

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This research focused on communication apprehension (CA) as it relates to contract negotiations. A model was developed to examine what may affect one's CA in a contract negotiation situation. Survey data were gathered from 231 Government and 442 industry personnel (reflecting an overall response rate of 61%). The survey asked contract negotiators to complete the Personal Report of Communication Apprehension-24 (PRCA-24) along with six questions specifically related to negotiations. Additionally, the survey asked participants their opinions about factors affecting their anxiety level prior to and during the negotiation process, preparation, coping mechanisms used to offset anxiety and the type of resources they felt would be most beneficial (e.g., counseling, preparation, mock negotiations).

Results from the PRCA-24 showed a score 12 points less than the national average indicating that those in the contract negotiation field are less communication apprehensive than the norm. Differences between Government and industry were examined by individual factors, CA, negotiation factors, and outcome. Recommendations were made with respect to training, management support, preparation, preparation time, survey modifications, and further research.

### SEXUAL HARASSMENT POLICIES AND PROGRAMS IN THE MILITARIES OF THE TECHNICAL COOPERATION PROGRAM (TTCP) COUNTRIES

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This thesis examines the policies, programs, and scope of sexual harassment in the United States Navy and the military forces in The Technical Cooperation Program (TTCP) countries, (United States, New Zealand, Australia, Canada, and United Kingdom). It highlights the most effective approaches to eliminate sexual harassment and makes recommendations for improvement. Research was conducted on the information provided from all participating countries.

This thesis assesses the background surrounding sexual harassment, including initial recognition, associated watershed events, and the role of women; reviews each country's national and military sexual harassment policies; describes sexual harassment training and associated programs, assessment groups, measurement instruments, and scope of sexual harassment; analyzes the common themes that emerge and the international highlights of the most effective programs; and provides recommendations.

Several critical elements are highlighted in this study. These include the general approach taken by New Zealand and Canada; the Canadian Defense Force's training program and cultural change efforts; the U.S. Navy's prevention and command assessment program; and the Australian, Canadian, and New Zealand emphasis on a well-conducted investigation. The leading recommendation stresses the need for TTCP militaries to take the steps required to evoke a cultural change to affect the attitudes and perceptions of personnel.

## 1997 THESIS ABSTRACTS

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### **INVENTORY REDUCTION USING BUSINESS PROCESS RE-ENGINEERING AND SIMULATION MODELING**

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Inventory reduction is one of the most critical areas facing DoD in this era of diminishing resources and increasing global commitments. This thesis analyzes the concept of cycle time reduction as a significant method to reduce inventory levels. The order fulfillment process of a distribution center is analyzed using simulation modeling and business process reengineering (BPR) concepts. The two simulation models were designed and evaluated by measuring the cycle time of an order flowing through the distribution center. The results indicate that the cycle time of the order fulfillment process can be reduced by 90%, inventory levels reduced by 77%, with a labor savings of \$60,000. This was achieved by reengineering the order fulfillment process from a batch system to one that sends incoming orders directly to the warehouse for order selection. The implications for the DoD are critical to the goal of inventory reduction; by focusing on the reduction of cycle time, in-process inventories are also reduced. The use of business process reengineering and simulation modeling offer powerful tools to aid the manager in reducing cycle time and inventory levels.

### **GLOBAL BROADCAST SERVICE FOR THE EXPEDITIONARY WARRIOR**

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The battlefield has changed tremendously during the past decade due to major technical innovations. These changes have resulted in a requirement for high-speed, multimedia communications and greater bandwidth capabilities. Global Broadcast Service (GBS) technology is a military application of the commercial system Direct TV and is one way the military can address the need for greater bandwidth. Many of the two-way systems in the MILSATCOM architecture could be relieved of their burden by use of GBS. This thesis focuses on the Marine Corps and how its decision-makers can integrate GBS into the existing communications architecture. This is illustrated by using a Marine Expeditionary Unit as an example. This technology meets the warfighters need to have a high data rate, high volume information transfer available. Crucial to the successful integration of GBS into the communications architecture is ensuring that the MEU command ships, and other amphibious vessels in the Amphibious Ready Group, are equipped with the GBS receive suites during MEUs workup and deployment cycle. Finally, command and control issues are discussed and how GBS can expedite the decision making process.

### **MODELING ORGANIZATIONAL CONFIGURATION AND DECISION PROCESSES FOR INFORMATION WARFARE ANALYSIS**

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Nancy Roberts, Department of Systems Management**

For an organization to survive it must be able to adapt to its environment. A military organization operates in an environment that is constantly changing. The ability to model organizational configurations and organizational decision processes

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can assist the commander in adapting to the environment and understanding how a military organization is susceptible to Information Warfare (IW) attacks. First a commander must understand the concepts of Information Warfare Command and Control and the concept of organizational decision processes and how these permit an organization to adapt to its environment. Then the commander must determine what level of detail is necessary to model the organizational decision processes for its environment. Next the commander must analyze his model for configuration and decision processes. Using such commercially available software as Organizational Consultant and VDT the commander can identify any organizational misfits to the environment and the IW attack susceptibilities of the organizational decision processes. In the end, this approach demonstrates that it is feasible to model organizational configuration and organizational decision processes in an Information Warfare environment.

### **SUPPORTING DECISION AND NEGOTIATION IN AN INTERNET ENVIRONMENT: AN EXPERIENCE WITH NEGOTIATOR/I**

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The purpose of this thesis is to explore implementation of decision support on the Internet. The tremendous growth and popularity of the Internet presents researchers with opportunities to deploy DSS across geographic boundaries. To identify the requirements of an Internet-based DSS, this thesis discusses four traditional decision making models. The information collected from these models is applied to the creation of an Internet-based DSS. These models are the decision-making model, problem solving model, creative thinking model, and the negotiation model. From an implementation point of view, this thesis develops a prototype decision support system for negotiation using Java. Realization of the prototype suggests that a decision support system (DSS) can be implemented using Java provided the DSS meets certain design parameters.

### **ANALYSIS, DESIGN, AND IMPLEMENTATION OF A DATABASE MANAGEMENT SYSTEM FOR GENERATING TECHNICAL/MEDICAL REPORTS BY CHIROPRACTORS**

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A medical center specializing in chiropractic care is burdened with the enormous task of managing numerous patient's records, preparing error free billing statements, and writing official business/medical reports. This task requires increased attention of staff personnel. The burden of paper file management could be lessened through automation of record keeping, while increasing accuracy, efficiency, and effectiveness. Valuable time for the providers and secretary could be saved through elimination of excessive paperwork which they are required to prepare.

Based on the staff requirements, this thesis designs and implements a database management system. The primary objective is to automate the current manual system to allow providers to generate official medical reports. In addition to, this system will also store, sort, and compare data relevant to all patients while minimizing the need to maintain hard copy files. The Chiro Pro 97 (CP97) Database system is designed using Microsoft Access 97.

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### **MILITARY APPLICATIONS OF INTRANET TECHNOLOGY: FLEET NUMERICAL METEOROLOGY AND OCEANOGRAPHY CENTER**

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Intranets are rapidly becoming a corporate internal information-sharing medium. Intranet technology is the same robust, proven, industry standard technology that is used on the Internet. The technical aspects of implementing the technology are simple. The organization and management aspects are significant and are key to its successful implementation. This internal use of Internet technology is easy, inexpensive, and has produced savings and benefits for corporate organizations.

This thesis reviews corporate and government intranets and examines the feasibility of implementing this technology and benefiting from it, in a military organization. Specific applicability of intranet technology was examined at Fleet Numerical Oceanographic and Meteorology Center, while maintaining the vision of its applicability to other military organizations. Fleet Numerical Oceanographic and Meteorology Center has the requisite technical and organizational infrastructure necessary to successfully implement intranet technology. The management and technical skill sets necessary to successfully implement this technology at any military command operating a computer network should be available, or easily trained. Fleet Numerical Oceanographic and Meteorology Center and the U.S. Military should establish the organizational plans and infrastructure to implement and exploit this empowering information sharing medium.

### **A CASE STUDY OF THE MATERIALS MANAGEMENT DEPARTMENT AT THE NAVAL MEDICAL CENTER SAN DIEGO BENCHMARKING EFFORT**

**Pia S. Boston-Lieutenant, United States Navy**

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**Master of Science in Management-March 1997**

**Advisors: Linda E. Wargo, Department of Systems Management**

**Erik Jansen, Department of Systems Management**

This thesis sought to provide lessons learned, recommendations, and provoke thought among medical logisticians on the use of benchmarking. The researcher used a single case research strategy to assess how successful the Materials Management Department at the Naval Medical Center San Diego has been in implementing benchmarking as suggested by strategic objective 2.5.43 of the 1994 draft of the Navy Medical Logistics Strategic Plan. Information on the implementation of benchmarking in the Materials Management Department was based upon a questionnaire, document reviews, and direct observation. The research included reading and reviewing the current literature on benchmarking to compare private sector thinking with current practices in the Materials Management Department. The benchmarking case used the Ten-Step Department of the Navy Benchmarking Model and interview questions. The analysis and conclusions are based upon the initial research questions and the framework of the critical success factors for a benchmarking study. The results of the case suggest a cost-benefit analysis was done to purchase sterilization equipment.

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### **ANALYSIS OF THE MEDICAL AUGMENTATION PROGRAM**

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**Master of Science in Management-March 1997**

**Advisors: Alice Crawford, Department of Systems Management**

**James A. Scaramozzino, Institute for Defense Education and Analysis**

This thesis reviews medical readiness in the U.S. Navy. Data from multiple sources were used to analyze medical readiness issues. Analysis shows that Navy medical readiness needs to improve. Recommendations address the formulation of a readiness organization within the Military Treatment Facility (MTF). This organization would utilize the existing MTF organization and provide continuity, command involvement, and a means for continuous improvement.

### **APPLYING TECHNOLOGY TO MARINE CORPS DISTANCE LEARNING**

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**Advisors: Alice M. Crawford, Department of Systems Management**

**Hemant Bhargava, Department of Systems Management**

The purpose of this thesis is to investigate the application of technology to distance learning with the intention of recommending to the Marine Corps a feasible migration path away from its current correspondence program. Currently, the Marine Corps Institute (MCI) administers correspondence courses for both Occupational Skill Development (OSD) and Professional Military Education (PME). Automating and streamlining MCI processes is insufficient considering the pivotal importance distance learning plays in a Marine's career. Current application of technology to distance learning in education, business, and the military is discussed in light of information obtained through interviews, site visits, conferences, and the literature. A non-exhaustive list of tangible and intangible costs and benefits related to various distance learning technologies is provided, as well as a template for a distance learning decision making -process. The process can be used with decision support software to match requirements to technology and select appropriate migration paths through cost benefit analysis. This thesis recommends applying asynchronous methods to OSD courses and a combination of synchronous and asynchronous methods to PME courses. Finally, this thesis recommends changing the current structure and mission of MCI and consolidating its efforts with the College of Continuing Education under the Marine Corps University.

### **TECHNOLOGICAL AND ECONOMIC ASSESSMENT OF TELEMEDICINE:**

**AN EXAMPLE OF DOD MEDNET IN REGION THREE**

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**Second Reader: William J. Haga, Department of Systems Management**

The Department of Defense (DoD) has numerous initiatives underway to improve the health care delivery system within the military. Telemedicine is one of these initiatives that combine images, videos, sounds, and text to enhance the health care providers' ability to diagnosis and treat patients. The Secretary of the Army in October 1994 established the Center for Total Access as a laboratory for healthcare re-engineering in the military. This thesis is provided as a resource guide to inform those who may become involved with this complex and chaotic field of telemedicine by providing a review of state-of-the-art technology that can support delivery of telemedicine, and by proposing a cost benefit framework for telemedicine configuration design. The material for this thesis was primarily researched utilizing Internet web browsing technologies. A review of the In-Service Infrastructure Management Program Office (TIMPO) project (MEDNET) is outlined as working example of a large regional telemedicine/ telehealth system which was found to be the most revealing in the study of telemedicine.

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### **AN ANALYSIS ON THE EFFECTS OF THE AIRCRAFT SERVICE PERIOD ADJUSTMENT (ASPA) PROGRAM ON THE DIRECT COSTS OF STANDARD DEPOT LEVEL MAINTENANCE (SDLM) FOR THE F-14A**

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**Donald Eaton, Department of Systems Management**

In 1984 the Navy implemented the Aircraft Service Period Adjustment Program (ASPA) which was designed to induct aircraft into Standard Depot Level Maintenance (SDLM) only after they fail to meet certain criteria during an inspection. This thesis used regression analysis to explore the relationship between time F-14A aircraft serve in tour and the direct costs of the corresponding SDLM.

Almost every year of ASPA, the average direct labor and material costs of F-14A SDLM have increased, rising from \$763,571 in 1985 to a high of \$1.68 million in 1993. However, this analysis shows that only a weak correlation exists between the number of months an aircraft spends in tour and the direct costs of SDLM. A multiple regression model including additional variables such as aircraft age, tour number, whether a modification was performed concurrently, and work standard was found to explain 57 percent of the variation in the direct costs of SDLM. The effect of time in tour was insignificant.

### **CONNECTIVITY FOR UNDERWAY COAST GUARD PATROL BOATS**

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**Second Reader: Rex Buddenberg, Department of Systems Management**

This thesis examines the U.S. Coast Guard patrol boat's ability to effectively exchange operational data while underway. The patrol boat is currently unable to obtain tactical law enforcement information from the central Law Enforcement Information System II (LEIS II) database while on patrol. LEIS II provides access to law enforcement information from Coast Guard, FBI, and state and local law enforcement agencies. Availability of this information will alert the boarding team of potentially dangerous situations and heighten their awareness during the boarding, allowing for a safer boarding.

This thesis evaluates the current state of the patrol boat's communication system and recommends a solution to its current needs. Current and proposed satellite communication systems are evaluated using the Analytic Hierarchy Process (AHP). Pairwise comparisons are made of multiple decision criteria and the alternatives to obtain a recommended solution.

The conclusion of this study is that the patrol boat's future requirements will far exceed the bandwidth available from current satellite systems. Broadband mobile communication systems such as Teledesic and Spaceway are currently under development and show promise. Until broadband service is available, Iridium should be adopted as the solution to the patrol boat's current needs.

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### **RE-ENGINEERING DOD THROUGH ENTERPRISE-WIDE MIGRATION TO OPEN SYSTEMS**

**Robert A. Cameron-Lieutenant, United States Navy**

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The Department of Defense cannot afford to develop and deploy information systems that have no growth potential. Legacy systems must be replaced with flexible, highly interoperable systems that produce high residual values. With shrinking budgets, depreciation of existing hardware, and rising maintenance of legacy systems, organizations must deploy systems that are capable of evolving with changing business requirements.

The Department of Defense enterprise vision for information management (IM) emphasizes integration, interoperability, flexibility, and efficiency through the development of a common, multi-purpose, standards-based technical infrastructure. This vision requires a new paradigm for building information systems.

The new paradigm relies on open systems, which make it easier, less expensive, and faster to develop and change applications and to employ new technology features. This research examines open systems and provides a strategy for organizations to migrate to them. A case study of the Naval Postgraduate School illustrates the strategy. Provisionally, a prototype application models the desired characteristics of an open system.

### **COST SAVINGS AND OTHER BENEFITS FROM TRANSFERRING NAVY FAST COMBAT SUPPORT SHIPS TO THE NAVAL FLEET AUXILIARY FORCE**

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**Paul J. Fields, Department of Systems Management**

The U.S. Navy's Fast Combat Support Ships (AOEs), which are the largest and most powerful logistics ships in the world, are designed to meet all of the logistical needs of an Aircraft Carrier Battle Group. Without an AOE, a battle group would lack the logistics support that it requires to perform its crucial missions of global presence, power projection and sea control. Yet today, battle groups must perform these missions with smaller budgets than in the past. To relieve some of this fiscal pressure, the AOEs could be transferred to the Military Sealift Command's Naval Fleet Auxiliary Force (NFAF), whose civilian-crewed ships operate at a lower cost than Navy ships. Transferring the AOEs to the NFAF could save an estimated \$140 million per year.

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### **TESTING EFFECTIVENESS OF GENETIC ALGORITHMS FOR EXPLORATORY DATA ANALYSIS**

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Second Reader: William J. Haga, Department of Systems Management**

Heuristic methods of solving exploratory data analysis problems suffer from one major weakness - uncertainty regarding the optimality of the results. The developers of DaMI (Data Mining Initiative), a genetic algorithm designed to mine the CCEP (Comprehensive Clinical Evaluation Program) database in the search for a Persian Gulf War syndrome, proposed a method to overcome this weakness: reproducibility — the conjecture that consistent convergence on the same solutions is both necessary and sufficient to ensure a genetic algorithm has effectively searched an unknown solution space. We demonstrate the weakness of this conjecture in light of accepted genetic algorithm theory. We then test the conjecture by modifying the CCEP database with the insertion of an interesting solution of known quality and performing a discovery session using DaMI on this modified database. The necessity of reproducibility as a terminating condition is falsified by the algorithm finding the optimal solution without yielding strong reproducibility. The sufficiency of reproducibility as a terminating condition is analyzed by manual examination of the CCEP database in which strong reproducibility was experienced. Ex post facto knowledge of the solution space is used to prove that DaMI had not found the optimal solutions though it gave strong reproducibility, causing us to reject the conjecture that strong reproducibility is a sufficient terminating condition.

### **NETWORK MANAGEMENT PRACTICES: AN EMPIRICAL ANALYSIS**

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and**

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**Master of Science in Information Technology Management-September 1997**

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Second Reader: Tung Bui, Department of Systems Management**

As organizations continue migrating mission critical applications and business processes to distributed computing environments, network utilization and the number of bandwidth-intensive applications will continue increasing. Costly network infrastructure upgrades are forcing organizations to explore alternative management methodologies for addressing bandwidth congestion control. In an era of stagnant budgets and increasing IT requirements, DoD is no exception. The enactment of the Information Technology Management Reform Act of 1996 mandates investigating cost-effective ways of managing 21st Century network resources.

This thesis reviews traditional computing resource management and how resource management has changed with the addition of bandwidth as a decision variable. It then investigates current network management practices determined from a sample of business-sector organizations, academic institutions, and military installations, focusing on prioritization and chargeback as bandwidth controls. It then examines the future of prioritization and chargeback technologies and their potential impact on future DoD network operations.

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### **IMPLEMENTATION ISSUES FOR THE INITIAL DEPLOYMENT OF THE PERFORMANCE AND CALIBRATION MODULES OF THE MK 92 MOD 2 FIRE CONTROL SYSTEM MAINTENANCE ADVISOR EXPERT SYSTEM**

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The MK 92 Mod 2 Fire Control System (FCS) is a complex, maintenance intensive shipboard weapon system found primarily aboard the Oliver Hazard Perry class guided missile frigates (FFG-7). This system, based on 1970's technology, frequently requires extensive troubleshooting and supplemental support from shore-based technical experts. A maintenance advisor expert system (MAES) is being developed by the Port Hueneme Division of the Naval Surface Warfare Center (NSWC-PHD) and the Naval Postgraduate School (NPS) to assist the Fire Control technicians aboard ship to better isolate faults in the MK 92 Mod 2 FCS.

This thesis furthers the efforts of the project at NPS by investigating key implementation issues that will affect the deployment of the initial version of MAES to the fleet. Additional deployment issues addressed in the thesis include incorporating lessons learned from deploying other expert systems in the armed forces, gaining support from individual chains of command, training MAES users effectively, involving MAES users in the implementation process, and changing hardware implementation issues. A training plan, implementation plan, and updated MAES user's manual for the initial deployment are included.

### **ANALYSIS OF TRANSFERRING U.S. NAVY PERRY CLASS FRIGATES TO TURKEY AND ISSUES RAISED DURING THE PROCESS**

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**Keith Snider, Department of Systems Management**

This thesis analyzes the process used to transfer U.S. Navy Perry class frigates to Turkey and issues raised during this transfer process. Up to the final step, this transfer was representative of most U.S. military equipment transfers. The relations between allied countries depend heavily on the mutual support they provide to each other. Strong relations create strong mutual support, or vice versa. Although the FMS/FML process is a very effective process for ship transfers, political issues must never be underestimated. As the Cold War came to an end, the mutual threat had changed, affecting alliances and rephrasing the causes of their existence. The effect of this change has caused more domestic oriented policies to predominate within a country's political system.

Although this policy change didn't cause procedural changes in regulations and rules, the application of the decisions given and approved by the highest executive and legislative branch authorities are now more subjective and seem unpredictable. Long-term and continuous repetition of this behavior could cause negative impact on alliances.

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### **USING AN EVOLUTIONARY ACQUISITION STRATEGY TO IMPROVE THE SYSTEM ACQUISITION PROCESS: A CASE STUDY OF THE REMOTE MINEHUNTING SYSTEM**

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This thesis discusses the need for a mine countermeasure capability integral to the surface navy and the acquisition strategy used to produce the Remote Minehunting System (RMS). Directed to develop a system quickly and given a limited budget, the Program Executive Officer Mine Warfare formulated an acquisition strategy that used existing commercial technology to provide the core capability for the RMS. The acquisition strategy also planned for the upgrade of the core capability through a series of pre-planned product improvements. The evolutionary acquisition (EA) strategy enabled the Navy to test the RMS concept aboard the *USS John Young* and the *USS Cushing*.

The thesis compares the EA strategy with the traditional model and concludes that the EA strategy uses the same framework as the OMB A-109 model. Additionally, use of EA concepts such as pre-planned product improvement, early fielding and testing of a core capability, and user involvement are compatible with current laws and regulations. Finally, the thesis concludes that program managers are inhibited from using innovative techniques to reduce cycle time by cultural and technological barriers throughout the system acquisition process.

### **A DICTIONARY OF ACQUISITION AND CONTRACTING TERMS**

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**Advisors: David V. Lamm, Department of Systems Management**

**David A. Smith, Department of Systems Management**

This thesis is part of a joint research project between students of the Naval Postgraduate School in Monterey, CA and the Air Force Institute of Technology, Wright-Patterson Air Force Base, Dayton, OH. The purpose of the research is to establish working definitions for commonly used contracting and acquisition terms and phrases. Twenty-five terms were selected from a master list compiled by previous researchers. Contracting literature and regulations were researched to identify published definitions. The published definitions were used to develop a synthesized definition for each of the 25 terms. The synthesized definitions were submitted to contracting professionals for examination and comments. The acceptability of proposed definitions was based upon consensus and the input from respondents was used to develop a refined definition.

### **THE EFFECTS OF PRE-SERVICE CRIMINAL HISTORY ON RECRUIT PERFORMANCE IN THE U.S. NAVY**

**Jeffrey W. Connor-Lieutenant Commander, United States Navy**

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**Stephen L. Mehay, Department of Systems Management**

The purpose of this thesis is to determine the potential gain from using information from state criminal history files as a screen for enlistment. Additionally, two more fundamental questions are addressed. First, what is the level of pre-service criminal behavior in the recruit population and to what extent is it "hidden" from the Navy? Second, does pre-service criminal behavior affect first term performance, and if so, how large is the effect? The data examined are composed of MEPCOM personnel files combined with state criminal history records which allow determination of recruits' actual recorded criminal backgrounds. Four measures of recruit success are identified: first-term unsuitability attrition; promotion to paygrade E-4; reenlistment eligibility; and retention beyond EAOS. Employing cross-tabulations and logit models, this

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research compares the effects of juvenile versus adult offenses, felony versus non-felony offenses, and convictions versus arrests on the likelihood of success. The results indicate that a moral waiver process relying on self-disclosure may not be effective in identifying an individual's criminal background and that recruits with pre-service criminal histories are more likely to attrite for unsuitability and are less likely to promote to E-4, be reenlistment eligible, or remain in the Navy beyond their EAOS. This study suggests adult felony criminal histories are effective predictors of future recruit success and recommends using state criminal information in the recruit selection process.

### **CLASSIFICATION, SEARCH, AND RETRIEVAL IN A MULTI-VARIABLE, MULTI-LEVEL TAXONOMY: APPLICATION TO DECISIONNET**

**Christopher M. Corgnati-Lieutenant, United States Navy  
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The explosion of information available on global computer networks underlines the need for effective repositories that facilitate organization of, and search for, information. These digital repositories may contain simple data, or increasingly, objects of other types such as software and decision models. A taxonomy can be thought of as a navigational aid to a repository. Organization of objects may take place along multiple dimensions, each of which may have a taxonomy of classification terms that spans many levels.

This thesis examines the design and development of a WWW based Classification, Registration, Search, and Retrieval System. The system was applied and tested on the DecisionNet project which is an electronic brokerage house for decision technologies. In order to facilitate user interaction via the WWW the system was designed to be run through a standard web browser. A graphical user interface was developed in Java. The back-end functions for data management, search and retrieval were also programmed largely in Java.

### **RELOCATING DEFENSE LOGISTICS AGENCY STOCK AT CLOSING AND DEACTIVATING WAREHOUSES**

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**Master of Science in Management-December 1996**

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In the past five years, the Base Realignment and Closure Commissions (BRAC) have ordered the Defense Logistics Agency (DLA) to close or deactivate 15-20 distribution centers. Consequently, DLA has been forced to relocate millions of items of wholesale stock to the remaining depots. Past relocation actions have placed most, if not all, displaced stock at one of the Primary Distribution Sites in Susquehanna, PA and at San Joaquin, CA without regard to the expected location of demand for that stock. A method is presented for relocating stock that places stock near its expected demand points, thus reducing future delivery costs and logistics response time.

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### **AN ANALYSIS OF THE UNITED STATES SPECIAL OPERATIONS COMMAND'S ACQUISITION PROCESS TO DETERMINE ITS COMPLIANCE WITH ACQUISITION REFORM INITIATIVES OF THE PAST DECADE**

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**Linda E. Wargo, Department of Systems Management**

The United States Special Operations Command (USSOCOM) is a vital component of our nation's defense that is called upon daily to accomplish a wide variety of unique and challenging missions throughout the world. A critical element of USSOCOM's success is its ability to acquire the finest equipment available to achieve these missions. This research analyzes USSOCOM's acquisition process to determine its level of success at delivering this equipment, and focuses primarily on its ability to incorporate acquisition reform initiatives of the past decade into the process. In developing this analysis, the following areas are discussed: the roles and missions of USSOCOM, acquisition reform initiatives of the past decade beginning with the Packard Commission, the findings and recommendations of the USSOCOM Acquisition Process Action Team Report and the acquisition process at USSOCOM.

Based on the research conducted, it is clear that, overall, USSOCOM has done a superb job incorporating reform initiatives into its acquisition process. Areas determined to be non-compliant relate primarily to the concept of empowerment of the Program Executive Officers (PEO). Recommendations for correcting these weaknesses include giving PEOs the authority to execute reprogramming and realignment in accordance with established legal thresholds.

### **ANALYSIS OF PRIVATIZATION OF THE JACKSONVILLE MILITARY COMPLEX'S POTABLE WATER DISTRIBUTION SYSTEMS**

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**Master of Science in Management-December 1996**

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**Second Reader: Janice Menker, Department of Systems Management**

Privatization of Department of Defense utility systems has become a central issue. It is seen as a way to relieve the Services of their current burden of huge maintenance and repair backlogs for aging systems. This thesis performs an economic analysis to determine whether it is economically feasible to privatize the Jacksonville Military Complex's potable water distribution systems. To address this issue, current legislation affecting utilities privatization was studied. Interviews were conducted with representatives of the Army, Navy, and Air Force regarding their current utilities privatization efforts. A case study of NAVWEPSTA Earle was used to provide the framework in which the Jacksonville decision should be made. Data was gathered from NAS Jacksonville, NAS Cecil Field, and NAVSTA Mayport to calculate their annual water consumptions and the current plant value of their water systems. The systems' current plant value was obtained from NAVFAC's P164 and adjusted for accumulated depreciation to provide the net current cost of the systems. These figures were used to derive the net present value of both the status quo scenario and the privatization scenario. Based upon the net present value calculations, privatization of the systems is recommended.

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### **THE TRICARE MANAGED CARE SUPPORT CONTRACTS—AN ANALYSIS OF THE BID PRICE ADJUSTMENT AND RESOURCE SHARING MECHANISMS**

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DoD health care costs are escalating rapidly. Managed care is one way to control costs effectively while maintaining, or increasing, quality and accessibility of care. The TRICARE Program has transformed CHAMPUS from being a fee-for-service system to a managed care organization. DoD understands that to run a smaller more efficient health care system effectively, it must continue to pursue managed care. TRICARE must continually improve on health care delivery methods. This starts by implementing an effective, well-constructed contract.

This thesis examines the unique features of the Tri-Service Coordinated Care (TRICARE), Managed Care Support (MCS) contracts. Specifically, it answers the question—What are the unique characteristics of the military's TRICARE MCS contracts, and are they functioning sufficiently to achieve the objectives of the TRICARE Program? In answering this question, the bid price adjustment (BPA) and risk sharing mechanisms are analyzed. The TRICARE Program is compared to past military health care programs, and the considerations which led to the inclusion of the bid price adjustment (BPA) and risk sharing mechanisms are examined. Finally, a working-level perspective of the problems with these unique mechanisms is presented, and recommendations are made to improve the next generation of TRICARE MCS contracts.

### **A FAULT MANAGEMENT SYSTEM (FMS) ARCHITECTURE FOR THE NAVAL COMPUTER AND TELECOMMUNICATIONS AREA MASTER STATIONS (NCTAMS)**

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William J. Haga, Department of Systems Management**

The Joint Fleet Telecommunications Operations Center (JFTOC) acts, on behalf of the Naval Computer and Telecommunications Command, as the fleet's "one-stop shop" for information services. Effective fault management is vital to ensuring reliable network service. Currently, however, the JFTOC employs a Fault Management System (FMS) that consists primarily of manual processes and non-networked resources. Users require a system that provides a centralized and accessible source of near-real time fault management information.

This thesis uses the methodology of the Department of Defense (DoD) Technical Architecture Framework for Information Management (TAFIM). TAFIM outlines a structured approach for migrating legacy systems to a systems, standards-based target architecture.

Through application of the TAFIM process, a target FMS architecture, termed HelpDesk On-Line Information System (HOLIS), is developed. HOLIS includes: the existing NCTAMS classified local area network and SIPRNet infrastructure; network operating system, office automation, e-mail and database software from the interim Navy Automated Information System Standards list; and commercial off-the-shelf help desk software. Four migration paths are outlined, and one is selected as the best option for moving from the baseline system to the target FMS.

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### **AFFECT OF CONTRACTOR'S ESTIMATING SYSTEM DEFICIENCIES AND DISAPPROVALS ON DOD PROCURING CONTRACTING OFFICERS**

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**David V. Lamm, Department of Systems Management**

Contractor estimating systems that produce reliable proposals are a key safeguard for the Government to obtain fair and reasonable contract prices for goods and services. Government Administrative Contracting Officers (ACO), with the help of the Defense Contract Audit Agency (DCAA), are responsible for determining the adequacy of contractor's estimating systems. If a DCAA audit finds estimating systems deficiencies, the ACO may take several actions including disapproving the contractor's system, in part or in whole. The process of formal disapproval and deficiencies resolution is a series of contractor written responses, corrective action plans, and ACO evaluations. This process can take years before a final determination is made. This thesis will focus on how the Procuring Contracting Officer (PCO) obtains the information about deficiencies or disapproval and what actions he/she takes to ensure the Government is receiving a fair and reasonable price for the goods and services it buys.

### **AN ANALYSIS OF CONTRACTS AWARDED IN THE FACE OF A NEGATIVE PREAWARD SURVEY RECOMMENDATION**

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**Danny A. Shockley, Department of Systems Management**

The purpose of this thesis is to examine the Department of Defense Preaward Survey process and assess its effectiveness as a source selection and risk management tool. This is accomplished by identifying the primary causes of negative Preaward Survey recommendations, determining how Procuring Contracting Officers use this information in source selection and examining the Department of Defense's experience with contracts awarded in the face of a Negative Preaward Survey.

The data for this research were gathered by reviewing Preaward Survey files and interviewing contract administration office personnel at Defense Contract Management Command (DCMC) and Defense Logistics Agency Headquarters. Personnel from various buying activities throughout the Department of Defense were also interviewed.

This thesis concludes that the Department of Defense Preaward Survey process is operating at a reasonable level of efficiency and effectiveness, but that improvements could be made to its use as a source selection and risk management tool. This conclusion is based upon findings that Preaward Survey information is being utilized effectively for contractor responsibility determinations. However, it was noted that Preaward Surveys are not always useful to facilitate source selection decisions and that Preaward Surveys are not being fully utilized as a risk management tool during preaward and post-award contract management. In addition, this thesis presents ten recommendations for further improvements to the Preaward Survey process.

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### **DATA WAREHOUSING AND DATA QUALITY FOR A SPATIAL DECISION SUPPORT SYSTEM**

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**George W. Thomas, Department of Systems Management**

**Kathryn Kocher, Department of Systems Management**

This research investigates the problems inherent in Decision Support Systems (DSS) that depend on the quality and accuracy of legacy information as the basis for decision-making. A Spatial Decision Support System (SDSS) was developed at Naval Postgraduate School to analyze the comparative desirability of Army Reserve Unit locations. The Army Reserve Installation Evaluation System (ARIES) integrates a GIS mapping engine and a decision model solver in a flexible environment that leverages operational legacy database information for decision-making.

Data quality problems from legacy sources motivated the development of a data migration plan to transform the source data into an architecture optimized for the ARIES SDSS application. This research developed a prototype Data Migration Tool (DMT) to extract the relevant source data into a centralized repository for the SDSS with an acceptable degree of data quality to support SDSS outcomes. Six data quality attributes were identified: accuracy, completeness, consistency, timeliness, uniqueness, and validity. The ARIES DMT focused on data validity and developed techniques for measuring and enforcing data validity. The DMT also specified individual responsibilities for data administration, development of data retrieval routines, and data quality assessment.

Significant system performance enhancements resulted from implementation of the DMT by leveraging the spatial aspects of the underlying repository through geographic queries that efficiently localized subsets of the data files. Additional performance enhancements were obtained through the use of data warehousing techniques.

### **CONTROLLED EXCHANGE OF CONFIGURATION MANAGEMENT DATA BY INDUSTRY**

**Paul X. Dougherty-Lieutenant, United States Navy  
B.S., Saint Louis University, 1995**

**Master of Science in Management-December 1996**

**Advisors: Jane N. Feitler, Department of Systems Management**

**William Haga, Department of Systems Management**

In response to DoD's ongoing CALS effort, the Joint Engineering Data Management and Information Control System (JEDMCIS) was developed as a repository for technical data at government sites with the overall intent of improving access to engineering data and drawings. Although establishment of this system has facilitated the access of government owned, contractor provided data, the majority of information contained in these repositories is still in the form of aperture cards and is not always readily accessible to be "shared" with other potential users.

This thesis will examine the benefits and potential cost savings applicable to the Navy's CALS program. Specifically, the potential cost savings associated with implementing a regionalized, shared JEDMCIS database between the Naval Aviation Depot (NADEP) North Island, California, the Naval Air Technical Support Facility (NATSF) in Philadelphia, Pennsylvania, and McDonnell Douglas Aerospace in Saint Louis, Missouri will be discussed. The analysis will begin by reviewing the current and anticipated configuration management requirements for a specific Navy program (F/A18) using existing information technology. A proposed consolidation of the same technical data between both government facilities and the prime contractor using a shared database with subscription based access will then be analyzed and cost comparisons presented.

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## 1997 THESIS ABSTRACTS

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### **ARE THERE COST EFFECTIVE ALTERNATIVES TO NAVY READY SUPPLY STORES?**

**Barry J. Dowell-Lieutenant, United States Navy**  
**B.A., University of North Carolina at Charlotte, 1984**  
**Master of Science in Management-December 1996**  
**Advisors: Kevin R. Gue, Department of Systems Management**  
**Jane N. Feitler, Department of Systems Management**

This study presents two alternatives to the Navy's Ready Supply Store (RSS) to determine if there is a more cost-effective means of performing their function while still providing the same level of customer support. The RSS is a means of providing supply support to remote site DoD customers for high demand, low cost consumable items needed for day to day operations. This study focuses on the RSS at the Naval Postgraduate School Monterey, CA, and examines two alternatives: a government-wide commercial credit card program and partnering with the nearest Fleet and Industrial Supply Center (FISC). The cost of operations, sales price between government and local vendors, and customer preference are compared. The results suggest that items are slightly less expensive when purchased at the School's RSS than at local vendors. However, the savings to the school in operations costs and to the Navy in Budget Project 28 funds, by eliminating the RSS, far outweigh the higher cost of purchasing items from local vendors. It was also found that the same level of customer support could be provided if the NPS RSS were eliminated. As a result, it was recommend to eliminate the RSS at NPS and implement the government-wide commercial credit card program.

### **INDIRECT MISSION SUPPORT COSTS AT THE NAVAL POSTGRADUATE SCHOOL**

**Brian T. Drapp-Lieutenant, Supply Corps, United States Navy**  
**B.A., University of South Florida, 1984**  
**Master of Science in Management-June 1997**  
**Advisors: Kenneth J. Euske, Department of Systems Management**  
**James L. Kerber, Department of Systems Management**

This thesis provides Naval Postgraduate School management and administrators with a tool for reviewing and possibly reducing indirect mission support costs. This thesis develops a computerized activity-based costing model for indirect mission support costs at the Naval Postgraduate School by identifying cost drivers and associated cost flows for resources and support activities. Cost drivers and associated cost flows were identified through archival research and unstructured interviews with Naval Postgraduate personnel. Estimated cost allocation figures are calculated which can be used as a starting point to improve cost allocations at the Naval Postgraduate School.

### **ESTIMATING THE NUMBER OF AVAILABLE HIGH QUALITY RECRUITS AT A COUNTY LEVEL**

**Timothy J. Duening-Lieutenant Commander, United States Navy**  
**B.S., University of Wisconsin-Stevens Point, 1984**  
**Master of Science in Management-March 1997**  
**Advisors: Mike Cook, Department of Systems Management**  
**Stephen Mehay, Department of Systems Management**

Whether or not a person is available to be recruited is essentially determined by two factors. First, the person has to be desirable to the military in terms of meeting the entry screens. Desirable, as defined by the military, is a person of "high quality." The "high quality" market is defined as high school graduates scoring above the 50th percentile on the Armed Forces Qualification Test (AFQT). The second factor is determined by the individual's choice to attend college. A person who attends college is, for all practical purposes, not included in the military enlistment market. The two factors affecting availability are not independent of each other. A person who scores high on the AFQT is more likely to attend college and therefore be exempt from the potential recruitment pool. This simultaneity must be accounted for in determining the probability that a person is not only qualified but also available for recruitment.

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This thesis takes into account the simultaneity of being "high quality" and a non-college attendee in a model that uses alternative demographic and economic explanatory variables. These variables include parents' education, family income, single parent household, race, and gender. The general findings are that individuals with very low or very high values of parents' education and family income have a lower probability of being in the recruiting pool, whereas those with average values of these characteristics have a higher probability of being in the recruiting pool. This study also finds that minorities were less likely to be in the recruiting pool compared to whites.

### **JUNIOR SURFACE WARFARE OFFICER RETENTION**

**Robert B. Du Mont, III-Lieutenant, United States Navy**

**B.S., United States Naval Academy, 1989**

**Master of Science in Management-March 1997**

**Advisors: Alice Crawford, Department of Systems Management**

**Ronald Weitzman, Department of Systems Management**

The purpose of this thesis is to identify factors that lead to resignation of junior Surface Warfare Officers (SWO) and to develop an hedonic model of junior SWO turnover. The first source of data was a survey of active-duty, junior SWOs currently serving aboard ships. The second source of data was a survey of 0-3 SWOs who are currently drilling in the Naval Reserves. Results of the two surveys were compared to identify differing levels of satisfaction with the active-duty Navy. The reservists also compared their satisfaction between the active-duty Navy and their current civilian employment. Civilian salary levels were obtained from the reservists and their spouses to determine the pay differential between the Navy and civilian jobs for former junior SWOs.

A regression model found three factors to have significant power in explaining civilian pay: years since leaving active duty, employment status, and comparative work stress between civilian employment and the active-duty Navy. SWOs with full-time employment who experienced the greatest reductions in pay also experienced the greatest reduction in work stress. Junior SWOs experienced, on average, a 20 percent pay cut after leaving active duty. Pay returned to its pre-departure level in 2 to 3 years.

### **A METHODOLOGY FOR DETERMINING THE MARGINAL COST PER STUDENT AT THE NAVAL POSTGRADUATE SCHOOL**

**John P. Eckardt-Lieutenant, United States Navy**

**B.S., United States Naval Academy, 1989**

**Master of Science in Management-June 1997**

**Advisors: Katsuaki L. Terasawa, Department of Systems Management**

**John E. Mutty, Department of Systems Management**

The overall objective of this thesis was to develop a flexible model to determine the marginal cost of graduate education per student for each of the various curricula at the Naval Postgraduate School (NPS). In the past, "average cost per student" values were calculated. These calculations missed the nuances of the 44 different curricula (curriculum length, student loading, professor salaries, lab intensive curricula, etc.) at NPS and provided no information as to the marginal costs of graduate education. Two models resulted from the research. The Cost per Curriculum Model calculates the average cost per student for each curriculum, given selected cost inputs. The costs are allocated across the courses and then allocated to the students that took the courses. A second model, Marginal Cost per Student Model, was developed that calculates the marginal cost per student for a single curriculum, for a selected number of additional students. Both models provide the user with considerable flexibility in determining and ultimately better information regarding both the average and marginal costs of graduate education at NPS.

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### NAVAL LEADERSHIP AND SOCIETY

**Robb P. Entyre-Captain, United States Marine Corps**

**B.A., Norwich University, 1989**

**Master of Arts in National Security Affairs-March 1997**

**Advisor: Mark J. Eitelberg, Department of Systems Management**

**Second Reader: Roman A. Laba, Department of National Security Affairs**

Tensions between society and the uniformed leaders of the military have produced disastrous results for some democracies. If the peaceful nature of American civil-military relations is to continue through the twenty-first century, a certain level of understanding and shared views need to exist between the military's senior leaders and society.

This thesis explores whether senior leaders of the naval service are becoming isolated from society; and, if so, the implications this divide may have on civil-military relations. Three measures of civil-military interaction—racial/ethnic representation, military experience, and shared values—are used to assess the extent of isolation between the nation's naval leaders and society. These measures of interaction are examined with historical and projected statistics on racial/ethnic representation among naval officers, Congressional voting records on defense-related legislation, and interviews with a sample of retired flag and general officers. The results suggest growing isolation and tension between naval leaders and society.

### STUDY OF FIRST-TERM ATTRITION AMONG RACIAL/ETHNIC MINORITIES IN THE NAVY

**Emilson M. Espiritu-Lieutenant, United States Navy**

**B.S., Old Dominion University, 1989**

**Master of Science in Management-March 1997**

**Advisors: Mark J. Eitelberg, Department of Systems Management**

**Eli S. Flyer, Defense Consultant**

The objective of this study is to gain a better understanding of first-term enlisted attrition among racial/ethnic groups in the Navy. Previous research on attrition is limited with respect to racial or ethnic variables. The study uses a special database developed by the Defense Manpower Data Center in Monterey, CA. The database contains the records of over 500,000 male recruits who enlisted in the Navy during fiscal years 1983 through 1992. These people are tracked over a 48-month period to determine rates of first-term attrition. Cross-tabulation and frequency analysis are used to examine attrition rates by race, racial/ethnic group, and ethnicity (including 20 categories). Attrition rates for these groups are also evaluated according to several variables: Armed Forces Qualification Test category; high quality status (a combination of education and aptitude test scores); reasons for separation; and occupational area. The exploratory results reveal several trends between and within racial and ethnic groups, based on the selected variables. The results also confirm that a number of racial or ethnic groups have comparatively low rates of attrition. Further research is recommended to more fully explain underlying reasons for the relatively lower rates of attrition experienced by certain minorities.

### A SYSTEM ARCHITECTURE AND MIGRATION PLAN FOR THE STUDENT SERVICES DEPARTMENT OF THE MARINE CORPS INSTITUTE

**Clayton O. Evers, Jr.-Major, United States Marine Corps**

**B.A., University of Florida, 1984**

**Master of Science in Information Technology Management-September 1997**

**Advisors: Magdi Kamel, Department of Systems Management**

**Mark Nissen, Department of Systems Management**

This thesis is part of a year long project that was undertaken by NPS students and faculty to develop a system architecture and migration plan for the transition from a legacy information system to a client/server based, open information system for the Marine Corps Institute (MCI). The primary objective of this thesis is to develop the technology architecture required to support the information systems of the Student Services Department (SSD) of MCI and to address the complex issues of system migration.

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This thesis conducts an analysis of existing hardware and software, defines a technology architecture that will support the operational requirements of the data and business process model developed by other team members, and proposes a migration plan to transition from the current architecture to the proposed architecture that addresses both technical and human factor issues.

The thesis culminates in specific recommendations for MCI with regard to the hardware, software, and migration issues.

### **ARIES: AN ARCHITECTURAL IMPLEMENTATION OF A MULTI-CRITERION SPATIAL DECISION SUPPORT SYSTEM (SDSS)**

**Peter Ralph Falk-Lieutenant, United States Navy**

**B.S., Illinois Institute of Technology, 1988**

**Master of Science in Information Technology Management-September 1997**

**Advisors: Daniel R. Dolk, Department of Systems Management**

**LCDR Dale M. Courtney, Computer and Information Services**

This thesis describes a component-based methodology for developing a new class of Systems called spatial decision support systems (SDSS). The methodology is presented within the context of the development of the ARIES (Army Reserve Installation Evaluation System) software application, an SDSS designed to evaluate and compare site desirability for Army Reserve unit locations. The ARIES SDSS consists of a flexible component-based architecture that seamlessly integrates a user interface, GIS, multi-criteria decision model with associated DSS, and data warehouse.

To build the SDSS, the ARIES developers introduced a new architectural paradigm, undertaking a collaborative approach with U.S. Army Reserve Command (USARC) decision-makers to rapidly prototype ARIES using component-based technologies. The developers implemented several domain-specific architectures using a formalized proof-of-concept heuristic, Concept-to-Code (C2C), which conceptualizes user requirements in architectural terms, and migrating legacy data sources into a spatial data warehouse.

C2C allowed the resultant ARIES application to be conceptualized initially in general terms, and then specialized architecturally around existing off the shelf components, as design requirements were collaboratively prototyped and implemented within the existing USARC information system infrastructure. C2C facilitated the complete development of a complex, map-based system and accompanying data warehouse in the span of a few months with a technical team of three analysts and programmers. Significant system performance gains resulted from instituting a Migration Architecture System (MARS) engine to extract and spatially enable relevant data sources for geographic querying. Additional performance enhancements were also obtained through the use of rapid, component-based development techniques.

### **EVALUATING MARINE CORPS JRISS EFFECTIVENESS: A TRIANGULATED QUASI-EXPERIMENT**

**Carl Felton-Major, United States Marine Corps**

**B.S., Florida State University, 1985**

**Master of Science in Information Technology Management-September 1997**

**and**

**Lloyd Hamashin-Major, United States Marine Corps**

**B.S., University of Pittsburgh, 1982**

**B.S., Allegheny College, 1982**

**Master of Science in Information Technology Management-June 1997**

**Advisors: William J. Haga, Department of Systems Management**

**Frank J. Barrett, Department of Systems Management**

This thesis assesses the effectiveness of the Marine Corps's prototype implementation of the Joint Recruiting Information Support System (JRISS). It employs a quasi-experimental data collection design with pre-implementation and post-implementation data collection from a sample of Marine recruiters divided into a statistically equivalent experimental and control

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groups. Data sources were triangulated with behavioral data taken from archival records on three key indicators of recruiting production, while attitudinal data were approximated with a questionnaire whose items were reduced to four factors through principal components analysis. Ethnographic data were gathered through intensive interviews with the sample of Marine recruiters. This thesis is the first instance, in the IT academic literature, of a quasi-experiment with triangulated data sources used to test IT system effectiveness. The institutional rotation of military recruiters forced the gathering of post-implementation behavioral and attitudinal data before the full impact of JRISS could evolve. Discourse analysis of interview transcripts yielded 17 social insights into user construction of JRISS. Implications are drawn for the empirical evaluation of IT system success. Twelve specific recommendations are made for modifications and improvements to JRISS.

### **THE COST AND BENEFITS OF REDUCED MANNING FOR U.S. NAVAL COMBATANTS**

**Matthew G. Fleming-Lieutenant, United States Navy**

**B.S., Norwich University, 1990**

**Master of Science in Management-March 1997**

**Advisors: Wayne Hughes, Jr., Department of Operations Research**

**William Haga, Department of Systems Management**

The increasing cost of manpower in the United States Navy has generated a new initiative identified as Smart Ship. Smart Ship, or the uses of technology for manpower reduction, challenges the culture, tradition, and policies of the Navy. The life cycle cost for surface combatants can be reduced following the guidelines of Smart Ship. However, limited analysis has been conducted into the material readiness cost associated with reduced manning. It was the goal of this thesis to concentrate on the cost and benefits of Smart Ship. A maximum savings of 0.54 percent of the total budget for the Department of the Navy is possible, using FY 1996 dollars. Through analysis conducted in the study, the current objective of reducing manpower costs has been determined to be risky and imprudent. Nevertheless, the United States Navy should pursue Smart Ship to enhance combat effectiveness and quality of life, thereby increasing fleet readiness, morale, productivity, and retention. These factors will far outweigh any dollar savings from Smart Ship.

### **PROTOTYPE FOR ENHANCEMENT OF ANVIS/HUD CBT INSTRUCTION THROUGH THE USE OF EMBEDDED VISUAL SIMULATION**

**G. Thomas Foggin, IV-Lieutenant, United States Navy**

**B.S., United States Naval Academy, 1989**

**Master of Science in Information Technology Management-September 1997**

**and**

**Paul J. O'Rourke-Lieutenant, United States Navy**

**B.S., Rochester Institute of Technology, 1989**

**Master of Science in Information Technology Management-September 1997**

**Advisors: Anthony Ciavarelli, School of Aviation Safety**

**Tung Bui, Department of Systems Management**

The purpose of this project is to develop a computer based trainer (CBT) for ANVIS/HUD that takes advantage of recent advances in multimedia technology. Integration of a head-mounted display (HMD) into the CBT system allows the user to be immersed into a virtual world that simulates actual NVG use. In accordance with guidelines established by Ciavarelli, Baer and Sengupta, in their NVG Training Technology Report, December 1994, for the Naval Air Systems Command (PMA 205) and using Macromedia Director 6.0, it is possible to incorporate a synthesized continuous multimedia data base into a system that permits user interaction along a scripted NVG flight path. The system has the capability of demonstrating some of the capabilities and limitations of an actual ANVIS/HUD system under user selectable lighting and terrain features. By utilizing commercial-off-the-shelf (COTS) software and hardware the system represents a possible low cost, personal computer (PC) based, ANVIS/HUD trainer.

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### **MEASURING CUSTOMER SATISFACTION OF DEPOT MAINTENANCE: AN ANALYSIS OF CUSTOMER SATISFACTION OF F/A-18 MAINTENANCE AT NAVAL AVIATION DEPOT NORTH ISLAND, CA**

**Brian A. Forsyth-Commander, United States Navy**

**B.A., University of Northern Colorado, 1979**

**Master of Science in Management-June 1997**

**and**

**John P. Chadbourne-Captain, United States Army**

**B.S., North Georgia College, 1988**

**Master of Science in Management-June 1997**

**Advisor: William R. Gates, Department of Systems Management**

**Donald R. Eaton, Department of Systems Management**

The Department of Defense (DoD) spends about \$15 billion annually on depot level maintenance. About 60 percent of this funding is provided to government owned and operated depots. In light of defense budget downsizing, it has become more critical than ever that depots are run in the most efficient manner possible. DoD has tried to adopt a "best commercial practices" approach to improve efficiency of depot maintenance. A key focus of commercial practices is delivering customer satisfaction. To this extent, it is imperative that DoD depots understand and properly measure their customer's concerns if they wish to improve their performance. An adaptation of the gaps model, developed by Parasuraman, Zeithamal and Berry in 1985, was used to measure the current customer satisfaction of the NADEP NI F/A-18 aircraft maintenance program. The gaps model measures differences between customer expectations and perceptions of performance of various attributes, and ranks the attributes by importance. A pretest questionnaire was developed and sent out to customers of NADEP NI's F/A-18 aircraft maintenance program in order to evaluate alternative measures of customer satisfaction. Through this process, a tailored set of customer satisfaction measures was developed to provide better feedback to the depot management team and improve the depot maintenance process.

### **ROLES OF THE M1A1 TANK IN THE UNITED STATES MARINE CORPS**

**James Wade Foster-Captain, United States Marine Corps**

**B.A., Vanderbilt University, 1991**

**Master of Science in Management-December 1996**

**Advisor: Gregory Walls, Department of Systems Management**

**James E. Suchan, Department of Systems Management**

This thesis analyzes the operations the Marine Corps' M1A1 tanks could perform in support of the Marine Air-Ground Task Force (MAGTF). The research addresses the current and future capabilities of the M1A1 tank employed by today's Marine Corps. Based on these capabilities, lessons learned from training and combat, and conclusions from working groups during the 1996 Armor Conference, analysis on the M1A1's role in the Marine Corps are presented. This research and analysis satisfies the need, established during the Armor Conference, to articulate the capabilities of the M1A1 and the operations it could perform or support.

Numerous operations, such as Operations Other Than War and Military Operations on Urban Terrain, which the M1A1 is not currently conducting or supporting are discussed, with the recommendation that the M1A1 be employed in these operations to improve the combat power of the MAGTF. Emphasis is placed on the M1A1's ability to conduct or support operations covering the full spectrum of warfare, from high-intensity conflicts to peacekeeping operations.

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### **INSTRUCTIONAL DESIGN OF COMPUTER-BASED TRAINING**

**Robert W. Foster-Lieutenant Commander, United States Navy**

**B.S., University of Florida, 1984**

**Master of Science in Information Technology Management-December 1996**

**and**

**Alfred B. Price, Jr.-Lieutenant, United States Navy**

**B.S., Southern University, 1988**

**Master of Science in Information Technology Management-December 1996**

**Advisors: Tung Bui, Department of Systems Management**

**Anthony Ciavarelli, School of Aviation Safety**

The goal of this research is to combine the principles of instructional design and computer technology in order to produce a multimedia computer-based trainer for the Aviation Night Vision Image System and Heads-up Display (ANVIS/HUD). The technological advances in night vision goggles like the ANVIS/HUD system have permitted aircrews to accomplish numerous night mission tasks which they were not previously capable of completing. Increase in mission tasking requires the operators of the ANVIS/HUD system to obtain a large amount of ANVIS/HUD training to ensure safety of personnel and equipment as well as mission success.

The Department of the Navy's training budget is being reduced and the need for unconventional training methods to augment the cockpit and classroom is essential. The use of computer-based training provides the technology to achieve this training requirement. By providing a means to apply innovative instructional design principles and multimedia computer technology, the training of the war-fighters is expected to be accomplished both effectively and efficiently thus saving lives and money.

### **TRENDS IN NAVY OFFICER ATTITUDES TOWARD**

#### **THE "DON'T ASK, DON'T TELL" POLICY**

**Margaret R. Friery-Lieutenant, United States Navy**

**B.A., Alfred University, 1988**

**Master of Science in Management-March 1997**

**Advisors: Mark J. Eitelberg, Department of Systems Management**

**Theodore R. Sarbin, Defense Personnel Security Research Center**

**Ralph M. Carney, Defense Personnel Security Research Center**

The current policy concerning homosexuals and military service, commonly called "Don't Ask, Don't Tell," has been in place since 1994. The policy states that "homosexuality is incompatible with military service" and draws a distinction between sexual conduct and sexual orientation. Sexual orientation is considered a private matter and sexual conduct is an offense punishable by discharge from the military. The purpose of this thesis is to study trends in the attitudes of Navy officers toward homosexuals and officers' understanding of the policy. The research approach was modeled after a 1994 thesis at the Naval Postgraduate School, and it involved two phases: a fifty-question survey distributed to all (approximately 800) Naval officers attending the Naval Postgraduate School; and focus group interviews to explore issues raised in the survey. The results suggest that officers are even more uncertain in 1996 than in 1994 about basic elements of the policy, and they tend to interpret the policy pragmatically, balancing mission requirements against individual needs. Additionally, most officers continue to hold negative opinions about serving with known homosexuals; however, the intensity of their feelings appears to be decreasing. It is recommended that officers attend annual training on the policy to ensure an even-handed approach in dealing with homosexuals. Further study of the policy is also recommended.

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### **IMPLEMENTING THE SHOCK TRAUMA PLATOON IN THE REORGANIZATION OF THE MARINE CORPS MEDICAL BATTALIONS: RESOURCE AND TACTICAL IMPLICATIONS**

**Thomas J. Fuhrer-Major, United States Marine Corps**

**B.S., Clarion University of Pennsylvania, 1984**

**Master of Science in Management-December 1996**

**Advisors: Richard B. Doyle, Department of Systems Management**

**John E. Muty, Department of Systems Management**

The United States Marine Corps is extremely dependent upon mobility for success. Evidence from Desert Shield/Desert Storm indicated that the structure of the Marine Corps Medical Battalions impeded this mobility. The Marine Corps reorganized the First and Second Medical Battalions within the Fleet Marine Force in 1995 to address this problem. This thesis provides an overview of the restructuring initiative. It indicates how Shock Trauma Platoons fit into the scheme of operating a mobile Health Service Support Element and provides insight into how the reorganization affects the Navy Health Care Continuum. Data was obtained from a review of documents obtained from Headquarters Marine Corps, Marine Corps Combat Development Command, Fleet Marine Force Manuals, and interviews with officials involved in the restructuring. The thesis concludes that the Medical Battalions have become more mobile and are likely to be able to provide the required mobile Health Service Support. It was also concluded that the Marine Corps will experience a monetary savings from the reorganization.

### **SATISFYING NAVAL LOW DATA RATE MOBILE COMMUNICATION REQUIREMENTS**

**Sean P. Fuller-Lieutenant, United States Navy**

**B.S., United States Naval Academy, 1989**

**Master of Science in Space Systems Operations-September 1997**

**Advisor: Carl Jones, Department of Systems Management**

**Second Reader: Donald v. Z. Wadsworth, Space Systems Academic Group**

In today's electronic age, the Department of Defense is relying more heavily on the transfer of information to maintain battlespace awareness and command and control efficiency. Current military satellite communication systems are unable to keep pace with the growing requirements for electronic transfer of voice, data, and video information. Additionally, these systems are expected to begin failing in the 2003 to 2007 timeframe with no identified replacement. Naval Forces consist of highly mobile units that often operate in harsh environments. New communication systems must be designed that can satisfy the needs of these mobile forces that cannot rely on secure landlines for the timely transfer of information.

This thesis first examines the process for developing requirements and how they relate to the military acquisition and system engineering processes. Established methods for documenting satellite communications requirements are also reviewed. Next, potential technological drivers for a system to satisfy the low data rate needs of tomorrow's Naval Forces are presented. Current systems and plans are examined to provide information on current capabilities. Following that, a set of future architecture options and tradeoffs are presented to satisfy these mobile communications needs. Finally, conclusions and recommendations about the organizations and groups tasked with guiding the military and its use of space are provided.

### **HEALTH CARE REFORM AND THE DEFICIT, 1993-1996**

**William J. Gieri-Commander, United States Navy**

**B.S., United States Naval Academy, 1980**

**Master of Science in Management-March 1997**

**Advisors: Richard B. Doyle, Department of Systems Management**

**William R. Gates, Department of Systems Management**

Health care reform in the 103rd and 104th Congresses has run the gambit from extremely ambitious to less than ambitious undertakings. Proposals have engendered partisan debates, because of the scope and complexity of the issues involved and their implications for the federal deficit. Estimating the budget consequences of health care reform has become critical because of the strong link between health care programs and the growth in the deficit. This thesis examines the major health

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care reform proposals considered by Congress during the period 1993-1996. These included the comprehensive bills considered in response to President Clinton's proposed overhaul in 1993-94, the cuts included in the Republican-led balanced budget plan in 1995, and the Kassebaum-Kennedy Bill, which became law in 1996. In each case, the thesis examined the deficit situation facing Congress at the time health care reform was engaged, plans to address the deficit, and the impact of each health care reform on the federal deficit. Data was obtained from congressional reports and periodicals, journals and the Congressional Budget Office documentation. The major finding was that health care legislation which portends minimal impact on beneficiaries, providers, and the deficit is much more likely to succeed, while legislation which has a much broader effect will not receive the same support.

### **THE USE OF DOD MEDICAL ASSETS IN INTERNATIONAL HUMANITARIAN AND DISASTER RELIEF OPERATIONS**

**David E. Gilliland-Lieutenant Commander, United States Naval Reserve  
B.S., University of Florida, 1985**

**Master of Science in Management-December 1996**

**Advisors: Richard Doyle, Department of Systems Management  
Frank Barrett, Department of Systems Management**

The use of U.S. DoD medical assets in International Humanitarian and Disaster Relief Operations (IH/DRO) has been extensive in the past and has grown markedly since the end of the Cold War. It is important that DoD personnel understand the complex interagency coordination and political ramifications of their participation in IH/DRO. This thesis examines the history, current planning, interagency coordination, law, DoD doctrine, and budgeting issues affecting the use of DoD medical assets for IH/DRO. To research the current state of IH/DRO execution by the DoD, Federal laws, DoD doctrine, professional journals, and current periodicals were reviewed. Additionally, interviews were conducted with personnel in OSD, USCENTCOM, and the DoD medical community to obtain insight from recent participants in IH/DRO. Research indicated that three levels of control, coordination, and planning exist within the U.S. government to conduct IH/DRO. The strategic level consists of the U.S. Congress, the NCA, USAID, and the Joint Chiefs of Staff. The operational level consists of the Unified Combatant Commands, who conduct contingency planning for their Areas of Responsibility (AOR). Finally, the tactical level consists of the Joint Task Force (JTF) stood up by the Unified Combatant Command to execute the operation. Doctrine to execute these operations is lacking and acknowledged by DoD Doctrine Commands, who are working to address this shortcoming. The current command and coordinating structure documented in this thesis is in a dynamic state of evolution and development as the DoD strives to meet the demands of IH/DRO in a downsizing military.

### **ASSESSMENT OF DEPARTMENT OF DEFENSE REINVENTION LABORATORIES**

**James L. Gosnell-Commander, United States Navy  
B.S., U.S. Naval Academy, 1980**

**Master of Science in Management-June 1997**

**Advisors: Lawrence R. Jones, Department of Systems Management  
Jerry L. McCaffery, Department of Systems Management**

This thesis examines improvements in business practices accomplished by Department of Defense (DoD) Reinvention Laboratories. DoD goals for the National Performance Review and accomplishments are analyzed. DoD incorporation of entrepreneurial government ideas of restructuring, reengineering, reinventing, realigning, and rethinking are evaluated. Over \$16.4 billion in financial savings achieved through increased efficiency are described. In particular, lessons learned from successful and unsuccessful initiatives presented at the initial DoD Reinvention Laboratories Symposium are analyzed.

Key leadership practices instrumental to successfully achieving reinvention goals, include creating total commitment and a sense of urgency, communicating a vision, establishing clear goals, and plans for action, overcoming obstacles with persistence, measuring performance, recognizing people, and institutionalizing continuous improvement. The following barriers to implementing reinvention are identified: absence of top management support, no single DoD point of contact to

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guide reinvention, no clearly defined DoD waiver processes, insufficient financial resources, lack of knowledge and training on reinvention procedures, poor communication on goals and means, and cultural resistance to change.

Further research to document continued reinvention progress and to measure performance is recommended. This thesis identifies efficient business practices implemented in laboratories, and barriers that must be overcome to successfully accomplish reinvention objectives.

### **INTERNETWORKING: AIRBORNE MINE COUNTERMEASURES C41 INFORMATION SYSTEMS**

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**Master of Science in Information Technology Management-December 1996**

**Advisors: Don Brutzman, Undersea Warfare Academic Group  
Rex A. Buddenberg, Department of Systems Management**

Airborne Mine Countermeasures (AMCM) Command Control Communication Computer and Intelligence (C41) baseline currently consists of stand-alone tactical decision aids. Information such as aircraft position, equipment status, and abbreviated mine like contact reports cannot be transferred in any form other than voice from/to the MH-53E helicopters while conducting Airborne Mine Countermeasures operations. There are currently no methods to transfer sonar video or single-frame imagery of mine-like objects between any Mine Warfare (MIW) units in a near-real time manner. Delays lasting several hours are frequently encountered before the results of a "rapid reconnaissance" airborne minehunting mission are made available to the rest of the fleet and/or MIW community. In order to improve command and control, the AMCM Mine Warfare community must integrate all of its C41 assets onto a tactical internet.

This thesis presents a tactical internet for AMCM with an open, standards-based modular architecture. It is based on the TCP/IP network model using common protocols and interfaces. Command and control will significantly improve as this network will provide a methodology to transfer critical information between AMCM C41 assets and tactical networks worldwide. Results from a comprehensive laboratory prototype demonstration using commercial off-the-shelf (COTS) equipment are presented along with lessons learned. Laboratory results show that this system works and can be deployed for testing at sea.

### **IMPLEMENTATION OF ELECTRONIC COMMERCE IN THE DEPARTMENT OF DEFENSE AND THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION**

**Rodney A. Gray-Lieutenant, United States Navy  
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**Master of Science in Management-December 1996**

**Advisors: Janice M. Menker, Department of Systems Management  
Mark Stone, Department of Systems Management**

President Clinton's Executive Memorandum of 26 October 1993 mandated that all Federal Government agencies implement Electronic Commerce (EC) in order to "simplify and streamline the purchasing process."

Two agencies, the Department of Defense (DoD) and the National Aeronautics and Space Administration (NASA) employed divergent strategies and policies in implementing the President's Memorandum. DoD pursued a strategy using an existing DoD Electronic Commerce/Electronic Data Interchange (EC/EDI) architecture. NASA employed an Internet-based tool, the NASA Acquisition Internet Service (NAIS), as the cornerstone of its EC program.

This thesis examines the unique approach each agency employed, analyzing organizational theory and other influential factors to explain why two Federal agencies chose to implement such different strategies.

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### **RE-ENGINEERING THE PLANT PROPERTY INVENTORY MANAGEMENT PROCESS WITHIN NAVAL MEDICAL TREATMENT FACILITIES**

**David M. Groom-Lieutenant, United States Naval Reserve**

**B.S., Metropolitan State College of Denver, 1990**

**Master of Science in Management-December 1996**

**Advisors: Jane N. Feitler, Department of Systems Management**

**James A. Scaramozzino, Institute for Defense Education and Analysis**

This research evaluates the plant property inventory management process and recommend solutions that would enable accurate accountability of plant property within Navy medical treatment facilities (MTFs). It provides a standard set of revised plant property management procedures to assist local activities' comptrollers and equipment managers with day to day operations and to also meet the external requirements of two public laws: Public Law 103-356 and Public Law 101-576, requiring updated financial management and accurate, timely reporting operations.

The revised process presented in the thesis incorporates internal controls, quality check points, and a standardized format to ensure information accuracy and timeliness. The primary recommendation is to have Bureau of Medicine and Surgery incorporate the revised plant property management process as a claimancy-wide instruction or directive for all Medical Treatment Facilities' (MTF's) to follow.

### **DIVERSITY TRAINING IN THE UNITED STATES MARINE CORPS**

**Gregg T. Habel-Major, United States Marine Corps**

**B.S., United States Naval Academy, 1985**

**Master of Science in Management-March 1997**

**Advisors: George W. Thomas, Department of Systems Management**

**Alice Crawford, Department of Systems Management**

In recent years, the Marine Corps has become a very racially, ethnically, religiously, and gender diverse organization, and demographic trends indicate that this diversity will become even more pronounced in the future. Such diversity can have a strong, positive influence on productivity. This thesis examines problems the Marine Corps has had in accepting diversity within its ranks, analyses the Marine Corps' plans for addressing diversity issues now and in the future, and evaluates several coalition building workshops for their applicability to the Marine Corps. A literature review on diversity issues such as power, privilege, social conditioning, and racism is combined with the results of a survey of Navy and Marine Corps officers who participated in a graduate-level seminar on managing diversity in the military and with workshop assessments to develop a plan for diversity training in the Marine Corps. This plan incorporates highly interactive exercises, role-playing scenarios, personal experience, enlightened lectures, and other forms of instruction consistent with Adult Learning Theory to offer the Marine Corps a better chance of creating a cultural change around diversity issues. This training program should be facilitated by highly trained and dedicated instructors and it should be taught at career-level schools where small groups of racially, ethically, and gender diverse students can learn in a peer environment. This program must be given the same degree of attention as other important factors affecting readiness.

### **ANALYSIS OF SMALL BUSINESSES' PERSPECTIVE ON THE ELECTRONIC DATA INTERCHANGE ACQUISITION REFORM**

**Paul W. Hagen-Lieutenant Commander, Supply Corps, United States Navy**

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**Master of Science in Management-June 1997**

**Advisors: Mark W. Stone, Department of Systems Management**

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

This thesis examines small business' perception of utilizing Electronic Data Interchange (EDI) as a means to conduct business. The general concept and history of EDI is discussed along with a synopsis of current Government EDI systems in use. The results of two surveys are analyzed to provide an insight on the effect the Federal Acquisition Streamlining Act is

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having on small business' opportunity to obtain Government Contracts. Additionally, interviews were conducted with several Government personnel to get their opinions on the progress of EDI in the workplace.

The major conclusion drawn is that the majority of small businesses are willing to utilize EDI as a means to conduct business. But in its current form (i.e., FACNET) small businesses find it difficult to use and too expensive. The need to use a simpler and more cost-effective means is necessary to ensure that all small businesses have the opportunity to compete for Government contracts without cutting into their profit margins.

### **EVALUATION OF THE YOKOSUKA BASE FOR THE U.S. NAVY PACIFIC FLEET OPERATION**

**Hideyuki Haruki-Lieutenant Commander, Japan Maritime Self Defense Force**

**B.S., National Defense Academy Japan, 1984**

**Master of Science in Management-September 1997**

**Advisor: Katsuaki L. Terasawa, Department of Systems Management**

**Second Reader: Lawrence R. Jones, Department of Systems Management**

This research concerns evaluation of the Yokosuka base for the U.S. Navy Pacific Fleet operation. The research focused on fleet operating costs and required fleet assets for a given level of operation. In particular, what value in terms of fleet operating costs and assets does the United States receive using the Yokosuka base to deploy its fleet in Asia were examined. A computer model was developed to evaluate this benefit and compared the differences in operating costs and required fleet assets between the Yokosuka base and other bases such as Guam and Hawaii.

### **AN ANALYSIS OF DEPOT LEVEL MAINTENANCE FOR THE H-60 HELICOPTER UNDER AN INTEGRATED MAINTENANCE CONCEPT**

**Charles Sidney Hatcher, Jr.-Lieutenant Commander, United States Navy**

**B.S., United States Naval Academy, 1984**

**M.S., University of Tennessee, 1993**

**Master of Science in Management-September 1997**

**Advisors: William Gates, Department of Systems Management**

**John Mutty, Department of Systems Management**

**Donald Eaton, Department of Systems Management**

This thesis examines the depot maintenance processes of Naval H-60 helicopters. Budget and political climate issues are discussed. Aircraft Service Period Adjustment (ASPA) deferral rates, Standard Depot Level Maintenance (SDLM) turn-around time, depot maintenance direct labor and material costs, and projected backlog using depot requirements and funding are examined. Data analysis indicates a need for significant process improvements or radical changes to depot processes. The Integrated Maintenance Concept (IMC) will consolidate organizational and depot level maintenance at fleet locations. IMC offers several advantages over traditional depot maintenance methods. Using regression analysis, the direct costs of SDLMs conducted at the Pensacola Naval Aviation Depot from 1987 to 1995 were used to estimate direct costs of depot maintenance based on: aircraft age, the projected level of depot maintenance, and employment (operational versus training). Within the scope of this research, a weak correlation existed between the direct labor costs and aircraft age and employment as explanatory variables; direct material costs showed a higher correlation; for total direct costs, these two variables explained 34.4 percent of the variation. Incorporating additional explanatory variables, such as flight hours prior to SDLM, may improve the model. Finally, recommendations are made to facilitate the transition to Integrated Maintenance, emphasizing data collection requirements and data analysis techniques to better estimate maintenance and funding requirements.

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### **GARRISON BASED INTRANET PROTOTYPE FOR THE 40TH INFANTRY DIVISION (MECHANIZED)**

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**Master of Science in Information Technology Management-September 1997  
and**

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This thesis introduces the concept of an Intranet, chronicles the efforts required to create and deliver an Intranet, and provides a discussion of advantages and disadvantages of using an Intranet. It demonstrates that an Intranet can be a useful mechanism to solve problems related to information control and distribution for the reserve component of the 40th Infantry Division (Mechanized).

The thesis contains a detailed description of the rapid prototyping process model, as well as the modifications required to adapt the process for Intranet development. Further, it describes the gathering of system requirements using the results of several structured walk-throughs. It also describes, in detail, the development efforts to address each of the requirements identified.

The prototype developed as part of this thesis demonstrates several key aspects of Intranet development and deployment. For example, it incorporates webpage development using commercial-off-the-shelf products common to the division, and the development of interactive functions with spreadsheet and database programs. This thesis also addresses issues such as security and content control which are crucial for Intranet deployment.

### **DEVELOPMENT OF GRAPHICAL USER INTERFACE STANDARDS AND PROTOTYPE FOR THE STUDENT SERVICES DEPARTMENT OF THE MARINE CORPS INSTITUTE**

**Gerald L. Hehe-Lieutenant Commander, United States Navy  
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**Master of Science in Information Technology Management-September 1997**

**Advisors: Magdi N. Kamel, Department of Systems Management**

**LCDR Dale Courtney, Computer and Information Services**

This research supports a year long Marine Corps Institute project initiated to migrate from a closed non-relational legacy system to an open client/server system architecture in response to many identified shortcomings of the current information system used by the Student Services Department. The objectives of this thesis are: (1) to identify a set of Graphical User Interface (GUI) guidelines for application development, (2) design and develop a proof-of-concept prototype that demonstrates the functionality of a relational database management system, and (3) exercise usability testing to validate the prototype functionality. Additionally, an object oriented visual development tool is used to develop the prototype application based on process and data modeling constructs. Implementation recommendations include: (1) adopting a continuous application development strategy based on modern concurrent process and data modeling constructs, (2) utilizing an object oriented visual development tool that compliments the target relational database management system, (3) utilizing the GUI guidelines identified during this research for future application development, and (4) applying usability testing to validate application functionality prior to implementation.

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### **THE EVOLUTION OF THE MILITARY HEALTH CARE BENEFIT (MHCB): THE SCOPE OF THE CHANGES AND THE PRINCIPAL DRIVERS BEHIND THEM**

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This thesis examines the evolution of the Military Health Care Benefit (MHCB) and the principal factors that influenced its change. The Military Health Care Benefit is a critical part of the compensation package received by the military member. A detailed examination of United States Code, Title 10, along with congressional hearings, committee reports, legislative bills and external organizational literature was conducted. The congressional process for modifying the MHCB is explained, followed by identification and description of the major legislative changes to the MHCB between 1956 and 1996. Research revealed that the scope of the MHCB has dramatically increased since 1956. Three distinct periods of congressional action were identified. The first, 1956 to 1966, was characterized by establishment of the benefit structure and its initial expansion. The second, 1967 to 1982, was a "status quo" era in which Congress focused its attention on controlling the rising costs of CHAMPUS. The final period, 1983 to 1996, was dominated by congressional oversight, leading to further expansion of the MHCB and the development of Managed Care programs. Equity with private sector or other government sponsored health care programs was the primary factor in the growth of the MHCB. Understanding the process used to change the Military Health Care Benefit and the principal factors that influence this change allows planners an insight into possible future changes in military medical benefits and their associated costs.

### **COST AS AN INDEPENDENT VARIABLE IMPLEMENTATION ISSUE**

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**Master of Science in Management-March 1997**

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This thesis will examine challenges defense department managers face when implementing the cost as an independent variable (CAIV) concept of cost control. The CAIV concept replaces the design-to-cost (DTC) concept which only achieved limited success. Emphasis is placed on identifying issues that managers faced implementing the DTC concept. These issues are analyzed to determine the potential cause of the issue and the impact the issue may have on programs implementing CAIV.

It is the contention of this thesis that the CAIV concept and the DTC concept are in theory, virtually identical. Many of the same issues will surface during CAIV implementation that managers faced implementing DTC. CAIV may become another ineffective cost control measure. However, DTC was not usually implemented as intended by the guidance. In addition, acquisition reform has provided the manager implementing the CAIV concept significant advantages over previous managers. With full management support, programs implementing the CAIV concept can succeed and provide cost effective systems that meet the needs of the user.

### **A SURVEY OF SOFTWARE FOR DECISION ANALYSIS**

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**Master of Science in Information Technology Management-March 1997**

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There are an increasing number of desktop decision support Systems (DSS) generators available which can assist a manager in making decisions. The low cost of these packages also make them ideal instructional tools in academic courses

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covering decision analysis. Using literature review, surveys, correspondence and program inspection, this thesis demonstrates the features which are required of a good DSS as they relate to three potential uses: production, education, and demonstration.

This thesis discusses the characteristics a prospective user should consider when selecting a DSS. These characteristics include features such as the user interface, data and modeling support systems and the level of support available from the vendor. Following this, the thesis reviews the "state of the art" in currently available programs.

The programs reviewed in this thesis are easy to use and provide valuable tools for decision making. The programs lack in their ability to import and export data to other applications which limits their usefulness in a production setting, however, desktop DSS offer managers a sophisticated, yet easy to use, application which can improve decision making and benefit organizations at all levels.

### **COST/BENEFIT ANALYSIS OF INTERACTIVE COURSEWARE**

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**Master of Science in Management, December 1996**

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This purpose of this thesis is to present a cost/benefit analysis of different Interactive Courseware (ICW) packages available for use at Fleet Anti-Submarine Warfare Training Center (FLEASWTRACEN), San Diego, CA.

Data was gathered from interviews with the current users of ICW software at FLEASWTRACEN and at Goodfellow Air Force Base in Texas, interviews with companies that develop authoring systems, and information available on the Internet. Data was also gathered from information received from software companies and reports and memorandums available at FLEASWTRACEN. The goal of this thesis was to identify a cost-effective product that not only met the current training requirements at FLEASWTRACEN, but also one that would be able to expand and grow to meet their future requirements.

The nature of the pricing of the ICW software did not allow for a "strict" cost versus benefit analysis. Since the costs vary depending on both the capabilities of the software package and the economic benefits received by the customer (which are "soft" and difficult to measure), the analysis focused on identifying a product that required minimal investment in additional hardware and/or software requirements. Based on evaluation of the research data, recommendations are presented for future acquisition of ICW software.

### **AN ANALYSIS OF USING INTELLIGENT DIGITAL DATA TO REDUCE THE SPARE AND REPAIR PARTS INVENTORY FOR THE NEW ATTACK SUBMARINE (NSSN)**

**Kenneth S. Honeker-Lieutenant Commander, United States Navy**

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**Master of Science in Management-September 1997**

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Both the defense and commercial industry sectors are increasingly moving to automated manufacturing as a means to reduce costs and increase efficiency and quality. The Navy can leverage both the capabilities as well as the benefits of this technology application. For example, the acquisition of intelligent digital data in support of the new weapon systems has the potential to render a percentage of the Navy/DLA parts inventory as "virtual." This inventory would exist in "effect" but not in actual form until required. The Navy has developed and demonstrated the capability to use intelligent digital data to manufacture no-longer-available parts in a timely and cost-effective manner. The application of this technology is a natural complement to the advanced technology in computer-aided design and manufacturing incorporated in the Navy's newest weapon systems under procurement, specifically, the New Attack Submarine. This thesis presents an analysis of the application of this technology. There exists a market for this technology application as demonstrated by the intelligent digital

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data candidate parts analysis conducted during this investigation. As a result of this analysis it was determined that the Navy can conservatively save \$503 million over the life cycle of the New Attack Submarine by the applying the use of intelligent digital data.

### **THE TRI-BAND SATELLITE TERMINAL: A CASE STUDY IN ACCELERATED ACQUISITION AND PROGRAM MANAGEMENT OF ARMY COMMUNICATIONS SYSTEMS**

**Richard W. Housewright-Captain, United States Army**

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The Super High Frequency Tri-band Tactical Satellite Terminal (AN/TSC-143) is a multi-channel tactical satellite communications terminal that allows information to flow between major headquarters within the operational theater and the continental United States. The AN/TSC-143 program used an accelerated acquisition strategy which implemented the concepts of teaming, tailoring, concurrency, and Electronic Bulletin Board (EBB) to accelerate the process. The program successfully reduced the Procurement Administrative Lead Time (PALT) to 72 days, but many other challenges had to be managed during the procurement of this communications system. This case study examines the acquisition environment surrounding this procurement. The case study illustrates the differences between the typical acquisition environment and the communications systems acquisition environment. It also provides valuable insight into developing an acquisition strategy for similar programs.

### **THE INCREMENTAL COST OF F/A-18F NAVAL FLIGHT OFFICERS**

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**Master of Science in Management-June 1997**

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**John E. Mutt, Department of Systems Management**

This study was undertaken to estimate the number of required Naval Flight Officers (NFOs) and their associated costs resulting from the decision to shift from the F/A-18E to the F/A-18F as the replacement for the F-14. It addressed the analytical issues associated with determining the additional personnel requirements and their costs.

The dynamic method developed in this study not only considers the NFOs in the operational squadrons, but also includes all NFOs in the rotation base that are required to implement this decision. In addition, it considers the dynamics of change that will occur over time as F-14 NFOs transition to the F/A-18F. This dynamic method, rather than the current static method, provides a better estimate of the direct personnel costs associated with the implementation of an alternative. The improved estimate of costs could be an important part of a cost-effectiveness analysis.

This study recommends that the Navy continue to refine the methods of estimation developed in this study. A refined version of this method could provide future decision-makers with improved estimates of personnel requirements and their costs.

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### **ANALYSIS OF NAVAL ORGANIZATIONS WITHIN MARITIME NATIONAL INTERESTS: THE CASE OF COLOMBIA**

**Ismael Idrobo-Commander, Colombian Navy**

**B.S., Colombian Naval Academy, 1987**

**M.S., Pontificia Universidad Javeriana, 1994**

**Master of Science in Management-June 1997**

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**Roger D. Evered, Department of Systems Management**

This thesis examines the Colombian Maritime Authority and the Colombian Coast Guard Service using relevant constructs from strategic management and organizational theory. The research uses the Nuechterlein matrix concepts in basic national interests combined with the results of a survey to analyze the maritime mentality of Colombia. The thesis applies a Dynamic Systems Model and finds that common parameters are used in maritime organizations to manage maritime activities.

The study draws on comparative analysis of the contexts and organizational designs of foreign maritime organizations. Results indicate that Colombia does not include maritime national interests in its priorities of national interests. Survey results suggest that Colombia's management of maritime activities has only partially developed due to the complexity of the Nation-State's political and cultural environment. The study also identifies overlapping functions and redundant efforts within the two Colombian organizations. It explores the possibility and likely consequences of restructuring the two organizations, given Colombian maritime national interests and thus provides alternatives to maximize the management of maritime activities. Recommendations for further research are included.

### **FORMATIVE EVALUATION OF THE TACTICAL PATROL CRAFT TRAINER: A COMPUTER-BASED TRAINING EVALUATION**

**Dean A. Jacobs-Lieutenant, United States Navy**

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**Alice Crawford, Department of Systems Management**

This thesis describes the formative evaluation of the Tactical Patrol Craft Trainer (TPCT) during the implementation stage. The TPCT is an interactive multimedia computer-based trainer designed to deliver a full fidelity and analog video training scenario to Prospective Commanding Officers (PCOs) of the Coastal Patrol Craft (PC) class ship. The system is designed to induce stress while enhancing autonomous decision-making skills. The methodology involved six survey instruments, observation, and interviews with the trainees. The data show that the TPCT induces stress as intended, the user interface is appropriate, and the trainees perceived the training as valuable. Several improvements are noted in the course structure, user-interface, and system application. Recommendations are made for more scenarios, additional applications of the technology, and evaluation of training effectiveness after the final implementation of the system.

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### **THE EVOLUTION OF MILITARY HEALTH SERVICES SYSTEM WARTIME MANPOWER REQUIREMENTS GENERATION: FROM THE MEDICAL PLANNING MODULE TO THE MEDICAL ANALYSIS TOOL**

**Steven M. Jeffs-Lieutenant, United States Navy**

**B. A., Seattle Pacific University, June 1989**

**Master of Science in Management-March 1997**

**Advisor: Richard Doyle, Department of Systems Management**

**James Scaramozzino, Institute for Defense Education and Analysis**

Major changes in post-Cold War strategy led to changes in force structure, missions, and anticipated casualty rates and challenged the basic assumptions that are fundamental to the process of military medical readiness planning. The Military Health Services System (MHSS) sought to refine its wartime medical requirements in order to identify the medical forces required to support the new strategy. This thesis explores the process used to determine wartime medical manpower requirements within the MHSS, explores the evolution of medical requirements planning models from the Medical Planning Module (MPM) to the Medical Analysis Tool (MAT), and provides a comprehensive analysis of the models. Documents reviewed for this thesis include reports from DoD, GAO and Congress, congressional testimony, studies conducted by think tanks including the Rand Corporation and the Center for Naval Analysis, and pertinent DoD directives and manuals. Additional data were obtained through interviews with key officials involved in the development and implementation of the MAT, particularly the Director for Logistics J-4, Medical Readiness Division, and the primary contractor developing the MAT, Booz-Allen Hamilton. The conclusions of this research are that the MPM is inflexible, inaccurate, incompatible with current technology and planning factors, and not user-friendly. The MAT is more flexible, accurate, compatible with current technology and planning factors, and user friendly than the MPM and is the best alternative for replacing it.

### **MARITIME POWER IN COLOMBIA, ANALYSIS AND PROPOSAL OF STRATEGY**

**Juan J. Jimenez-Lieutenant Commander, Colombian Navy**

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**Master of Science in International Resource Planning and Management-June 1997**

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**Roger D. Evered, Department of Systems Management**

This study examines Colombia's maritime vision. Although Colombia has a maritime window on the world it has historically underutilized and under protected its sea resources. This study argues that the Colombian Government does not have an effective and clear vision as a maritime nation. Chapter I presents the research questions and a brief background of Colombia. In Chapter II, a model of the current maritime management of Colombia is developed. In Chapter III, this model is compared with similar management models used in other Latin American countries. Chapter IV is an Organizational Analysis of Colombia's maritime related agencies. Chapter V develops and suggests a strategy to better manage maritime activities in Colombia. Finally, the study's conclusions and recommendations are presented. The study concludes that Colombia as a state has a low maritime consciousness and that there is no common maritime vision to support government policies. The study recommends that an advisory and coordination entity be set up to help create this vision and provide for long-term management of Colombia's maritime resources.

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### **APPLIED RELIABLE MULTICAST USING THE XPRESS TRANSPORT PROTOCOL (XTP)**

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**Master of Science in Information Technology Management-March 1997  
and**

**Glenn D. Williams-Lieutenant, United States Navy  
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**Master of Science in Information Technology Management-March 1997**

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Rex Buddenberg, Department of Systems Management**

Reliable multicast protocols provide a means to deliver data from one sender to many receivers with assurance. Reliable multicast is better suited than unicast for the bandwidth restricted, high error rate, hostile communications environment found in the military's tactical arena. General purpose protocols ensure adaptability to the variety of communications suites currently used by the military. As well, any acceptable multicast protocol must support varying levels of assurance, from unreliable delivery to full reliability.

This thesis evaluates the performance capabilities of one implementation of the Xpress Transport Protocol— SandiaXTP, which is a reliable multicast transport protocol. Four experiments are run on a testbed consisting of four Sun SPARC4 workstations. These experiments look at unicast and multicast transmissions with varying numbers of induced errors. The included performance measurements examine the various challenges present in a communications medium subject to attack. The results demonstrate that reliable multicast in a tactical environment is possible.

### **ARMING OUR NAVAL OFFICERS WITH TOMORROW'S TECHNOLOGY- ISSUING LAPTOP COMPUTERS TO ALL NAVAL OFFICERS**

**Christi-Lynn Jones-Lieutenant Commander, United States Navy  
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**Master of Science in Information Technology Management-September 1997**

**Advisors: Nelson Ludlow, Department of Computer Science  
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Information superiority is the foundation for Joint Vision 2010 and the method for services to dominate the battlefield. The goal of IT21 is to rapidly implement a warfighting information network. To facilitate the engagement of information warfare, this thesis proposes that all officers be issued a laptop computer.

This thesis discusses how a computer can be as valuable as a rifle or a tank, and possibly change the way the Department of Defense fights wars. With a laptop computer, officers can have 24-hr access to critical information - turning all Naval Officers into Information Warriors! When officers transfer, they will be immediately on line at their new duty station.

This thesis uses the Technical Architecture for Information Management (TAFIM) model for strategic planning and evaluates three migration paths: a paycheck computer allowance; continuing buying desktop computers within individual command budgets; and leasing laptop computers. The alternatives are evaluated using an Information Technology Assessment Worksheet This thesis recommends that the best alternative is to lease computers for all officers and have Naval Information Systems Management Center (NISMC) be the program manager. This thesis clearly shows that after a three-year period the cost of leasing a computer is more economical than purchasing a computer.

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### **ANALYSIS OF DEPARTMENT OF DEFENSE (DOD) OVERSEAS SHIPMENT OPERATIONS TO JAPAN**

**David G. Jones-Lieutenant Commander, United States Navy  
B. S., United States Naval Academy, 1986**

**Master of Science in Management-September 1997**

**Advisors: James Kerber, Department of Systems Management  
Donald R. Eaton, Department of Systems Management**

The objective of this thesis is to document, evaluate, and recommend process improvements for transporting fresh produce product lines from the United States to mainland Japan. This thesis reviewed existing processes and strategies currently in effect for shipping fresh produce to Department of Defense (DoD) installations and other U.S. federal agencies in Japan.

The shipment of fresh fruits and vegetables (FF&V) is examined in detail, since they pose the most difficult logistical challenge. Aside from the issues associated with shipping perishable products overseas, there are political and cultural issues that are examined as well.

The entire process, from customer requirement order to delivery of product to destination is documented and analyzed. The current strategy and methods of purchasing, shipping, and distributing FF&V to resale customers in Japan is analyzed, with recommendations for improvement, if applicable.

A process management and decision chart of the entire process is developed, in hopes of providing a decision matrix that will apply to all shipments destined for mainland Japan, and possibly to other Pacific Rim destinations. Lessons learned and further research are identified that may be applicable to other destinations in the region.

### **DEVELOPMENT OF AN ACTIVITY-BASED COSTING MODEL FOR IMPLEMENTING CAPITATION AT NAVAL MEDICAL CENTER SAN DIEGO**

**Ives C. Jones-Lieutenant, United States Navy  
M.P.H., University of Oklahoma, 1987**

**Master of Science in Management-December 1996**

**Advisors: Kenneth J. Euske, Department of Systems Management  
James Kerber, Department of Systems Management**

The purpose of this research is to develop a financial model for Naval Medical Center San Diego for the calculation of an appropriate capitation rate under capitation budgeting. The current cost accounting system at Naval Medical Center San Diego and records of the Military Expense and Reporting System and the Uniform Management Report were analyzed to determine their usefulness in providing the information for and implementing capitation budgeting. An accounting model based on the principles of activity-based costing was used to develop a financial model and was applied to the current accounting system at Naval Medical Center San Diego.

The research showed the current accounting system used at Naval Medical Center San Diego and the Military Expense and Reporting System and the Uniform Management Report do not provide the needed financial information for the calculation of an appropriate capitation rate. The accounting system will need to be realigned to identify expenses by activities versus cost categories. The analysis done for this thesis indicates that activity-based costing can provide a more accurate measure of the cost of services (outputs) and facilitate in the calculation of an appropriate capitation rate for Naval Medical Center San Diego.

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## 1997 THESIS ABSTRACTS

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### **CAREER INTENTIONS OF JUNIOR UNRESTRICTED LINE NAVAL OFFICERS**

**Kurt A. Kastner-Lieutenant, United States Navy**

**B.S., Maine Maritime Academy, 1989**

**Master of Science in Management-March 1997**

**Advisors: George W. Thomas, Department of Systems Management**

**Kathryn M. Kocher, Department of Systems Management**

The purpose of this thesis was to investigate the factors affecting the career intentions of junior unrestricted line (URL) naval officers. Data were taken from the 1992 DoD Survey of Officer and Enlisted Personnel and their Spouses and were matched with the 1996 Active Duty Military Master File by the Defense Manpower Data Center. The sample was restricted to Navy URL officers in pay grades O1-O3, within their minimum service requirement. The data were divided into three sets: single male officers, married male officers, and female officers. A conceptual model was developed which grouped explanatory variables of career intentions into three broad categories: personal, internal work related, and external work related. A multivariate logistic model was estimated for each data set to determine the relative importance of these variables on an individual's intent to make the Navy a career. Results indicated that the factors influencing career intentions differ between male and female officers and married and single officers.

### **RETENTION OF FIRST-TERM AND SECOND-TERM MARINE CORPS ENLISTED PERSONNEL**

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**Master of Science in Management-March 1997**

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**Kathryn M. Kocher, Department of Systems Management**

The purpose of this thesis was to investigate the factors affecting the retention behavior of first term and second term Marine Corps enlisted members. Data were extracted from the 1992 DoD Survey of Officer and Enlisted Personnel and their Spouses and were matched with the respondents' 1996 status from the Active Duty Military Master and Loss File by the Defense Manpower Data Center. The sample was restricted to Marines with between two and ten years-of-service who had less than two years remaining on their enlistment contract and was further stratified by term of enlistment and gender. A complete conceptual model was developed which incorporated individual and organizational factors affecting retention. Four categories of determinants of turnover were used: Demographic, Military Experience, Cognitive and External. Logistic regression was used to measure the relative importance of a broad range of these factors for the retention decision. Results indicated that the factors affecting retention differ across term of service and by gender. No single factor was significant for all gender/term of service samples. Some factors were significant only for a particular term of service. Others were significant only by gender and many were significant only for a single sample. The specific findings can provide manpower planners with targeted information to manage retention levels for first term and second term Marines more effectively.

## 1997 THESIS ABSTRACTS

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### CHANGES AND TRENDS IN SMALL DISADVANTAGED BUSINESS (SDB) PROGRAMS

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Master of Science in Management-December 1996

Advisors: Sandra M. Desbrow, Department of Systems Management

Alice Crawford, Department of Systems Management

Since the late 1960s, it has been the policy of the Federal Government to support the development of small disadvantaged businesses (SDBs) owned and controlled by minorities and women. However, as a result of the current controversy over the proper role of affirmative action and the recent Supreme Court's landmark decision in the *Adarand Constructors, Inc. v. Peña*, which challenged a Federal program that provided cash bonuses to prime contractors for awarding subcontracts to minority-owned businesses, Federal SDB set-aside programs are facing uncertain future. Both the Clinton Administration and 104th Congress are currently reviewing the Federal affirmative action programs and have proposed various legislative proposals and programs that would meet the constitutional standards set forth in the *Adarand* decision. One of the objectives of this thesis is to analyze the major Supreme Court decisions, currently ongoing challenges to set-aside programs and political environment that have had a profound influence in shaping the Federal Government's SDB programs. This research also analyzes the latest legislative proposals and programs that are being developed to withstand the standards set forth in the *Adarand* case. This study recommends a consolidated single piece of legislative proposal that can best serve the public in promoting small disadvantaged businesses.

### UTILIZING WEB-BASED TECHNOLOGY TO DESIGN AND IMPLEMENT A CONFERENCE INFORMATION SYSTEM

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Master of Science in Information Technology Management-September 1997

Advisors: Monique P. Fargues, Department of Electrical and Computer Engineering

Second Reader: Rex A. Buddenberg, Department of Systems Management

This thesis is a follow-on effort to work conducted by Michael Chalfant and Kevin Coats. The focus is the design and implementation of a web-based information system for the Asilomar Conference on Signals, Systems and Computers. This technical conference specializes in signal and image processing, communications, sensor systems, and computer hardware and software. Organized in collaboration with the Naval Postgraduate School, San Jose State University, and the IEEE Signal Processing Society, the Conference is conducted annually at the Asilomar Conference Facility in Pacific Grove, California. Initial project efforts concentrated on article submissions and system administration (i.e., database management). The article review process and overall implementation of the improved system is the focus of this thesis.

The objectives of this thesis are to: 1) analyze the article review process of the Asilomar Conference, 2) implement a World Wide Web (WWW) based article review process, and 3) implement the improved Asilomar Conference information system. Internet automation is accomplished via interactive WWW pages, created using Borland's Delphi as a programming tool, O'Reilly's WebSite as the web server, and Common Gateway Interface scripts as the mechanism for interactivity. This interactivity provides seamless global access to the Conference database and processes.

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## 1997 THESIS ABSTRACTS

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### **ANALYSIS, DESIGN, AND IMPLEMENTATION OF A WEB-BASED TRAINING SYSTEM FOR MULTI-CRITERIA DECISION SUPPORT, INTEGRATING HYPERTEXT, MULTIMEDIA-BASED CASE STUDIES AND TRAINING SOFTWARE**

**Donald E. Klein-Lieutenant, United States Navy**

**B.S., University of Wisconsin, 1989**

**Master of Science in Information Technology Management-September 1997  
and**

**Christine A. Mallory-Lieutenant, United States Navy**

**B.S., University of the State of New York, 1988**

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and**

**David W. Safstrom-Commander, United States Navy**

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**Master of Science in Information Technology Management-September 1997**

**Advisors: Tung X. Bul, Department of Systems Management**

**Geoffrey Xie, Department of Computer Science**

The objective of the study is to propose a new learning medium, which takes advantage of the latest developments in computer based training (CBT) and the World Wide Web as an innovative mode for delivering education. The key research focus of this thesis is the design of the framework to best combine hypertext technology, computer-based training functionality's and interactive multimedia to enhance learning effectiveness. This research also focuses on the interactive multimedia to enhance learning effectiveness. Additionally, this research incorporates the migration and enhancement of a multiple criteria decision support textbook from print media to electronic media. Lessons learned from this development effort will be used to derive a general framework for developing integrated web-based CBT tools. A multimedia training module prototype developed during this research can be viewed at: (<http://www.cimnet.nps.navy.com/coop>).

### **BIDDING FOR CONTRACT GAMES: APPLYING GAME THEORY TO ANALYZE FIRST PRICE SEALED BID AUCTIONS**

**András I. Kucsma-Lieutenant Colonel, Army Hungarian Defense Forces**

**B.E., Military Academy of Artillery, St. Petersburg, 1977**

**Master of Science in Management-June 1997**

**Advisors: Katsuaki L. Terasawa, Department of Systems Management**

**William R. Gates, Department of Systems Management**

This study analyzed the first price sealed bid auction (FPSBA) using computer simulations. The first price sealed bid auction is a static Bayesian game with incomplete information. These games have a well-defined symmetric Bayesian Nash equilibrium. The existence of the equilibrium makes it possible to find the bidders' equilibrium strategies. The equilibrium strategy maximizes the bidders' profit. This thesis assumes, (1) the bidders act rationally and have private information about their production cost, (2) the bidders' preferences and information are symmetric, and (3) the buyer is committed not to deviate from the auction rules, even if a deviation would be profitable. Considering these assumptions and the equilibrium strategy, this thesis constructed a FPSBA model. The model was transformed into an algorithm and coded in Visual Basic language. The code was used to simulate the FPSBA in different scenarios. The simulation showed the bidders' behavior and identified factors affecting the bidders' decision during bid preparation. Critical factors include the cost distribution and number of bidders. The concluding chapter presents the analytical results.

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### **A STUDY OF THE CHINESE RELATIONSHIP ACROSS THE TAIWAN STRAIT**

**Hsin-yi Kuo-Lieutenant, Republic of China Navy**

**B.S., Chinese Naval Academy, 1988**

**Master of Science in Management-December 1996**

**Advisors: Roger Evered, Department of Systems Management**

**Shu S. Liao, Department of Systems Management**

This is a study of the relationship across the Taiwan Strait. The relationship between the Republic of China (ROC) on Taiwan and the People's Republic of China (PRC) on Mainland China is not only important to the two governments, but also is important to the world community. After an overview of the historical background and the political policy development of each side toward each other, this thesis points out the ROC and the PRC's current strategies in terms of their cross-Strait relation. Further, it examines four factors in the future development of their cross-Strait relationship; namely international politics, the PRC's stability, the ROC's public opinion of Taiwan independence, and interactions between both sides. Finally, the author provides conclusions and recommendations on how to improve the future relationship between the PRC and the ROC. The four primary recommendations are: adopting a concept of "soft sovereignty," implementing more pragmatic consultations, increasing exchanges, and creating mutual trust.

### **INVENTORY OPTIMIZATION OF CLASS IX SUPPLY BLOCKS FOR DEPLOYING U.S. MARINE CORPS COMBAT SERVICE SUPPORT ELEMENTS**

**Leonard D. Laforteza-Lieutenant, United States Navy**

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**Masters of Science in Management-June 1997**

**Advisors: Kevin R. Gue, Department of Systems Management**

**LtCol Timothy L. Phillips, U.S. Marine Corps Representative**

Combat Service Support Elements (CSSEs) for the U.S. Marine Corps deploy with a limited number of spare parts to keep the fighting unit at its highest level of readiness. Items that are requested by the unit, but not carried by the CSSE, are backordered, resulting in lower readiness and additional transportation costs. It is shown how to determine which items the CSSE should take, and in what quantities, to best support a fighting unit. The model was tested on data from a recently deployed Marine Expeditionary Unit (MEU), and the results suggest that the MEU could have experienced 13 percent fewer backorders and saved \$11,007 in shipping costs by using the model.

### **NAVY PERSONNEL WITH IN-SERVICE CRIMINAL RECORDS: CHARACTERISTICS OF OFFENDERS AND CAREER IMPLICATIONS**

**Miguel A. Lake-Lieutenant, United States Navy**

**B.S., Texas A&M University, 1988**

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**Advisor: Mark J. Eitelberg, Department of Systems Management**

**Eli S. Flyer, Defense Consultant**

National attention has been focused on the criminal offenses of Navy members while on active duty. This is due to recent incidents such as the rape of a young woman in Okinawa and the discovery of a military drug ring in Europe. Little is known about the characteristics of individuals who engage in criminal activity while on active duty or the effects of a member's criminal acts on his or her retention in the naval service. This thesis seeks to gain information on the characteristics of in-service offenders and to assist in designing improved enlistment standards and/or improved retention criteria. The Navy Enlisted Cohort file was merged with a Navy Criminal Investigations Service (NCIS) data file of enlisted personnel with serious in-service criminal investigations. The merged files were used to compare two groups of enlisted personnel: persons with serious in-service criminal investigations and the population of enlisted personnel without serious in-service criminal records. The study found: 1) offenders are considerably more likely to be discharged for failure to meet minimum behavioral performance criteria than for the offenses they commit and 2) current enlistment screening methods are not effective

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in identifying future in-service offenders. The study recommends that a consolidated database be developed to incorporate all information on in-service criminal activity. The database should include cases of Command Court Martial, detainment and arrest by Base Police, and cases adjudicated by civilian authorities as well as cases that are NCIS reportable.

### **IMPROVED MAINTENANCE AND READINESS THROUGH THE USE OF BUILT IN TEST (BIT) IN THE FIRE CONTROL SYSTEM OF THE MULTIPLE LAUNCH ROCKET SYSTEM (MLRS)**

**Charles D. Lassitter-Captain, United States Army**

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**Master of Science in Management-December 1996**

**Advisors: Jane N. Feitler, Department of Systems Management**

**Michael W. Boudreau, Department of Systems Management**

As the Army continues to face force and budget reductions while maintaining a high state of readiness, reliance on advanced technology systems is becoming more essential. The Army's leadership has recognized this challenge and is seeking ways to ensure readiness.

This thesis explores the application of the built in test (BIT) maintenance concept in supporting readiness in the Fire Control System (FCS) of the Multiple Launch Rocket System (MLRS). It provides background on the current Fire Control System and discusses factors both internal and external to the system that are driving the upgrade. Projected benefits gained from BIT are in terms of readiness through reduction in Mean Time To Repair (MTTR), cost savings, and compression of the maintenance levels. Application of BIT into other systems is covered.

BIT is one method currently being developed to maintain and improve readiness despite continued force and budgetary reductions. The goal of this thesis is to show how technology can be used to support readiness by increasing efficiency while minimizing costs.

### **THE EFFECTS OF MARRIAGE ON THE COHESION OF FLEET MARINE FORCE UNITS: AN OFFICER'S PERSPECTIVE**

**Stephen A. Lawson-Captain, United States Marine Corps**

**B.A., Miami University, 1991**

**Master of Science in Management-December 1996**

**Advisors: Alice Crawford, Department of Systems Management**

**Mark J. Eitelberg, Department of Systems Management**

This thesis examines the perceived effects of marriage on the cohesion of Fleet Marine Force units. Focused interviews were conducted with 25 Marine officers. All interviews were audio taped and then transcribed. Analysis of the transcripts revealed 11 general themes. These themes covered many topics, including how spouses affect Fleet Marine Force units, the connection between living in barracks and cohesion, the contrast between single and married Marines, and the judgment of junior enlisted Marines concerning marriage. A major finding drawn from the themes is that the Marine Corps must continue to strive for a deeper understanding of the relationship between marriage and cohesion and how the relationship affects Fleet Marine Force units.

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### **THE DEVELOPMENT OF A READINESS MODEL FOR MILITARY CONSTRUCTION (NAVY) INFRASTRUCTURES**

**Chad Henry Lee-Lieutenant, United States Navy**

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**Master of Science in Management-December 1996**

**Advisor: James M. Fremgen, Department of Systems Management**

**Second Reader: Shu S. Liao, Department of Systems Management**

As facilities throughout the Navy's infrastructure system degrade and require replacement, and as new missions require additional facilities, it is crucial that each facility approved will in turn improve an activity's ability to perform its mission. The central objective of this study was developing a method of predicting how new projects affect both an activity's and its major claimant's ability to succeed in their missions and to incorporate this prediction into the approval process. Research was conducted to determine how Naval Facilities Engineering Command (NAVFAC) currently approves construction projects and how additional information about an activity's facility condition, available in existing databases, could assist the approval system. The major development was an infrastructure readiness model that assesses the condition of each mission essential facility. From this condition assessment, the model attempts to predict how new construction projects or renovations at each activity will improve an activity's and its major claimant's current facility condition. Projects are then ranked in order of infrastructure readiness improvement. By using this model in conjunction with the current approval system, NAVFAC can determine whether activities and major claimants are requesting projects that improve both their infrastructure condition and their ability to complete their assigned missions.

### **DEVELOPING A WATERFRONT INTRANET**

**Curtis Corrigan Lenderman-Lieutenant, United States Navy**

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**Master of Science in Information Technology Management-September 1997**

**Advisor: Suresh Sridhar, Department of Systems Management**

**Second Reader: Rex Buddenberg, Department of Systems Management**

The objective of this thesis is to describe in detail the reasoning and development of a Waterfront Intranet which serves the shore-based staff and its numerous and geographically dispersed ships. This thesis is intended to show how a Waterfront Intranet can provide access to all of the in-port ships and staff members via a World Wide Web browser. It will provide more open communication in the Destroyer Squadron, quicker and more consistent information flows (service) to the ships, and reduced time spent on the telephone handling repetitive and often simple information exchanges. This intranet will be a Destroyer Squadron information clearinghouse, providing all key staff members with a 24-hour a day forum. Personnel will be empowered by information availability and are likely to be more proactive and innovative in the pursuit of mission readiness. A prototype has been developed to demonstrate the concept. The prototype is located at (<http://venus.as.nps.navy.mil>).

### **A STUDY OF INTRANET IMPLEMENTATION FOR THE REPUBLIC OF CHINA NAVY**

**Yi Liu-Lieutenant, Republic of China Navy**

**B.S., Chinese Naval Academy, 1988**

**Master of Science in Management-September 1997**

**Advisors: William J. Haga, Department of System Management**

**Shu S. Liao, Department of System Management**

An intranet is a computer network based on the data communication standards of the World Wide Web. These standards can contribute to enhance communication, collaboration, and information distribution within the organization. The adoption and implementation of this technology by industry has been swift, and broad, as organizations have quickly recognized the benefits to be realized from this technology for new organizational networks.

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This study presents a review of the Republic of China Navy's (ROCN) future intranet implementation and its potential applications. The first three chapters address the characteristics of intranet technologies, its pros and cons, its implementation issues, and the impact of the technologies on the Republic of China Navy Headquarters. The current information technology environment of the Republic of China Navy is reviewed. Some potential intranet applications are discussed in the Chapter IV. Recommendations are presented in the last chapter. These recommendations include more emphasis on information technology education in the ROCN. The overall conclusion of the study is that the ROCN leadership should embrace information technology at the highest level. Without a good implementation plan to manage and predict the growth of the information technology the Republic of China Navy will fail to realize this resource in the future.

### **OUTSOURCING: SHORT-TERM COSTS AND HUMAN RESOURCE ISSUES**

**Richard Wayne Loan-Lieutenant Commander, United States Navy**

**B.S., University of Texas A & M, 1985**

**Master of Science in Management-June 1997**

**Advisors: William R. Gates, Department of Systems Management**

**James L. Kerber, Department of Systems Management**

OMB Circular A-76 provides guidance for estimating the cost of commercial activities that are candidates for outsourcing. The benefits of outsourcing commercial activities are greater efficiency, better service, and reduced costs. However, DoD has experienced modest success outsourcing its commercial activities. This study exams DoD's limited success outsourcing commercial activities. Research was conducted by: studying the requirements of OMB Circular A-76; conducting interviews with comptrollers, base commanders, and human resources personnel; reviewing pertinent United States Codes and Codes of Federal Regulations; and reviewing court rulings establishing legal precedence. Outsourcing has experienced limited success due to DoD's reluctance to rely on inorganic assets, resistance from Congress and the executive branch, public-employee union criticism, improper incentives for Base Commanders, prohibitive short-term costs, and cumbersome A-76 requirements. To realize the benefits of outsourcing DoD must: fund programs that encourage volunteer separation, provide training for employees who complete the A-76, provide activities incentives to complete the process, fund outsourcing's short-term costs, fund staffs trained to handle outsourcing's human resources issues, seek modification of current bumping and retreating policies and streamline A-76 Circular requirements.

### **INTRANET FOR THE SYSTEMS MANAGEMENT DEPARTMENT**

**Edward D. Loewen-Captain, United States Army**

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**Master of Science in Information Technology Management-September 1997**

**and**

**Robert H. Lunn-Major, United States Army**

**B.S., Texas Tech University, 1983**

**Master of Science in Information Technology Management-March 1998**

**Advisor: Suresh Sridhar, Department of Systems Management**

**Second Reader: Hemant Bhargava, Department of Systems Management**

The objective of this thesis is to describe in detail the reasoning and development of an Intranet based decision support system. This thesis is intended to show how World Wide Web technologies can be used to develop a prototype Intranet that can provide access to information for faculty, students and staff members via a World Wide Web browser. It provides more open communication in the Department of Systems Management, quicker and more consistent information flows (service) to the faculty and staff, and reduced time spent on the handling of repetitive and often simple information exchanges. The decision support function is supported by a database which is an information clearinghouse, providing all personnel with 24-hour access. Personnel are empowered by information availability and are likely to be more proactive. A prototype has been developed to demonstrate the concept and to demonstrate the validity of rapid prototyping as a means of validating the effectiveness of the modified Intranet development methodology. The prototype is located at [<http://131.120.41.236>].

## 1997 THESIS ABSTRACTS

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### **SUSTAINMENT SUPPORT FOR NAVAL CONSTRUCTION FORCES OPERATING WITH MARINE AIR-GROUND TASK FORCES**

**Michael E. Loudy-Major, United States Marine Corps**

**B.S., University of Nebraska, 1982**

**Master of Science in Management-December 1996**

**Advisors: Paul J. Fields, Department of Systems Management**

**Kevin R. Gue, Department of Systems Management**

This thesis examines how Naval Construction Forces (NCFs) Operating with Marine Air-Ground Task Forces (MAGTFs) receive sustainment support. Restructuring of the military forces, in particular the Marine Corps engineer units, has resulted in an increase in the mission-dependent general engineering support that the Seabees provide to MAGTFs. The Seabees have developed a robust initial sustainment capability that serves them well in independent operations, but that can be a significant liability when operating with MAGTFs. This thesis analyzes the impact this robust sustainment capability has on the Seabees when they deploy in support of MAGTFs in terms of mobility and footprint. The research shows that elimination of initial sustainment material from the Seabees can reduce the Aircraft Load (ACL) requirements for the four Navy Mobile Construction Battalions (NMCBs) notionally slated to support a Marine Expeditionary Force (MEF) by more than 46 C-141B ACLs. Additional savings can be realized by realigning the medical capability of the NMCBs to a configuration similar to a comparable Marine Corps engineer unit. This reconfiguration would save weight and space as well as allow the NCF to eliminate almost \$5 million in medical equipment from its NMCBs.

### **OUTSOURCING FACILITIES MANAGEMENT: A COMPARATIVE ANALYSIS BETWEEN THE PRIVATE SECTOR AND DEPARTMENT OF THE NAVY**

**Christopher J. Luz-Lieutenant, United States Navy**

**B.S., Northern Arizona University, 1990**

**Master of Science in Management-December 1996**

**Advisors: James Fremgen, Department of Systems Management**

**Walter Owen, Department of Systems Management**

Because of a level DoD budget and the need to modernize the force, DoD is seeking ways to shift some operation and maintenance (O&M) dollars into procurement programs. One way to do this is through outsourcing.

This thesis compares the costs of performing facility management functions within the Navy at NAS Miramar and of outsourcing these functions (to private contractors at NAS Fallon). The purpose is to determine if a significant cost difference exists between the two bases. Actual facility management costs were obtained from both NAS Miramar and NAS Fallon for fiscal years 93-96. An area adjustment was made to the cost data at Fallon because of the higher cost of living in San Diego compared to Fallon, Nevada. The thesis also addresses how the Navy deals with nonfinancial factors, such as quality and performance, in an outsourcing situation.

The areas studied in facilities management include the operation and maintenance of buildings, utilities, and vehicles; maintaining environmental quality; administration and formulation of contracts; and management support. The study found outsourcing was cheaper in three areas, in-house was cheaper in five, and the cost were similar in one area over a 4-year period.

### **INTERNET AT SEA FOR THE HELLENIC NAVY**

**Panagiotis Lymberis-Lieutenant, Hellenic Navy**

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**Master of Science in Management-March 1997**

**Advisors: Rex Buddenberg, Department of Systems Management**

**Suresh Sridhar, Department of Systems Management**

The Hellenic Navy (HN) is confronted with a set of mission-related challenges that can not be efficiently supported by existing information systems. However, the transition to more modern information systems needs to fulfill a basic principle

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of command and control, "unity of purpose." This thesis uses the unifying concept of information architectures to identify some desired characteristics for future HN information systems. Two real-life projects are reviewed to substantiate the analytical suggestions borrowed by the client-network, or network-centric architectural paradigm. The "SeaNet" project is used to show the feasibility and utility of extending internet technologies to the maritime environment. The "Baffle Force e-mail" project is presented as a pilot program for the introduction of TCP/IP based data exchange between units at sea. In the concluding chapter, a set of recommendations is made for the transition to a network-centric information architecture for the Hellenic Navy and the development of internetworking capabilities over seawater.

**NAVY INVENTORY MANAGEMENT DECISION-MAKING**  
**Steven D. MacDonald-Lieutenant Commander, United States Navy**  
**B.S., State University of New York, 1986**  
**Master of Science in Management-March 1997**  
**Advisors: Paul J. Fields, Department of Systems Management**  
**Michael D. Stroup, Defense Resources Management Institute**

The General Accounting Office (GAO) has stated that the Department of Defense (DoD) believes it is better to overbuy inventory items than to manage with just the right amount of stock. This thesis asserts that Navy inventory managers do not have a general tendency to overbuy items, but rather make rational purchasing decisions influenced and motivated by the environment of rewards and penalties in which they work. It is also asserted that Navy inventory managers are risk adverse due to the nature of their environment. Personal stockout costs are examined as one of the key factors influencing decision-making and risk adverse behavior. This thesis introduces a conceptual model that describes the Navy inventory management decision-making environment. This model shows the relationship between personal stockout costs, required service levels, cost considerations, and planning horizons across the different decision-making levels in the Navy. This study concludes that readiness-based performance measures must be changed to incorporate a cost focus, and that the risk facing inventory managers due to personal stockout costs needs to be reduced to change their behavior if lower inventory levels are desired.

**CASHLESS SHIPS: A FEASIBILITY STUDY**  
**Carey M. Manhertz-Lieutenant Commander, United States Navy**  
**B.S., United States Naval Academy, 1987**  
**Master of Science in Information Technology Management-September 1997**  
**Advisor: Suresh Sridhar, Department of Systems Management**  
**Second Reader: Rex Buddenberg, Department of Systems Management**

The advent of mechanisms for facilitating electronic commerce has triggered widespread interest in several fields. However, research in electronic commerce to include Smart Card Technology has mainly focused on land-based transactions. This research investigates the role of Information Technology in facilitating electronic commerce at sea, aboard U.S. Navy ships. It determines the feasibility of replacing the current cash shipboard architecture with a cashless network providing real time accounting and banking applications. This research verifies the feasibility of cashless network systems aboard ships with cashless mechanisms. The motivation for this research to provide and ensure monetary freedom to sailors at sea. This research evaluates the efficiency of cash processes using Commercial off the Shelf technologies. It also identifies workload demands through automated networks, and verifies seamless integration with cashless processes available commercially. A review is conducted of the existing shipboard cash systems. Then, the motivation for electronic commerce on ships is discussed. Two active prototype solutions are investigated. And finally, some of the lessons learned based on the experiences of these prototypes are summarized with a recommendation for the future.

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### **MANAGING DIVERSITY IN THE UNITED STATES NAVY**

**Cheryl D. Manning-Lieutenant, United States Navy**

**B.S., Hampton University, 1987**

**Master of Science in Management-March 1997**

**Advisors: Alice Crawford, Department of Systems Management**

**Mark J. Eitelberg, Department of Systems Management**

**George Thomas, Department of Systems Management**

Diversity management has become a strategy used by many organizations and management practitioners in recent years. The goal is to ensure that all people are respected, and valued, and that their talents are fully utilized within the organization. Organizational strategies incorporating total systems change are being used widely to accomplish the objective. This thesis seeks to develop a "managing diversity" program for the Navy. It reviews the approaches used by private and public organizations to manage diversity. This thesis also evaluates new approaches by diversity management practitioners and organizations. It is recommended that the Navy commit to organizational change utilizing a total systems change approach, which affects the individual, interpersonal relationships, the organization's systems, policies and practices, and the culture of the organization. The total system must be addressed to effectively sustain managing diversity in the U.S. Navy.

### **THE STATE-OF-THE-ART OF PROPRIETARY FINANCIAL REPORTING IN THE DEPARTMENT OF THE NAVY**

**Jeffrey L. Manning-Captain, United States Marine Corps**

**B.S., Hampton University, 1988**

**Master of Science in Management-December 1996**

**Advisors: Douglas Moses, Department of Systems Management**

**John E. Mutt, Department of Systems Management**

With the enactment of the Chief Financial Officers (CFO) Act of 1990, the Department of the Navy (DoN) is required to produce proprietary financial statements for fiscal year 1996 and beyond. Proprietary financial reporting focuses on the creation, management, and use of all resources (assets) of an organization, not just on expendable funds. This thesis provides a comprehensive overview of the state-of-the-art of proprietary financial reporting in the DoN. To address this issue, a review of the laws, policies, and agencies which effect proprietary reporting was conducted, along with a comparison between Federal government and private sector financial reporting. An analysis of the form and content of the primary proprietary reports, the Statement of Financial Position and the Statement of Operations and Change in Net Position, and an analysis of the information systems, which are used to gather the data, was conducted. The DoN is operating in a time of expanding requirements with limited resources. This review of proprietary financial reporting in the DoN has shown that the statements required by the CFO Act can be produced. However, the deficiency of the information systems, which affect the accuracy of the data, combined with inadequate performance measurements, lessens the current value of the proprietary financial statements.

### **CHANGES NEEDED IN DOD'S INCENTIVE AND REWARD STRUCTURE TO AFFECT INVENTORY REDUCTIONS IN DOD INVENTORY LEVELS**

**Elysheva S. Martin-Lieutenant, United States Navy**

**B.S., Miami University, 1986**

**Master of Science in Management-December 1996**

**Advisors: Paul J. Fields, Department of Systems Management**

**Erik Jansen, Department of Systems Management**

In its report titled "Organizational Culture: Use of Training to Help Change DoD Inventory Management Culture," (GAO/NSIAD-94-193) (1994), the Government Accounting Office asserts that the Department of Defense would be able to reduce its inventory of secondary items and develop a culture of economic and efficient inventory management if Department of Defense inventory management personnel were trained in modern logistics practices. In contrast, this thesis presents the

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position that high inventory levels are the result of performance measures and reward systems that encourage holding high levels of inventory. Included is a description of performance measures used for Item Managers, Inventory Managers, and unit commanders along with a discussion of an employee motivation model and other systemic factors that impact inventory levels. This thesis suggests the addition of Inventory Turnover and Total Costing to the performance appraisals of those within the Department of Defense's supply systems, and a separation of readiness criteria into supply-related and non-supply-related issues for unit commanders' performance appraisals as means to promote lower on-hand secondary inventories while continuing to meet the demand for those items.

### **IMPACT OF ZIMBABWE - SOUTH AFRICA TRADE RELATIONS: A BILATERAL, REGIONAL, OR MULTILATERAL APPROACH?**

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The pursuit of a seemingly unfruitful bilateral trade arrangement with South Africa, and continued participation in overlapping, but non-functional regional free trade areas, has left Zimbabwe in foreign trade dilemma, specially in the light of the deteriorating terms of trade with South Africa, her main trading partner and competitor for both mutual and regional trade.

This thesis examines the various regional trade possibilities involving Zimbabwe and South Africa using the free trade area and customs union models of international trade. Whereas a functional bilateral trade agreement or a regional customs union culminating in a common market might improve Zimbabwe's regional competitiveness in the short run, due to South Africa's economic dominance and protectionist trade policies, Zimbabwe's potential to benefit from trade with non-participants would be severely curtailed. However, a broad free trade area, which allows flexibility to pursue national trade policies, seems less harmful. The analysis concludes that only a broad free trade area superseding all current eastern and southern African regional trade arrangements, would increase Zimbabwe's economic welfare. It would be in the interests of all regional countries to finalize a single broad free trade area rather than maintain the status quo.

### **EVALUATION OF THE INVENTORY AND ACCOUNTABILITY PRACTICES OF COMMON SUPPORT EQUIPMENT THROUGHOUT PACIFIC AND ATLANTIC FLEETS**

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B.S., United States Naval Academy, 1981**

**Master of Science in Management-March 1997  
and**

**Joyce L. McCallister-Major, United States Marine Corps  
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**Robert D. Pridgen-Captain, United States Marine Corps  
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**James G. Taylor, Department of Operations Research  
Gordon R. Nakagawa, Department of Operations Research**

Within Naval Aviation, Common Support Equipment (CSE) plays a critical yet unglamorous role in maintaining aircraft material readiness. Defense of CSE dollars is difficult because the output of Aviation Support Equipment is not measurable. The ability to quantify and defend that role has been the nemesis of the Aviation Support Equipment Integrated Program Team members over the past two budget cycles.

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This study's intent is to provide an argument in defense of adequate program funding. The premise of this argument is: Inventory validity is a major consideration in making sound investment decisions. If the Fleet SE inventory validity is within acceptable limits, then the Fleet's input into the re-capitalization decision support system is valid. If the Fleet's SE inventory validity is poor, then the Fleet's buyout input is suspect. The foundation of this research is to determine how accurately the Fleet's on-hand assets reflect in the automated inventory database used to manage those assets.

This research concludes that the mean SE validity for a reporting custodian's Intermediate Maintenance Activity (IMA) or Organizational Maintenance Activity (OMA) account is 72.4%. Fleet Individual Material Readiness List (IMRL) inventory control processes are hampered by a lack of quantifiable metrics, duplicative and conflicting inventory control methods, and lack of a single source directive detailing inventory procedures. Failure to control these processes degrades the IMRL decision support system, hampers recapitalization decisions, and inhibits the ability to determine how SE—or the lack thereof—impacts aircraft material readiness.

### **INTEGRATED PRODUCT TEAM IMPLEMENTATION AND LEADERSHIP AT THE PROGRAM LEVEL**

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**Master of Science in Management-December 1996**

**Advisor: Susan Hocevar, Department of Systems Management**

**Keith Snider, Department of Systems Management**

This thesis presents exploratory research that investigated how integrated product teams at the program office level are being implemented in response to Department of Defense policy. Research data were gathered by conducting interviews with twenty participants from three teams representing two program offices. Interviewees were queried about their experiences with integrated product teams relative to issues derived from research literature on effective teams: team implementation processes, mission and structure, training, team management, decision making and conflict resolution methods, and implementation challenges and pitfalls. The research, though only a small sample size, revealed that program managers are consistent with what current teaming literature considers to be "good teaming practices" in the areas of: basic team structure and functional area mix, openness and participation in meetings, and the administration of team meetings. The research also identified practices or problems that the research literature suggests limits team success such as the lack of team consistency and stability, team specific training, team self-assessment and evaluation methods, and the absence of formal feedback mechanisms. Mixed findings were revealed in the areas of empowerment, team self-management, decision making and conflict resolution processes, and support for the teaming concept by senior management.

### **CALIBRATION LABORATORIES AS A REGIONAL REPAIR CENTER: CONSOLIDATE OR COLOCATE?**

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**Master of Science in Management-December 1996**

**and**

**John E. Pasch-Lieutenant, United States Navy**

**B.S., University of North Carolina at Wilmington, 1986**

**Master of Science in Management-December 1996**

**Advisors: Lawrence R. Jones, Department of Systems Management**

**Gordon E. Louvau, Department of Systems Management**

The purpose of this thesis is to examine the integration of AIMDs Miramar and North Island, and NADEP North Island calibration laboratories. The expected benefits and weaknesses or problems resulting from integration are examined. The benefits analyzed include those in the areas of manpower, training, standards reduction, inventory reduction, streamlining facilities, and increased productivity. The problems analyzed include increased transportation costs, facilities modification costs, reduced military resiliency, potential negative impact on customer service, and issues related to sea/shore rotation, AIS, and the internal chain of command. The thesis also discusses Navy organizational structure and financial management

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policy, and the aspects of each that make it difficult to implement change. The thesis concludes that consolidation is feasible and there are scale economies to be achieved from consolidating the Intermediate and Depot level calibration laboratories at NAS North Island. However, the financial management and command and control issues must be solved before the benefits of Regional Maintenance can be realized.

### **WINDOWS NT THREATS AND VULNERABILITIES**

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**Master of Science in Information Technology Management-September 1997**

**Advisor: Norman Schneidewind, Department of Systems Management**

**Second Reader: Douglas Brinkley, Department of Systems Management**

The objective of this research is to examine the threats and vulnerabilities of a Windows NT network. One aspect of this research is to add to the Department of Defense's understanding of the disadvantages of the system. This research demonstrates five vulnerabilities of Windows NT with respect to the military network operating system security environment. First, there is the NetBIOS-over-TCP/IP vulnerability. Windows NT by default allows networking over this protocol. This protocol could allow an attacker to remotely connect to a drive and edit the registry. Second, the server message block (SMB) vulnerability allows remote access to shared directories. An unauthorized user could use this hole to access everything on the shared resources. Third, the remote registry access vulnerability could allow an attacker to view and change the contents of another computer's Registry. Fourth, improperly set permissions could allow unauthorized access to sensitive and classified data. Fifth, the built-in file transfer protocol (FTP) service allows users to change directories. Users could use this hole to see the root directory. Before DoD becomes too committed to Windows NT, these issues need to be addressed.

### **CONTRACT ADMINISTRATION ORGANIZATION: A CASE STUDY OF THE U.S. MARINE CORPS ADVANCED AMPHIBIOUS ASSAULT VEHICLE PROGRAM**

**Keith M. Moore-Major, United States Marine Corps**

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**Danny A. Shockley, Department of Systems Management**

As weapon systems have become more complex and costly, the DoD has explored a variety of methods to decrease the acquisition cycle, reduce costs, and enhance performance of the systems acquired. Current DoD initiatives have focused upon reducing the Government's unique specifications and activities that are not cost effective. This has led to a reexamination of Government policies and practices regarding oversight of contractors. This philosophical shift toward a more team-oriented approach to major weapon systems acquisition has caused a change in the management techniques used by the Government, and consequently, has impacted the structure and relationships between the Government organizations responsible for monitoring and controlling contract performance. This thesis develops a continuum of organizational models based upon the level of control the Government desires in managing a weapon system program. The need for control is based upon the confidence and trust placed in the contractor's capabilities and motivations. The U.S. Marine Corps Advanced Amphibious Assault Vehicle program is then analyzed in terms of the continuum to develop a generic model of the types of organizational structure and inter-organizational agreements needed to promote a culture of partnership between industry and the various Government agencies that are responsible for contract management.

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### **AN INTRANET FOR THE SYSTEMS MANAGEMENT CURRICULAR OFFICE**

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Intranets are a recent development in information technologies which have provided a wealth of IS utility. "Intranet" refers to the use of World Wide Web technology to manage information within an organization—a self-contained Internet running on a LAN or WAN. Generally, the technologies used include web servers, browsers, hypertext transfer protocol (HTTP), hypertext markup language (HTML) pages, and search engines. Many organizations are now using or building intranets to distribute, collect, and share timely, consistent, and accurate information. The Systems Management (SM) Curricular Office at the Naval Postgraduate School presently relies on an inefficient paper-based system for distributing and collecting information from students. This thesis examines how an intranet can overcome the limitations of the current paper-based system. Rapid Application Development (RAD) methodology is used to conduct an analysis of current data flows and processes, and develop a working prototype of an intranet.

### **DETERMINING OUTSOURCING POTENTIAL FOR THE INVENTORY MANAGEMENT OF NAVY REPAIRABLES**

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**Advisors: Paul J. Fields, Department of Systems Management**

**Robert B. Vassian, Department of Operations Research**

The potential exists to outsource the inventory management of repairable items to the private sector. However, the Navy must be able to determine when outsourcing will benefit DoD. This research compares Navy inventory management to commercial inventory management in proposed and existing outsourcing programs and develops a model which the NAVICP can use to estimate the potential success for outsourcing repairable items. The research develops an inventory surcharge of 19 percent. The inventory surcharge represents the Navy's costs to perform functions which can be outsourced and serves as a benchmark for comparison to commercial costs. The research then analyzes the costs and benefits of several successful DLA and NAVICP outsourcing initiatives. The analysis results in a model which NAVICP can use to screen repairable items to determine which level of outsourcing will succeed.

### **DEVELOPING CORE COMPETENCIES AND MEASURES OF EFFECTIVENESS FOR A NAVY MEDICAL CHIEF INFORMATION OFFICER**

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**Master of Science in Information Technology Management-September 1997**

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While not all organizations benefit from the establishment of a Chief Information Officer (CIO), organizations that rely on information resources to accomplish their mission will gain a definite strategic advantage from developing an executive level position that can deal strategically with information technology and information resources. The Department of the Navy (DoN) medical department has established the position of CIO in a number of locations throughout the world. The purpose of this thesis is to use critical success factors to identify core competencies and skills essential for civilian medical CIOs and the core competencies and skills identified as essential for Department of Defense CIOs. By combining these two groups of core competencies and skills, this thesis develops a set of core competencies and skills necessary for a DoN

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medical department CIO. Additionally this thesis develops measures of effectiveness for the medical CIO in a DoN environment to gauge his effectiveness in contributing to the executive management of the organization.

### **A DICTIONARY OF ACQUISITION AND CONTRACTING TERMS**

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**David A. Smith, Department of Systems Management**

This thesis effort is a continuance of research to determine, through a consensus of opinion among contracting professionals, a definition for current contracting terminology. This research was first initiated by Lieutenant Commander Daniel L. Ryan, Supply Corps, United States Navy and was later accomplished by others at both the Naval Postgraduate School, Monterey, California, and at the Air Force Institute of Technology, Wright-Patterson Air Force Base, Ohio. As with the previous efforts, this thesis examined literary sources for the current definitions and usage of the chosen terms. A definition for each of twenty-five terms was synthesized, incorporated in an open ended survey, and sent to contracting professionals affiliated with the National Contract Management Association. Respondent comments were analyzed, and, when appropriate, incorporated in the final, proposed definitions.

### **USING THE ACQUISITION PROCESS TO REDUCE THE VULNERABILITY OF FUTURE SYSTEMS TO INFORMATION WARFARE**

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**Advisors: Keith F. Snider, Department of Systems Management**

**Dan C. Boger, Command, Control, and Communications Academic Group**

Information warfare (IW) is a growing concern for the United States Army. The sophisticated, high-technology modern weapons systems upon which the U.S. Army heavily relies are increasingly vulnerable to IW weapons and tactics. The acquisition process plays a major role in reducing defense systems' IW vulnerability. This research identifies the primary IW threats to systems during the acquisition lifecycle and what factors in the acquisition environment contribute to IW vulnerability. This research also suggests a technique for integrating IW countermeasures into the defense systems acquisition process. A primary finding of this research is that while a Program Management Office (PMO) can institute a myriad of useful countermeasures, influencing the prime contractor to establish a secure development environment is the most important action it can take in reducing the vulnerability of future systems to IW.

### **AN EXPLORATORY COST ANALYSIS OF NAVY RECRUITING STATIONS**

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**Gregory G. Hildebrandt, Department of Systems Management**

In determining the most cost effective recruiting station locations, the military services must be able to identify station costs that vary by location as well as location-specific differences in production. This thesis is an exploratory analysis of station-level costs for Navy Recruiting stations. The thesis attempts to identify: (a) the relevant costs of Navy recruiting station location and realignments; (b) the effect of location and realignment decisions on these costs; and (c) who collects the relevant cost items. The thesis explores the feasibility of collecting the data necessary for a cost analysis of alternative

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station locations. Finally, the thesis aims to evaluate the feasibility of automating cost collection at the recruiting station level. To accomplish these goals the thesis reviews the Navy's responsibilities, policies, procedures, and rationale in determining recruiting resource allocation decisions. The methodology relies on a review of the literature and personal interviews with individuals from Commander, Navy Recruiting Command, Navy Recruiting Areas, selected Navy Recruiting Districts and the Office of the Secretary of Defense's Joint Recruiting Facilities Committee. Two Navy Recruiting Districts are surveyed to collect cost data for a random group of their recruiting stations. These station costs are then matched with the facilities lease and contract cost data from the Army Corps of Engineers' Recruiting Facilities Management Information System and the vehicle cost data from the General Services Administration. An illustrative spreadsheet is constructed containing cost information for stations in NRD San Francisco. The spreadsheet provides cost-per-contract for these stations. Although the thesis was unable to conduct a full cost-effectiveness analysis, it proposes two approaches for future collection and analysis of the necessary cost data.

### **CENTRALIZED VERSUS DECENTRALIZED ALLOTMENTS IN THE NAVAL SURFACE RESERVE FORCE**

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**Advisors: Richard Doyle, Department of Systems Management**

**John E. Mutt, Department of Systems Management**

The purpose of this thesis is to examine the advantages and disadvantages of centralized versus decentralized allotments in the Naval Surface Reserve Force. This research will assist the Reserves in determining which system offers the most efficient use of diminishing resources. A literature review on private and government sector systems was completed. Interviews were conducted with key personnel at echelons two, three, and four. The next step was to establish an historical background of the Naval Surface Reserve Force and a baseline of the Reserve Personnel Navy (RPN) and Operations and Maintenance Navy Reserve (O&MNR) allotments. The resultant analysis explains the advantages and disadvantages of the two allotments. If the RPN allotment were decentralized, it would allow responsibility at a lower level, more efficient utilization of funds, and a better identification of actual costs. Decentralization of the RPN allotment to the echelon four command level would entail additional costs for manpower, training, and Management Information Systems. It is recommended that some portions of the RPN allotment be lowered to the echelon four command level.

### **AN AUTOMATED SPATIAL DECISION SUPPORT SYSTEM FOR THE RELOCATION OF ARMY RESERVE UNITS**

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**Master of Science in Information Technology Management-March 1997**

**Advisors: Daniel Dolk, Department of Systems Management**

**George Thomas, Department of Systems Management**

This research analyzes the process used to evaluate potential relocation sites for Army Reserve units from the perspective of military readiness. A comparative decision model (based upon Multi-Attribute Utility Theory), augmented by a Geographic Information System (GIS), was designed and implemented in an automated Spatial Decision Support System (SDSS). This SDSS provides a flexible structure that can be generalized to serve as an executable conceptual model for a wide range of decisions containing significant geographic or location-related components.

The Army Reserve Installation Evaluation System (ARIES) integrates several commercial software products in a seamless and synergistic manner. Data extracted from numerous large databases is spatially processed by a commercial mapping engine, and then overlaid onto a formal decision model. The decision maker can rely on a single, simplified interface that consistently applies the professional judgement of a panel of experts to produce standardized reports, or choose from a robust suite of methods for model management, sensitivity analysis, and the display of results. A process that

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previously required weeks can now be completed in minutes. More important, this approach improves the decision-maker's effectiveness by conveniently providing insights into the nature of the source data and the decision process.

### **ANALYZING THE ARMY'S CONFIGURATION MANAGEMENT SYSTEM APPLICABILITY TO A COMMERCIAL CATALOGING SYSTEM**

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**David V. Lamm, Department of Systems Management**

General Motors and Ford Motor Company maintain complete Configuration Control of their products and automobiles. That is, a customer orders a replacement vehicle part from their local dealership. Within a few days, they receive the part that meets the form, fit, and function requirement.

Military personnel requiring replacement or spare parts must submit a written request which requires the part name, number with revision level, and the national stock number. Barring any delays, the part is received within two to three days. In most cases, however, there are delays and it takes up to several weeks to receive the part.

The purpose of this thesis is to identify the key elements required for Configuration Management, identify policies, procedures, and regulations that govern, shape, and dictate secondary item procurements, and to analyze the Department of the Army's and Industry's spare parts procurement process.

This thesis demonstrates that the Department of the Army's and Industry's Configuration Management models are similar; but the policies and regulations that govern, shape, and dictate secondary item procurements are quite different; and that Congress and Government agencies must change their policies to adapt to commercial practices. The thesis also demonstrates that the current direction the Government is taking in acquisition reform will seriously impede improvements in the field of Configuration Management, which encompasses the development and maintenance of technical data packages that support secondary item procurements.

### **ANALYSIS OF THE U. S. MARINE CORPS' STEADY STATE MARKOV MODEL FOR FORECASTING ANNUAL FIRST-TERM ENLISTED CLASSIFICATION REQUIREMENTS**

**Van Q. Nguyen-Captain, United States Marine Corps**

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**Michael D. Cook, Department of Systems Management**

The Marine Corps accesses approximately 29,000 to 36,000 new recruits annually. Determining how to classify these new enlistees into more than 200 Military Occupational Specialties is a critical task. These classification estimates must be precise, so the units within the Fleet Marine Force will have the necessary personnel to accomplish their mission. At the same time, these manpower planners must also balance the force structure to minimize personnel overages which could lead to excessive labor and training costs as well as promotion delays.

The purpose of this research is to validate and, if necessary, improve the steady state Markov model currently being utilized by the manpower planners at Headquarters, U.S. Marine Corps (Code MPP-23) to forecast the annual personnel classification requirements of new recruits. From a mathematical perspective, all the essential elements of their model were present; however, some of the components like the year one continuation rate were not computed according to standard practice, and their estimates of the classification stocks are imprecise due to rounding errors inherent in their forecasting procedure. As a result, a revised model was developed to improve the accuracy and timeliness of the personnel classification forecasts. The recommendations were to implement the revised model and to review the computation of the continuation rates.

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### **SEANET REMOTE WIRELESS INTERNET PROJECT MANAGEMENT PLAN**

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**Master of Science in Information Technology Management-September 1997**

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Ubiquitous computing, the ability to use computer resources anywhere and at anytime to accomplish tasks, is a capability that is in much demand. The Internet has provided an opportunity to meet this demand. However, access to the Internet is limited by connections to land-based wired systems. In order to truly achieve effective ubiquitous computing, technology must be developed that extends Internet access to remote and mobile platforms by using wireless access. The SEANET is a proof of concept collaborative project seeking to extend Internet access to the sea for the Oceanographic Research Fleet. This thesis studies how the Internet evolved to draw lessons learned that can be applied to the development of SEANET. It also presents a possible method for more effectively meeting the SEANET goals through use of a Project Management Plan.

### **DEVELOPMENT AND APPLICATION OF A MULTIMEDIA ASSESSMENT TOOL**

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**Master of Science in Information Technology Management-March 1996**

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William Haga, Department of Systems Management**

In the Naval Aviation community, interactive, multimedia computer-based training is being explored as a cost-effective alternative to traditional modes of training. This thesis develops an assessment tool for multimedia systems to be used in computer-based training by combining performance recommendations for multimedia hardware and software. It delivers a checklist for multimedia developers to assess the capability of proposed multimedia training systems.

### **AN ANALYSIS OF THE PROPOSED SURFACE WARFARE OFFICER CAREER INCENTIVE PAY (SWOCIP) PROGRAM USING AN ANNUALIZED COST OF LEAVING (ACOL) MODEL**

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**Advisors: Stephen L. Mehay, Department of Systems Management  
Gregory G. Hildebrandt, Department of Systems Management**

This thesis investigates the effect of the proposed Surface Warfare Officer Career Incentive Pay (SWOCIP) program on the voluntary separation behavior of Navy surface warfare officers using an Annualized Cost of Leaving (ACOL) model. Data provided by the Center for Naval Analyses and the Defense Manpower Data Center (DMDC), Monterey, CA, on surface warfare officers are used for this analysis. Multivariate probit models are estimated to predict the effects of the proposed SWOCIP program on the voluntary retention rate of surface warfare officers between six and ten years of service. These estimates are used to calculate the costs and benefits of the SWOCIP program. This thesis finds that the SWOCIP program would increase the voluntary retention rate by 2.62 percent in the sixth year of service and 1.16 percent in the seventh year of service. The effect would decrease between eight and ten years of service. The calculated savings in accessions are greater than the estimated bonus cost. These calculations indicate, therefore, that the program is cost-effective.

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### **SPAWAR YEAR 2000 ASSESSMENT PHASE CASE STUDY**

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**B.S., New York State University, 1995**

**Master of Science in Software Engineering-September 1997**

**Advisors: Tung Bui, Department of Systems Management**

**Elizabeth M. Gramoy, Naval Command, Control, and Ocean Surveillance Center-San Diego**

This thesis involves a case study that surveys government systems within the Space and Naval Warfare Systems Command (SPAWAR) to (i) determine the Year 2000 impacts within their Department of the Navy (DoN) systems, (ii) compare this impact with current industry experience, (iii) evaluate the cost drivers used in estimating costs within the DoN and determine if these cost drivers are valid for use in estimating Year 2000 costs for SPAWAR systems, and (iv) evaluate the Assessment Phase process. In this case study it was observed that the SPAWAR systems were impacted in the same manner by the Year 2000 problem as private industry. The SPAWAR systems cost modeling will require calibration for unique Year 2000 cost drivers in addition to cost drivers unique to the Department of Defense. The Year 2000 Assessment Phase requires strong management support and a centralized Year 2000 office responsible for all aspects of a Year 2000 effort.

### **MILITARY PRODUCTS FROM COMMERCIAL PRODUCTION LINES - A FEASIBILITY STUDY**

**Shane T. Openshaw-Captain, United States Army**

**B.S., University of Utah, 1986**

**Master of Science in Management-December 1996**

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

As defense budgets decline and traditional defense industry suppliers downsize and consolidate, many believe that the Department of Defense (DoD) must learn how to do business in the commercial marketplace. In fact, commercial industry is pacing technological advances in many important areas. Many current and ongoing acquisition reform initiatives are geared to improve the business practices of DoD and to integrate the commercial and defense sectors of the industrial base. This thesis is an examination of one such acquisition reform program. The Air Force's "Military Products From Commercial Production Lines Pilot Program" is demonstrating the feasibility of a commercial firm to manufacture military avionics modules. This thesis explores existing technical, legal, and cultural barriers to implementing the pilot program, analyzes the program's risks and benefits, and makes recommendations for future applications. The thesis provides an account of the successes, failures, and lessons learned that may be used by program managers at all levels in determining if commercial industry can be a viable source of military-unique end-items.

### **THE DEREGULATION OF ELECTRIC UTILITIES IN CALIFORNIA AND ITS EFFECT ON NAVY INSTALLATIONS**

**Patrick J. O'Shea-Lieutenant Commander, United States Navy**

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**James L. Kerber, Department of Systems Management**

On January 1, 1998, California will be the first state to deregulate its electricity industry. Deregulation is expected to reduce the high rates paid throughout the state by allowing competition, not regulators, to determine rates.

Deregulation will dissolve the monopoly of the electricity industry by allowing customers to choose who will supply their electricity. Competition will emerge in the generation market, where transactions between consumers and suppliers will be free and open. Under regulation, most customers do not have a choice in their electricity supplier. Their supplier is usually determined by their geographic location.

This thesis researches the differences between the regulated and deregulated rate structures and provides a cost comparison for a Navy organization classified as a large commercial/industrial user of electricity. There are many aspects of

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deregulation that are not yet determined, but the initial comparison indicates deregulation may save Navy installations money. If deregulation progresses as planned, additional future saving may occur.

### **CONCEPTUAL DESIGN OF A CYBERNETIC INFORMATION SYSTEM FOR COMMAND AND CONTROL**

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**Second Reader: Hemant K. Bhargava, Department of Systems Management**

This thesis argues a case for focusing command and control efforts more towards conflict deterrence vice conflict resolution and proposes a conceptual design for a command and control system to accomplish this paradigm shift. It also addresses the issue of shortening the Observe, Orient, Decide, Act (OODA) Loop of a decision-maker to enhance control while disrupting an adversary's control of a situation. Accomplishing these goals requires some method to handle the overabundance of data available for processing and analysis.

The proposed system would use advanced, but existing, information technology, incorporating cybernetic models, to enhance a decision-maker's control process. It does this by collecting, processing, and fusing all-source data for presentation to a decision-maker. Natural Language Processors categorize, filter, and fuse relevant data while advanced visualization engines display that data in a way that improves a decision-maker's ability to rapidly assimilate information, and increase knowledge and understanding.

This thesis shows that using cybernetic models, and advanced Artificial Intelligence tools, a design exists that could help increase understanding and control by improving the decision-making process and shortening the decision-maker's OODA Loop.

### **ISSUES IN SPACE LAW AND POLICY**

**Steven A. Padget-Lieutenant Commander, United States Navy  
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**Master of Science in Systems Technology-December 1996**

**Advisor: Dan C. Boger, Command, Control, and Communications Academic Group**

**Second Reader: Carl R. Jones, Department of Systems Management**

This thesis provides a student studying space with background information and insight into selected issues that have shaped, or continue to shape, the world's approach to activities involving space. Further, the basic understanding gained through the study of these issues and their connection with international treaties and policies gives an appreciation for the regulatory side of space programs.

Some of the topics discussed are the delimitation and control of space, space debris, and the interpretation of the Anti-Ballistic Missile Treaty. Though they are often seen as issues in space law, it is shown that political considerations and decisions more often determine the outcome or path followed. Further, technical aspects and applications have seemingly usurped any laws which govern use, i.e., what can or cannot be done. Regardless, a commitment to the future use of space is as important as current operations.

This does not imply a need to quickly fill this legal void with well-meaning rules to provide structure. Rather, it is seen that certain laws do need to be created in order to ensure the continued access and use of space will not be interrupted.

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## 1997 THESIS ABSTRACTS

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### THE NAVAL POSTGRADUATE SCHOOL PUBLIC WORKS DEPARTMENT MAINTENANCE REQUEST PROCESS ANALYSIS

Hui K. Pak-Lieutenant, United States Navy

B.S., University of Florida, 1991

Master of Science in Management-June 1997

and

Robert J. Ware-Lieutenant, United States Navy

B.S., University of South Florida, 1988

Master of Science in Management-June 1997

Advisors: William R. Gates, Department of Systems Management

Captain John B. Schmidt, Institute for Defense Education and Analysis

This thesis analyzes the maintenance request process for the Public Works Department (PWD) at the Naval Postgraduate School (NPS). A flow chart of the maintenance process was developed through interviews with PWD personnel. The PWD's historical database files for FY94 to FY97 provided the data for the analysis. The process flow chart and the data analysis identified areas of inefficiencies and bottlenecks. Methods to relieve the bottlenecks and improve efficiency were identified. Performance metrics were also identified to help the PWD track performance and identify areas where further improvements could be made.

This research found that the PWD can benefit most by improving labor scheduling, material requisitioning, and its information technology management system. Additional benefits could materialize from improving the PWD's allocative efficiency (i.e., project priority system).

### INTEGRATED CONCEPT TEAM UTILIZATION IN THE REQUIREMENTS DETERMINATION PROCESS

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Master of Science in Management-December 1996

Advisors: David F. Matthews, Department of Systems Management

David V. Lamm, Department of Systems Management

The Army has developed a new requirements determination process aimed at providing decision-makers with better cost and technological feasibility information. The goals are to cut acquisition cycle-time and costs. The Army Training and Doctrine Command (TRADOC) will be responsible for all requirements decisions under the new system. The Army recognizes that requirements are produced from a variety of sources—battle labs, field commanders, Force XXI joint ventures, TRADOC schools, and other major Army commands. TRADOC, through its schools, is the new guiding force for the process. The school commandants will define, document, and defend doctrine, training, leadership development, organization, material development, and soldier requirements (DTLOMS). The user, requirements, and acquisition communities will have representatives on newly-created integrated concept teams (ICTs). Industry, academia, and relevant Pentagon organizations will also have members on the teams. ICTs will guide the requirements development process and complement the integrated product team (IPT) methodology already used by material developers. Establishing ICTs early in concept development enables the teams to transition to IPTs when a material requirement is approved at a Milestone I decision.

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### **OPTIMIZING THE NAVY'S TRANSITION TO THE INTEGRATED MAINTENANCE CONCEPT FOR THE H-60 HELICOPTER**

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**Master of Science in Operations Research-September 1997**

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**Second Reader: Donald Eaton, Department of Systems Management**

The United States Navy is in the early stages of transitioning to a newly developed maintenance plan for the H-60 helicopter called the Integrated Maintenance Concept (IMC). Before any helicopter can be transitioned to IMC, it must be of a sound structural and material condition, called baseline condition. The Navy's aging fleet of H-60 helicopters needs to be brought up to baseline condition prior to implementation of IMC. There are several alternatives, both existing and proposed, for baselining the fleet before transition to IMC. To aid the Navy during this transition, this thesis develops an optimization model that minimizes the maintenance time required for scheduling the current H-60 inventory during the transition to IMC, ensuring that the entire fleet is of a sound material condition, all operational commitments are met, and all other scheduling requirements are satisfied. To demonstrate its effectiveness, the model is implemented in the General Algebraic Modeling System (GAMS) and produces an optimal timeline schedule of baseline maintenance inductions for each helicopter in the Navy's H-60 inventory.

### **THE EFFECTS OF POLICY GUIDANCE EMPHASIZING THE USE OF PARAMETRIC METHODS IN COST ESTIMATING**

**James K. Patton-Lieutenant Commander, United States Navy**

**B.S., University of Rhode Island, 1981**

**Master of Science in Management-December 1996**

**Advisors: David F. Matthews, Department of Systems Management**

**David V. Lamm, Department of Systems Management**

This study examines the potential impacts of DoD emphasizing the use of parametric cost estimating methods or techniques in the acquisition process. As one of many initiatives to improve the DoD acquisition process through use of commercial practices, parametric cost estimating has the potential to be helpful in many applications for which it has never before been considered. This study, conducted through a questionnaire, personal interviews, and a review of recently released publications from the DoD Joint Government/Industry Initiative, identifies areas of interest for those anticipating using parametric cost estimating methods and techniques. These areas include the Program Definition and Risk Reduction and Engineering and Manufacturing Development phases of program management as well as for many pre-award contract actions. The data from this thesis show that the majority of the personnel in the DoD acquisition community believe that parametric cost estimating methods can be used effectively in those areas. The data also show that the methods also may have applications in the Production, Fielding/Deployment and Operational Support phase of program management and post-award contract actions such as negotiating changes, forward pricing rate agreements, or analyzing claims.

### **HOMOSEXUALITY, MORALITY, AND MILITARY POLICY**

**Michael A. Peterson-Captain, Australian Regular Army**

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**Master of Science in Management-March 1997**

**Advisors: Mark J. Eitelberg, Department of Systems Management**

**Kevin R. Gue, Department of Systems Management**

In December 1993, the Department of Defense issued directives that revised the military's exclusionary policy toward homosexuals. These directives marked the culmination of an intense period of public debate that placed little emphasis on the moral dimension of homosexuality. The objective of this thesis is to determine if personal religious beliefs of military members influence their responses to policies that they perceive to involve morality, specifically with regard to the 1993

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proposal to integrate homosexuals into the military. The research approach involved two phases: a review of the religious heritage of the United States, the First Amendment to the Constitution, and the history of military policies toward homosexuals; and an analysis of the religious demographics of the active-duty military, the doctrines on homosexuality of the largest denominations represented in the military, and the expressed moral beliefs of active-duty members regarding homosexuality. The results indicate that the United States has a strong Christian heritage, and that the First Amendment to the Constitution was not written to exclude Christian moral influence from the public-decision making process. Demographic data shows that a majority of military personnel classify themselves as Christian. Also, various studies suggest that a majority of military personnel oppose homosexual integration into the military. The author concludes that opposition to homosexual integration from military personnel is likely influenced by Christian teaching. It is recommended that future research explore the implications of opposition based on religious belief.

### **STUDY OF THE U.S. MILITARY OFFICERS COMMISSIONED THROUGH ROTC AND THE SERVICE ACADEMIES**

**Hsiung Lo Ping-Lieutenant Colonel, Republic of China Army**

**B.S., National Defense Management College, 1983**

**Master of Science in Management-March 1997**

**Advisors: Mark J. Eitelberg, Department of Systems Management  
Gregory G. Hildebrandt, Department of Systems Management**

This thesis compares the performance of officers who have been commissioned through the U.S. Reserve Officers Training Corps (ROTC) with that of their counterparts who are graduates of the Service Academies. The study is intended to assist the Republic of China Department of Defense in designing its ROTC program and in establishing measures of program effectiveness. A special database, developed by the Defense Manpower Data Center, was used as the basis for statistical analysis. The database includes all U.S. officers who were commissioned in 1977 and allows for the tracking of officers longitudinally through promotion to O-5. The comparison of performance focuses on promotion rates to O-4 and O-5 and the retention experiences of officers in all armed forces, using logistic regression analysis. The results indicate that the U.S. ROTC program is successful in attracting high-quality officers to a career in military service. The success rates of ROTC officers are especially evident in ROTC scholarship programs and in programs administered by the U.S. Air Force. The effects of various demographic variables are also estimated. Further research of U.S. ROTC programs is recommended to aid the government of Taiwan in establishing a similar system for commissioning military officers.

### **MARKET RESEARCH IN THE UNITED STATES NAVY: A STUDY OF THE SKILLS AND TOOLS REQUIRED TO CONDUCT MARKET RESEARCH**

**John Phillip Polowczyk-Lieutenant, United States Navy**

**B.S., United States Naval Academy, 1987**

**Master of Science in Management-December 1996**

**Advisors: Janice Menker, Department of Systems Management  
Sandra M. Desbrow, Department of Systems Management**

This thesis investigates the underlying policy guidance and the current skills and tools used in conducting market research within Department of the Navy procurement activities, and explores the potential for future improvement in the market research process. The process of market research is explored by establishing what types of information are collected, who is collecting the information, and what tools and skills are currently utilized to both collect and analyze market information. This thesis also examines the application of Information Technology to the market research process.

Market research is an essential part of advanced procurement planning and the procurement process. Detailed market research provides the procurement workforce with information in order to make better and more informed procurement decisions. New legislation has targeted market research as a tool to examine the commercial marketplace. This thesis examines the workforce perceptions in the market research process as well as recommendations on how the Department of the Navy might best improve the market research process.

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### **MEASURING THE EFFECT OF THE DEFENSE ACQUISITION WORKFORCE IMPROVEMENT ACT**

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**Master of Science in Management-June 1997**

**Advisor: Walter E. Owen, Department of Systems Management**

**Mark W. Stone, Department of Systems Management**

Numerous reform initiatives have attempted to improve the acquisition process. The success or failure of these initiatives have often been based on subjective determinations. In order to determine the true effect of these initiatives we must be able to measure the effect of these initiatives on the acquisition process. Measurement requires the development of metrics. This study explores the use of metrics for measuring the effect of acquisition reform, using the Defense Acquisition Workforce Improvement Act (DAWIA), Public Law 101-510, as a case study.

This study identifies the objectives of DAWIA. Using the Policy Effectiveness Model, the study develops and proposes metrics for DAWIA objectives in an effort to measure the implementation and effectiveness of this important and far reaching acquisition reform legislation.

### **EXIT STRATEGY IN THE IMPLEMENTATION OF INFORMATION TECHNOLOGY SYSTEMS**

**Todd W. Pugh-Lieutenant, United States Navy**

**B.S., The Citadel, 1988**

**Master of Science in Information Technology Management-September 1997**

**Advisors: William J. Haga, Department of Systems Management**

**Barry Frew, Department of Systems Management**

This thesis proposes that planning for the implementation of information technology projects include an exit strategy. The military origins of exit strategy are reviewed along with corporate formulations of exit strategies in plans for non-technology investments. Cultural, political and organizational barriers to exit strategy are considered. Suggestions are made for further research.

### **ACTIVITY-BASED COSTING AND MARINE CORPS FORMAL SCHOOL BUDGETING**

**George E. Pratt, Jr.-Captain, United States Marine Corps**

**B.A., Vanderbilt University, 1989**

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**Master of Science in Management-December 1996**

**Advisors: Shu S. Liao, Department of Systems Management**

**Gordon E. Louvau, Department of Systems Management**

The purpose of this thesis is to evaluate the current practice for budget estimation and resource allocation in Marine Corps Formal Schools for potential improvement. The methodology used devises a budgeting system that reflects variation in activity level, or output requirements, and how costs change when student throughput changes.

While the evaluation is relevant to Marine Corps Formal Schools in general, the research focused on an approach taken by the Marine Corps Engineer School for the development and design of its Cost Estimation and Resource Allocation Model and the potential for application in any Marine Corps school. The spreadsheet modeling technique employs the concepts of activity-based costing for cost estimation, resource allocation, and budget execution. The thesis addresses the shortcomings of current budgeting practices by applying a modeling technique that was designed to facilitate cost identification for direct and indirect course costs, as well as allocation of overhead and general/administrative costs, thereby providing for the association of costs with varying outputs.

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### **RE-ENGINEERING THE NAVAL POSTGRADUATE SCHOOL'S PURCHASE CARD ACCOUNTING PROCESS**

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**William Gates, Department of Systems Management**

When DoD introduced the purchase card program in 1989, no standardized system was adopted to manage internal memorandum accounting. Today the services are populated with dozens of unique applications for managing purchase card accounting. DoD is currently standardizing each service's purchase card automated systems. The focus of this research was to evaluate the DoN card program at the activity level. Specifically, it identifies the cost savings in replacing the current automated purchase card management system, known as the standard automated contracting system, with a standardized memorandum accounting system for tracking credit card purchases at the Naval Postgraduate School (NPS). To identify these savings, interviews were conducted with NPS and Defense Finance and Accounting Service representatives, and the historical purchase card data for NPS was analyzed. By adopting the DoD proposed new practices and eliminating the current non-value added steps in the NPS process, the potential annual costs savings are \$619,895 if specific job descriptions are eliminated and \$361,727 if current job descriptions remain unchanged.

### **ACQUISITION OF FOREIGN NON-DEVELOPMENTAL ITEM (NDI) WEAPON SYSTEMS FOR UNITED STATES SPECIAL OPERATIONS FORCES**

**Andrew R. Ramsey-Major, United States Army**

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**Master of Science in Management-June 1997**

**Advisor: Walter E. Owen, Department of Systems Management**

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

The purpose of this thesis is to explore and analyze the process required to procure foreign non-developmental item (NDI) weapon systems for Special Operations Forces (SOF). The primary intent is to provide the program manager and other acquisition professionals with information needed to identify the strengths, weaknesses, and validity of acquiring foreign NDI weapon systems. A case analysis, focusing on the acquisition of the Maritime Air Delivery System (MADS) for USSOCOM, is utilized to develop recommendations regarding the procurement of foreign NDI weapon systems for Special Operations Forces. Key issues regarding the MADS procurement are analyzed within the context of the impediments, challenges and advantages discussed in the thesis. It was determined that the MADS acquisition strategy, although not perfect, was sufficient to obtain and test a viable weapon system while mitigating the risks associated with cost, schedule and performance. Problems encountered during the process have been identified and organizational and administrative changes have been made to correct these deficiencies.

### **TRAINING IN COMMERCIAL LOGISTICS PRACTICES TO IMPROVE INVENTORY MANAGEMENT IN THE NAVY**

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**Master of Science in Management-December 1996**

**Advisors: Paul J. Fields, Department of Systems Management**

**Keebom Kang, Department of Systems Management**

The Department of Defense (DoD) has repeatedly been accused of needlessly holding large inventories. In comparison, the commercial sector has drastically cut its inventories over the last twenty years through such practices as Just-In-Time (JIT) and cycle time compression. Some defense analysts have suggested that training in commercial logistics would change the

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culture of DoD inventory management and promote similar efficiencies. This thesis examines that idea in the context of inventory management of secondary items in the Navy. It describes Navy inventory structure and it examines the causes of excess inventory. It then discusses current training for Navy and DLA item managers and active duty Navy personnel, and how that training is applied at inventory control points and in the fleet. The thesis then looks at commercial practices and the factors necessary for their implementation. It concludes that training in commercial logistics practices would not improve Navy inventory management for several reasons. First, the causes of excess inventory are unrelated to training. Second, the factors necessary to implement commercial logistics practices are not present in the Navy. Finally, training is not a principal agent in cultural change since it is better suited to conforming personnel to an existing culture. The author recommends increased emphasis on Joint Total Asset Visibility as a foundation for improved DoD inventory management.

### **UNIT COHESION AND THE MILITARY'S "DON'T ASK DON'T TELL" POLICY**

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**Master of Science in Management-March 1997**

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**Gail Fann Thomas, Department of Systems Management**

The Department of Defense policy of excluding known homosexuals from military service is partially based on the assumption that homosexual service members pose a threat to the cohesion of a military unit. The assumption is drawn largely from anecdotal evidence suggesting that junior service members would be uncomfortable in an environment that accepted homosexuals. This thesis examines the attitudes and opinions of junior officers to determine various aspects of unit cohesion that may be affected by homosexual service members. A series of seven focus group interviews were conducted with officers attending the Naval Postgraduate School in 1996. Analysis of the focus group interviews indicates that junior officers may be far more tolerant toward differing sexual preferences than is assumed; and that the commission of inappropriate acts, such as fraternization, assault, or sexual harassment, may form a stronger basis for exclusion of personnel than sexual preference. Military leaders intent on achieving and maintaining unit cohesion should reexamine the impact that homosexuals have on unit cohesion.

### **THE DEVELOPMENT OF CAREER NAVAL OFFICERS FROM THE U.S. NAVAL ACADEMY: A STATISTICAL ANALYSIS OF THE EFFECTS OF SELECTIVITY AND HUMAN CAPITAL**

**Matthew G. Reardon-Lieutenant, United States Navy**

**B.S., United States Naval Academy, 1991**

**Master of Science in Management-June 1997**

**Advisors: William R. Bowman, United States Naval Academy**

**Stephen L. Mehay, Department of Systems Management**

This research analyzes the United States Naval Academy's (USNA) admissions and professional development processes and their impact on the career development of its graduates in the Unrestricted Line (URL) communities. Three hypotheses are advanced to explain the high level of fleet performance and retention of USNA graduates: selectivity of applicants; Navy-specific human capital investment; and institutional favoritism. Nonlinear LOGIT regression models for the USNA Classes of 1980 through 1985 are developed to analyze the influence of the hypothesized factors on the probability of a midshipman: (a) graduating from the USNA and (b) developing into a career officer.

Both the USNA's composite "whole-person" and individual selection criteria play a significant role in the probability of graduation. Non-scholastic affective selection criteria, and both affective military performance and Navy-specific cognitive skill development at the USNA, are positively associated with the development of career officers. Additionally, several key predictors of career potential are identified. A paradigm shift in perspective from the current short-term context to a life-cycle career context is recommended in the "whole-person" selection and development of USNA midshipmen.

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### **VIDEOTELEEDUCATION: LESSONS LEARNED**

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**Master of Science in Management-March 1997**

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**James Suchan, Department of Systems Management**

Videoteleducation is a method of education and training that is occurring more frequently in corporate, military, and educational environments. VTE provides education and training to people who cannot or who prefer not to attend traditional educational institutions, to employees or companies who need timely information, and to those who seek cost savings for training widely dispersed groups of people. This study uses personal interviews of professors and trainers in both the military and civilian sector and reviews the VTE literature to determine lessons learned from VTE. Results show that VTE causes changes in instructional design, physical, administrative and technological support, production facilities, and student/teacher preparation. The transition from a live classroom to VTE requires teachers to develop new skills and behaviors. Additionally, VTE saves costs and effectively delivers training as shown in studies of private corporations, federal agencies, educational institutions, and the military. However, VTE is not applicable to all courses and teaching methodologies. While researchers claim that VTE is effective, they often have not applied appropriate evaluation measures to their claims of VTE efficiency and effectiveness. Decision makers should conduct thorough analyses and exercise caution before committing to a VTE program based on the claims in the literature.

### **OBJECT-ORIENTED PLAN REPRESENTATION FOR THE OMWG C2 OBJECT SCHEMA**

**Robert M. Reeves-Lieutenant, United States Navy**

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**Master of Science in Information Technology Management-March 1997**

**Advisors: Dan Boger, Command, Control, and Communications Academic Group**

**Tung Bui, Department of Systems Management**

The purpose of this thesis is to examine current Command and Control planning methods and to aid in the furtherance of the Object Model Working Group's (OMWG) Core Plan Representation. Chapter I introduces the discipline of planning and its history. Chapter II discusses the theory and practice of modern Object-Oriented modeling. The structure and conventions of object programming are covered as well as a method for information system abstraction. Chapter III covers the background of current Command and Control systems and gives a report on the OMWG efforts in creation of an Object Schema for Command and control. Chapter IV presents the author's submission for an Object-Oriented representation of the COMSUBPAC OPLAN 5050 based on the Core Plan Representation (CPR).

### **AN ANALYSIS OF QUALITY OF SERVICE OVER THE AUTOMATED DIGITAL NETWORK SYSTEM**

**Brian D. Rehard-Lieutenant, United States Navy**

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**Master of Science in Information Technology Management-September 1997**

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**Second Reader: Suresh Sridhar, Department of Systems Management**

With the implementation of the Automated Digital Network System (ADNS), the United States Navy has significantly expanded its communication capabilities. However, as ADNS is installed throughout the Fleet, and bandwidth-hungry applications such as video teleconferencing become more popular, network congestion will become a larger and larger problem. Specifically, network congestion will cause a slow down in delivery of all traffic. Applications with hard, real-time requirements for data delivery, which treat late message packets as lost packets, will begin to lose data. This thesis will explore the message priority setting and congestion handling functions of ADNS, pointing out inadequacies during congested conditions which may lead to data losses. It will then go on to introduce Quality of Service (QoS) standards being

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developed by the Internet Engineering Task Force (IETF). These QoS standards are implemented by reservation protocols to provide deterministic service over networks regardless of network loading. Finally this thesis will introduce the Resource Reservation Protocol (RSVP) as a means to implement QoS over ADNS, allowing privileged applications to enjoy deterministic service over the network at any time or under any conditions of network loading.

### **MODEL MANAGEMENT VIA DEPENDENCIES BETWEEN VARIABLES: AN INDEXICAL REASONING IN MATHEMATICAL MODELING**

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**Master of Science in Information Technology Management-March 1997**

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Gordon H. Bradley, Department of Operations Research**

The design and implementation of computer-based modeling systems and environments are gaining interest and importance in decision sciences and information Systems. In spite of the increasing popularity of GUI-based operating systems, most of the algebraic modeling languages, today, are still file-oriented, text-based, and therefore require structured declarations and formal model definitions. The utilization of the standard graphical screen objects of a graphics-based operating system provides enhanced visualization of models and more cohesive human-computer interaction.

The approach taken in this thesis is to explore the design and implementation of a graph-based modeling system focusing on computational dependencies between model components. Another important aspect of this research is the development of a user-friendly model formulation interface for algebraic modeling languages and systems; these facilitate the description and implementation of mathematical models by allowing the modeler to employ commonly known and powerful algebraic notation instead of language specific codes.

The major conclusion of this thesis is that dependencies between variables are a useful foundation for building and using models and modeling languages. It also shows that this supports model documentation, validation, formulation, implementation, comprehension, maintenance and reuse. That is, it impacts nearly every step of the modeling life cycle.

### **INTRANET TECHNOLOGY: CONSIDERATIONS FOR IMPLEMENTATION WITHIN THE DEPARTMENT OF DEFENSE**

**Oliver E. Rich, Jr.-Lieutenant, United States Navy  
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**Master of Science in Information Technology Management-March 1997  
and**

**Valerie S. Rich-Lieutenant Commander, United States Navy  
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**Master of Science in Information Technology Management-March 1997**

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Nancy Roberts, Department of Systems Management**

Intranets, internal networks based on the same technology and protocol as the World Wide Web, have emerged in the past two years as a very popular medium for communication and information exchange within organizations. Organizations are flocking to this new tool in order to maintain or improve their market share and enhance communications and productivity. The purpose of this thesis is to give the DoD some guidance in deciding if this new wave of technology is suitable for its computing and information environment. A qualitative approach is used in obtaining the data for this thesis. The primary assumption of this research is that the introduction of an intranet is similar to the introduction of any information system. Therefore, a sample of information technology professionals with at least five years experience in planning, developing, managing, and implementing information systems within DoD or large, bureaucratic, and hierarchical organizations is interviewed. The interviews reveal a process of implementation that is heavily dependent on variables such as culture, structure, and size of the organization. The process has four major phases: leadership buy-in, prototype introduction, attainment of critical mass, and intranet refinement. The authors conclude that intranet technology creates the opportunity for the

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DoD to become more productive and more efficient. They note that the real test for DoD implementors is in the application of the technology.

### **PROMOTION POLICIES AND CAREER MANAGEMENT - AN EMPIRICAL ANALYSIS OF BELOW-ZONE PROMOTION OF U.S. NAVY OFFICERS**

**Napoleón E. Rivero-Lieutenant Colonel, Venezuelan National Guard**

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**Master of Science in Management-March 1997**

**and**

**Holger Schiuter-Commander, German Navy**

**M.S., University of Hamburg Germany, 1985**

**Master of Science in Management-March 1997**

**Advisor: Stephen Mehay, Department of Systems Management**

**William Bowman, United States Naval Academy**

This thesis investigates the selection and promotion of officers in the U.S. Navy. This thesis develops multivariate models to estimate the effects of "belowzone" early promotion on the career of officers and attempts to determine whether below-zone selection puts Navy officers on the fast-track for later promotion or whether, instead, it increases the probability that their subsequent career will stagnate. Outcome variables include: performance on fitness reports, screen for command, and promotion to the ranks of Commander (O-5) and Captain (O-6). Using data from the Navy Officer Promotion History Files, the thesis analyzed officers appearing before their respective promotion board between fiscal years 1986 and 1995. The data sets were further categorized into three major URL warfare communities (submarine, surface, and aviation).

Ordinary Least Squares (OLS) and maximum likelihood logit regression models are employed to estimate the probability of being promoted, to screen for command, or having high fitness report scores in comparison to officers selected in-zone. The findings do not reveal evidence that officers earlier promoted below-zone incur later disadvantages in comparison to their fellow in-zone selected officers. Recommendations for further studies are included.

### **CONTRACTING IN A FOREIGN COUNTRY**

**Darrin H. Rodeschin-Captain, United States Army**

**B.S., United States Military Academy, 1987**

**Master of Science in Management-June 1997**

**Advisors: Walter E. Owen, Department of Systems Management**

**Mark Stone, Department of Systems Management**

The emergence of the United States as the only remaining superpower requires its forces to deploy to an increasing number of foreign countries. U.S. businesses are expanding their markets to include many foreign countries as well. Additionally, the United Nation's role as a multi-national peacekeeping force is growing. This thesis investigates and compares the different contracting structures of the U.S. Army, the TIN, and Apple as well as the duties and responsibilities of the contracting individuals within these organizations. It also explores the regulations and policy, training and organization-specific issues relevant to overseas contracting.

This thesis revealed that although each organization is unique in its methodology of overseas contracting, it is possible for each organization to learn from another's method of contracting. This thesis did not determine the best way to conduct overseas contracting, nor was this the intent. The objective was to compare different ways of contracting overseas. In doing so, a reference document is now available for current and future contractors. The knowledge gained from this document will help prepare these contractors to meet the challenge of contracting in a foreign country.

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### **A METHODOLOGY FOR IMPROVING THE USABILITY OF THE ANVIS/HUD COMPUTER BASED TRAINER**

**Daniel R. Rozelle-Lieutenant Commander, United States Navy  
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**Master of Science in Information Technology Management-March 1997**

**Advisors: Anthony Ciavarelli, School of Aviation Safety  
William Haga, Department of Systems Management**

Computer software has taken an increasingly larger role in the U.S. Navy. It is used in nearly every facet of naval operations, from administrative chores to controlling complex weapons systems. Because of the high cost of software and the potential for inadvertent misuse, it is important that software be easy to use and understand. This thesis explores the methods and techniques available for conducting software usability evaluations. Using one of the methods described in this thesis, actual software usability testing is done on a recently developed computer based training (CBT) program. The CBT program evaluated in this study is designed to instruct helicopter pilots in the use of the AN/AVS-7 ANVIS/HUD. The device is an advanced night vision goggle system that is comprised of the AN/AVS-6 ANVIS night vision goggle (NVG) set and a Heads-Up Display (HUD). This thesis describes the usability test conducted on the ANVIS/HUD CBT and establishes a methodology that can be used, not only on future versions of the ANVIS/HUD CBT, but on other PC oriented software. The result of this usability test show that improvement can be made to the navigation method used by the CBT and the presentation of instructional material.

### **ASSIGNING COMMUNITY CRITICALITY WEIGHTS TO MARINE CORPS READINESS REPORTABLE EQUIPMENT**

**Thomas W. Russell-Major, United States Marine Corps  
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**M.B.A., Oklahoma City University, 1994**

**Master of Science in Management-December 1996**

**Advisor: David Matthews, Department of Systems Management  
Keebom Kang, Department of Systems Management**

The Marine Corps' purpose of reporting equipment readiness ratings is to reflect both the portion of equipment possessed by an organization and the ability to perform its wartime mission. Supply ratings generated by the current methodology do an adequate job of reflecting the portion of equipment available for use, but the readiness ratings fall short of representing the unit's true war-fighting ability. The current method used to compute readiness ratings reflects the percentage, or fraction, of readiness reportable items rated that are on-hand and in an operational condition. Under this method, any reportable item that is declared as being in a deadline maintenance condition will impact the readiness rating with an equal weight, regardless of the critical nature of the item. This thesis proposes a better way of computing the readiness rating in order to ensure it represents the true war-fighting capability of the unit instead of a mere percentage of available equipment. The study involves assigning "community criticality weights" to Marine Corps reportable equipment that will reflect the critical nature of an item in terms of the war-fighting mission assigned to the organization that possesses it. When a piece of equipment becomes deadline, the community criticality weight will be considered when generating readiness ratings. A broken item will, therefore, influence the readiness rating by a magnitude that is commensurate with the item's community criticality weight. The readiness rating will now bear a closer approximation to the war-fighting ability of the unit than the rating generated under the current method and it will ensure that the priority of the maintenance effort is focused on those items that will provide the maximum benefit to mission accomplishment.

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## 1997 THESIS ABSTRACTS

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### **DEVELOPMENT OF A MODEL TO PREDICT DRUG USE AT THE LOCAL COMMAND LEVEL IN THE U.S. NAVY**

**Stuart C. Satterwhite-Lieutenant, United States Navy**

**B.E.E., Georgia Institute of Technology, 1991**

**Master of Science in Management-March 1997**

**Advisors: Jules I. Borack, Naval Personnel Research and Development Center**

**Stephen L. Mehay, Department of Systems Management**

The primary objective of this thesis is to develop a model that predicts the threat of drug use at the local command level. The model is developed from two surveys: (a) the National Household Survey on Drug Abuse (U.S. Department of Health and Human Services) and (b) the 1995 Department of Defense Survey of Health Related Behaviors Among Military Personnel. This predicting technique is applied to specific Navy commands from data obtained from the Defense Manpower Data Center (West) on each command's demographic profile.

The results show that a model can be developed to predict drug use at the local command level based on the underlying civilian drug use propensity. The sex of an individual is the most important predictor for civilians. The education level and the age of the individual are the most important predictors for the military. Race and sex do not have an impact on drug use among military members.

The model could be used by local commanders to determine the potential threat of drug use at the command. Commands should test at a monthly test rate relative to the magnitude of this threat. The model should be revalidated periodically as demographic and locational factors change.

### **THE DESIGN AND INSTALLATION OF A GLOBAL BROADCAST SERVICE DEMONSTRATION PROJECT AT THE NAVAL POSTGRADUATE SCHOOL**

**Keith E. Schaffler-Lieutenant, United States Navy**

**B.S., Clarkson University, 1987**

**Master of Science in Information Technology Management-March 1997**

**Advisors: Paul H. Moose, Department of Electrical and Computer Engineering**

**Rex Buddenberg, Department of Systems Management**

The author presents a detailed description of the design and installation of a Global Broadcast Service (GBS) demonstration and evaluation project at the United States Naval Postgraduate School. GBS is a Department of Defense CONUS-based Direct Broadcast Satellite (DBS) evaluation project utilizing commercial, off-the-shelf components for the reception of video, Internet Protocol (IP) and Asynchronous Transfer Mode protocol (ATM) data transmission. Direct Broadcast Satellite technology offers enormous digital relay capability with data transmission speeds on the order of 30 Mbps being available on a single satellite transponder. As modern computer and communications devices now employed by each of the armed services need access to wideband data channels to effect efficient and timely communications, this capacity has generated significant interest within the DoD. The author discusses several key DBS technical areas, including video compression methods, data throughput capacity, polarization, and frequency biasing. Proper installation techniques and suggestions are presented, in addition to other useful DBS-related material. Many significant difficulties experienced during design, installation, and initialization of the NPS testbed are discussed in detail. The author presents this information to help subsequent GBS project participants decrease the time required to design, procure, and install a semi-permanent GBS receive suite.

## 1997 THESIS ABSTRACTS

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### **STUDY OF ATTRITION AMONG ENLISTED WOMEN IN THE NAVY**

**Vicky D. Sealey-Lieutenant Commander, United States Navy**

**Master of Science in Management-March 1997**

**Advisor: Mark J. Eitelberg, Department of Systems Management**

**Eli S. Flyer, Defense Consultant**

This thesis examines data on the possible reasons for attrition among enlisted women in the Navy. Cross-tabulations are employed to analyze the most prevalent reasons for attrition among women in the Navy across occupations and compared with men. Entry cohorts from fiscal years 1986 through 1990 were used to identify personnel who left the Navy prior to the completion of their obligated service over a 48-month period. The study results indicate that, with the exception of pregnancy and alcohol/drugs, the reasons for early separation are generally the same for men and women across Navy occupations. The study suggests that further research is needed to accurately determine and address the reasons for female attrition from the Navy.

### **IMPACT OF NATIONAL CULTURE IN FOREIGN MILITARY SALES PROGRAMS: A CASE STUDY OF THE SWISS AND FINNISH F/A-18 FOREIGN MILITARY SALES**

**Carol E. Shaw-Captain, United States Marine Corps**

**B.A. University of Southern California 1989**

**Master of Science in Management-December 1996**

**Advisors: Sandra M. Desbrow, Department of Systems Management**

**Alice Crawford, Department of Systems Management**

This thesis is a case study of the impact of the national cultures of buying nations on Foreign Military Sales (FMS) programs. The sales of the F/A-18 fighter aircraft to Switzerland and Finland are specifically evaluated. The issues brought forth in this study will demonstrate the necessity for those employees who interact with people from foreign cultures to ensure that they possess adequate training in cross-cultural communications. In an era of declining defense budgets, defense contractors are pursuing foreign buyers vigorously. Increased competition from foreign competitors mandates the need for increased awareness of intercultural differences and improved skills in this area. Cross-cultural communications training opportunities for both Government employees and contractor personnel are discussed, in addition to reviewing the current status of training received by the personnel assigned to two on-going FMS cases. Proper intercultural communications training will help defense contractors and Government agencies by resulting in more efficient programs with fewer misunderstandings and possibly in lower prices for the Government as a result of increased economies of scale due to the foreign sales. Recommendations for further research are provided.

### **AN ECONOMIC ANALYSIS OF THE SMALL BUSINESS ADMINISTRATION'S 8(A) PROGRAM**

**Edward M. Shine-Lieutenant Commander, United States Navy**

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**Master of Science in Management-June 1997**

**Advisors: Mark W. Stone, Department of Systems Management**

**David R. Henderson, Department of Systems Management**

Since the late 1960s, the Federal Government has supported a policy of affirmative action with respect to the award of government contracts to small business firms owned and operated by members of select minority groups. Although originally structured to aid in the development of small business regardless of minority status, the Small Business Administration's 8(a) program fell victim to social and political pressures of the civil rights movement; becoming an instrument of affirmative action through federal procurement. With the apparent shift in the national social opinion towards quotas and set-asides based on minority affiliation, including the Supreme Court's recent ruling against such set-asides in *Adarand Constructors, Inc. v. Peña*, the future of the 8(a) program is uncertain. Minority set-aside programs have not historically been subject to cost/benefit analysis. This thesis analyzes the economic efficiency of the 8(a) program. Finally, the research concludes with an analysis of alternative initiatives sponsored by the United States Congress and the President.

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### **WHEN SHOULD BUREAU OF MEDICINE AND SURGERY HOSPITALS MAKE OR BUY SERVICES?**

**Kirstina Due Shore-Lieutenant, United States Navy**

**B.S., California State University-Sacramento, 1988**

**Master of Science in Management-March 1997**

**Advisors: Gordon E. Louvau, Department of Systems Management**

**Lawrence R. Jones, Department of Systems Management**

This thesis provides Commanding and Executive Officers tools to use in make-or-buy decisions for Naval health care treatment facilities. It analyzes make-or-buy issues, presents criteria and variables to use in make-or-buy decisions, and identifies services to contract out. It also focuses on three make-or-buy analyses conducted by Naval Medical Center San Diego. Criteria and variables that the medical center used in make-or-buy analyses and lessons learned from this experience are discussed. The thesis applies data used in the three make-or-buy analyses to potential outsourcing initiatives at other Naval hospitals. In conclusion, the thesis outlines the need for an outsourcing plan, a transition plan, a personnel relocation plan, and a make-or-buy analysis. Appropriate criteria for a make-or-buy analysis are suggested. Recommendations indicate when Naval hospitals should make or buy services.

### **RE-ENGINEERING THE NAVY PROGRAM OBJECTIVES MEMORANDUM (POM) PROCESS**

**Thomas A. Simcik-Lieutenant, United States Naval Reserve**

**B.A., University of Pittsburgh, 1986**

**Master of Science in Management-December 1996**

**Advisor: Lawrence R. Jones, Department of Systems Management**

**Jerry L. McCaffery, Department of Systems Management**

This thesis examines the Navy Planning, Programming and Budgeting System (PPBS) to determine if reengineering principles can be applied to increase the efficiency and effectiveness of resource allocation. In particular it focuses on improving the Program Objectives Memorandum (POM) process. A comprehensive description and analysis of the current Navy PPBS process is provided. This thesis analyzes unique characteristics of the policies, procedures and organizations that have shaped the development of the Navy POM process, as well as the major external forces that have affected Navy PPBS.

Process reengineering for the POM is evaluated against criteria represented in three resource allocation methodologies: Strategy-to-Tasks, Mission-Based resource allocation, and the General Staff Command. A description of each methodology is provided along with its application to the Navy POM and PPBS process.

Organizational structure and resource allocation processes within DoD have been under constant scrutiny and revision since WWII. This thesis recommends a resource management method that provides for a fundamental redesign of the current PPBS process. Implementation of this methodology would have broad effects on DoD and Navy organizations, the roles and missions of the military departments and services and unified military operations.

### **ALTERNATIVE FRAMEWORKS FOR IMPROVING GOVERNMENT ORGANIZATIONAL PERFORMANCE: A COMPARATIVE ANALYSIS**

**Cary A. Simon-Lieutenant Commander, United States Navy**

**B.S., Houston Baptist University, 1974**

**M.B.A., Brenau University, 1991**

**Master of Science in Management. March 1997**

**Advisors: Nancy C. Roberts, Department of Systems Management**

**Roger D. Evered, Department of Systems Management**

Complex government bureaus and their managers struggling to adapt to major changes find they are faced with alternative frameworks to improve organizational performance. Six major frameworks emerging in the U.S. since 1980, applicable to the public sector, and designed to enhance organizational change toward improved performance are reviewed and analyzed: Total Quality, "Excellence," Reinvention, including the National Performance Review, the Government Performance and

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Results Act of 1993, the Baldrige Award, and Reengineering. The purpose of the thesis is to provide guidelines to assist public managers in organizational change toward improved performance by analyzing the frameworks based on four criteria: workable in a political, pluralistic environment; realistic given constraints; comprehensive from a systems perspective; and capable of providing explicit measures of organizational performance.

### **A RELATIONAL DATABASE MODEL AND DATA MIGRATION PLAN FOR THE STUDENT SERVICES DEPARTMENT AT THE MARINE CORPS INSTITUTE**

**Aaron Tory Slaughter-Major, United States Marine Corps**

**B.A., Tulane University, 1986**

**Master of Science in Information Technology Management-September 1997**

**Advisor: Magdi N. Kamel, Department of Systems Management**

**Second Reader: Suresh Sridhar, Department of Systems Management**

Today's business environment in the Department of Defense (DoD) demands that managers possess a clear understanding of the design, implementation, and maintenance of the databases used to store, organize, manipulate and return data.

In response to shortcomings identified in their current legacy information system, the Marine Corps Institute (MCI) initiated a project to migrate from a file processing database system to a relational database using a client/server system based on an open hardware and software architecture.

This research provides a relational data model and migration plan in response to MCI's request. It investigates data modeling and database design using the Integration Definition for Information Modeling (IDEFIX) methodology and the relational model. It also addresses the migration of data and databases from legacy to open systems. The application of the IDEF1X model, supported by CASE tools to facilitate data modeling and database maintenance, reveals strategies for dealing with the complex issues of database design, migration, and maintenance in DoD.

### **CONSISTENCY IN DEPARTMENT OF DEFENSE ENVIRONMENTAL CONTRACTING**

**Barry R. Smith-Lieutenant Commander, United States Navy**

**B.A., State University of New York at Potsdam, 1984**

**Master of Science in Management-December 1996**

**Advisors: Mark W. Stone, Department of Systems Management**

**David V. Lamm, Department of Systems Management**

This thesis examines and analyzes the unique aspects of environmental remediation and the different contracting methods used by the DoD to outsource its environmental contracting needs. The analysis was conducted using archival and opinion research to define the unique qualities associated with environmental remediation and the individual Service's contracting methods. The research revealed that legislative requirements are numerous and a majority of the environmental remediation requirements are unclear in nature. The Navy's choice of the Comprehensive Long-Term Environmental Action Navy (CLEAN) and the Remedial Action Contract (RAC) and the Army's choice of the Total Environmental Remediation Contract (TERC) are compared and evaluated. This evaluation looks at the advantages and disadvantages in their application. The researcher's analysis of the data determined that the Army's TERC contract is the more efficient environmental contracting method. With the ultimate objective of providing an environmental contracting method that would enhance an integrated single face to industry it is recommended that the Army's TERC contracting method be adopted for use throughout the DoD.

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### **A FEASIBILITY STUDY INTO THE USE OF A SINGLE LOCAL FINANCIAL MANAGEMENT SYSTEM FOR THE DEPARTMENT OF THE NAVY**

**Gary W. Southerland-Lieutenant, United States Navy**

**B.S., Northeast Missouri State University, 1986**

**Master of Science in Management-June 1997**

**Advisors: William Gates, Department of Systems Management**

**John E. Mutty, Department of Systems Management**

This thesis investigated the feasibility of implementing a single Navy-wide local financial management system. In this era of downsizing and budget cuts, the government is looking for opportunities to spend funds more efficiently. One initiative which is starting to pay dividends is consolidating finance and accounting systems. The Navy-wide implementation of the Standard Accounting and Reporting System family of accounting systems is nearly complete. This system, however, provides no financial management capability to local managers. These managers must independently organize their local financial management systems.

This thesis evaluated the feasibility of taking this consolidation process one step further, to the local level. It used the Fund Administration and Standardized Document Automation System (FASTDATA) local financial management system as a baseline for analysis. It evaluated the system's capabilities and its acceptability by operational users.

It was determined by the research that a single Navy-wide local financial management system is feasible. FASTDATA performed extremely well and users find it to be a very acceptable system. FASTDATA has the potential to fill the role as the Navy-wide local financial management system. However, several technological upgrades will need to be incorporated.

### **JUST-IN-TIME TECHNIQUES AS APPLIED TO HAZARDOUS MATERIALS MANAGEMENT**

**John S. Spicer-Lieutenant Commander, Supply Corps, United States Navy**

**B.A., Drake University, 1983**

**Master of Science in Management-December 1996**

**Advisors: David V. Lamm, Department of Systems Management**

**William Gates, Department of Systems Management**

Just-in-Time (JIT) production and purchasing techniques represent highly effective methods to procure and move material through a manufacturing or service process in a continuous flow. Successful use of these techniques means that material never sits idle, eliminating the need for inventory systems and costs associated with them. Another characteristic of JIT is its focus on the elimination of waste by using resources to their full potential. This focus on smooth flow of materials and elimination of waste is especially appealing in the area of hazardous materials (HAZMAT) management. This is because there are high inventory and disposal costs associated with this material and because HAZMAT typically has a limited shelf life. For this reason HAZMAT management programs seek to reduce and consolidate inventories, reduce material entering the waste stream, ensure materials are used only where appropriate, and guarantee appropriate vigilance. There are several features of JIT that mirror the goals of Navy HAZMAT management programs. This study investigates the feasibility of integrating JIT techniques in the context of hazardous materials management. This study provides a description of JIT, a description of environmental compliance issues and the outgrowth of related HAZMAT policies, and a broad perspective on strategies for applying JIT to HAZMAT management.

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### **TRAINING IN COMMERCIAL LOGISTICS PRACTICES TO IMPROVE INVENTORY MANAGEMENT IN THE ARMY**

**Leonard T. Steiner-Captain, United States Army  
B.S., Troy State University, 1980**

**Master of Science in Management-December 1996**

**Advisors: Paul J. Fields, Department of Systems Management  
Keebom Kang, Department of Systems Management**

The Department of Defense (DoD) and private firms share a common set of logistical challenges. Rising costs, external pressures, new technology, and other factors have focused attention on improving logistics management. GAO believes top management support and training are fundamental to improving economy and efficiency for DoD's inventory management system. This thesis examines current inventory management training and policies for secondary item inventories used by the Department of the Army to determine the potential impact of increased training in commercial logistics practices on Army inventory management. The study briefly describes the Army Supply System, evaluates current performance, reveals current training practices, discusses commercial logistics practices, and identifies the key factors required for implementation of commercial logistics practices. These key factors form the basis for a comparison between the public and private sectors. Finally, McCaskey's model of organizational behavior is used to assess the potential for increased performance through training in commercial logistics practices. This study concludes that training in commercial logistics practices will not improve the inventory management system. There are inherent differences in the political, economic, legal, and social environment that must be addressed first.

### **MILITARY AND CIVILIAN RELATIONSHIPS: DO THEY AFFECT INTEGRATED PRODUCT TEAMS?**

**Gail E. Stenger-Civilian**

**B.S., Monmouth University, 1985**

**Master of Science in Management-March 1997**

**Advisors: Susan P. Hocevar, Department of Systems Management  
Linda Wargo, Department of Systems Management**

The implementation of the Integrated Product Team (IPT) concept by the Department of Defense to support the acquisition process assumes that service members and DoD civilians work together productively to produce effective weapon systems. This thesis investigates military-civilian relationship issues on IPTs.

Interviews were conducted with twenty-three DoD civilians and service members who have participated in Department of Defense IPTs. These interviews were consolidated and issues shared by a majority of the interviewees are presented and analyzed in terms of the existing literature on intergroup conflict. All interviewees stated that these group stereotypes had no negative impact on IPT performance.

Conclusions reached were that military and civilians do have positive and negative perceptions regarding the other group, and based on existing literature, these issues present challenges for the two groups to work together productively when both participate in IPTs. Models from the research literature on intergroup conflict are used to provide recommendations for addressing intergroup perceptions and improving the effectiveness of IPTs.

### **THE STATE-OF-THE-ART OF BUDGETARY FINANCIAL REPORTING IN THE NAVY**

**Phillip Carl Stephens-Lieutenant, United States Naval Reserve  
B.S., University of Tampa, 1986**

**Master of Science in Management-December 1996**

**Advisors: O. Douglas Moses, Department of Systems Management  
John E. Mutty, Department of Systems Management**

The purpose of this thesis was to investigate current budgetary financial reporting practices in the Navy and provide a comprehensive overview of budgetary reporting in that department. This thesis reviewed and discussed appropriation life

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cycles, along with the organizations, accounting systems and reports involved in Navy budgetary financial reporting. Each appropriation enacted and allotted down the financial chain of command is accounted for through budgetary financial reporting. The organizations involved in budgetary reporting are categorized into two groups—field level and service level. Five reports are currently in use: Trial Balance Report, Expense Element Report, Fund Status Report, Report on Budget Execution, and Appropriation Status Report. The Navy is streamlining its current budgetary financial and accounting reporting use of 37 systems down to two primary budgetary accounting systems: the Standard Accounting and Reporting System and the Naval Headquarters Financial System. A comparison of budgetary reporting with private sector financial reporting illuminated similarities in the basic accounting model underlying the financial reports, but differences in reporting objectives and practices. Budgetary financial reporting serves the objective of reporting budget execution status well but is limited in its ability to communicate financial position.

### **COMPARING TIME-BASED AND HYBRID TIME-BASED/FREQUENCY BASED MULTI-PLATFORM GEO-LOCATION SYSTEMS**

**Andrew D. Stewart-Lieutenant, United States Navy**

**B.S., United States Naval Academy, 1991**

**Master of Science in Operations Research-September 1997**

**Advisor: Arnold H. Buss, Department of Operations Research**

**Second Reader: Carl R. Jones, Department of Systems Management**

While time difference of arrival (TDOA) information is sufficient to passively solve for the location of a radio frequency transmitter, frequency difference of arrival (FDOA) information may be added to the TDOA information to solve for both the position and velocity of the transmitter. This analysis implements a stochastic discrete event simulation, written in Java, to compare and stochastically describe, under a variety of conditions, the differences between a mixed TDOA/FDOA Multi-platform Global Positioning System (GPS) Assisted Geo-location System and that of the same system which uses TDOA information only. The presented analysis compares both solution types for two- and three-dimensional fixes across: various measurement error distributions and correlation values, sensor network geometry, and sensor platform selection. The simulation results show first order stochastic dominance in the accuracy of the TDOA/FDOA solution in the two-dimensional scenarios. In the three-dimensional scenarios, sensor network to target geometry dominates both solutions' accuracy. While solution accuracy is used as the primary method of effectiveness, the distribution of each solution's uncertainty is also compared. Finally, the simulation itself remains a useful tool for further system design experimentation, performance indication, and as a means to describe system capabilities to the war fighter.

### **THE APPLICATION OF RE-ENGINEERING TO THE ACQUISITION PLANNING PROCESS FOR A MAJOR WEAPON SYSTEM: A CASE FOR INFORMATION TECHNOLOGY**

**Mark E. St. Moritz-Lieutenant Commander, United States Navy**

**B.S., University of Central Florida, 1982**

**Master of Science in Management-June 1997**

**Advisors: Mark E. Nissen, Department of Systems Management**

**Janice M. Menker, Department of Systems Management**

Effective and timely acquisition planning is vital to the successful procurement of a major weapon system. However, the underlying process may not be well understood or defined, is labor intensive, and heavily bureaucratic. Efforts to improve the planning function for a major weapon system traditionally focus on the people and organizational aspects without showing any real reductions in time or increases in productivity. New approaches, such as business process reengineering, now show considerable promise in dramatically reducing cycle times, especially when combined with information technology as an enabler. This paper explores the use of information technology in the development of an acquisition plan at a major systems command and suggests that process innovations of 50% or more may be possible. To accomplish this improvement, the process of developing an acquisition plan is redesigned using database and workflow systems as enablers to the process.

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### **MANAGEMENT OF AUTONOMOUS SYSTEMS IN THE NAVY'S AUTOMATED DIGITAL NETWORK SYSTEM (ADNS)**

**James A. Sullivan-Lieutenant Commander, United States Navy  
B.E., State University of New York, Maritime College, 1984**

**Master of Science in Information Technology Management, September 1997**

**Advisors: Rex A. Buddenberg, Department of Systems Management  
Suresh Sridhar, Department of Systems Management**

In an effort to create a more efficient, interoperable communications environment for its ships at sea the Navy has developed the Automated Digital Network System. Because of its recent introduction into the fleet and the evolving nature of the program there has not yet been any high level operational guidance provided for communications planners and managers. The major contribution of this thesis is to describe key issues fundamental to successful mission accomplishment. Operating in a network-centric environment represents a conceptual departure from standard Navy at-sea communications methods. The changes in thinking necessitated by this departure are presented to highlight the need for a new approach to communications management. Analysis of program design and implementation yielded the framework for the outline of system requirements and the management considerations necessary for effective operational employment. Reviews of fundamental concepts underlying the system and program origins are provided as background material.

### **MULTI-YEAR PROCUREMENT: A DESKTOP GUIDE**

**David R. Sutton-Lieutenant Commander, United States Navy  
B.B.A., Mercer University, 1985**

**Master of Science in Management-June 1997**

**Advisors: Mark W. Stone, Department of Systems Management  
Nancy C. Roberts, Department of Systems Management**

This thesis provides a desktop guide to assist the program manager in the use of multiyear procurement. Information is provided to help the program manager in selecting multiyear candidates and guidance is provided to assist the program manager in the implementation of multiyear procurement. A questionnaire was used to elicit information from multiyear procurement users about problematic issues they have encountered. It is difficult to develop a system that meets the disparate needs of the contractor, Department of Defense, and Congress. The end result has been the development of a system based on compromise and accommodation. The responses to the questionnaires indicated, while there are aspects of multiyear procurement that some program offices would, at times, like to change, multiyear procurement is workable as is.

### **RECYCLING DECISION SUPPORT SYSTEM: DESIGN AND DEVELOPMENT OF A WEB-BASED DSS**

**Clayton G. Tettelbach-Lieutenant Commander, United States Navy  
B.S., United States Naval Academy, 1984**

**Master of Science in Information Technology Management-March 1996**

**Advisor: Hemant K. Bhargava, Department of Systems Management  
Second Reader: Suresh Sridhar, Department of Systems Management**

The explosive growth of the World Wide Web creates new opportunities for the development and deployment of Decision Support Systems. No longer restricted by machine-specific limitations, Web-based Decision Support Systems (DSS) provide global access to widely diversified and geographically dispersed users through sharing of data, models, algorithms, and modeling environments. This thesis examines the design and development processes involved in the creation of a Web-based DSS.

The Recycling Decision Support System utilizes a rapid prototype and refinement process to create a Web-based system focusing on supporting ordinary people and industrial users in making good decisions for recycling and disposal of household and industrial waste. Through abstraction of details from the specific Web-based DSS design, a generalized

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framework for supporting decision-making via the WWW is built which supports functionality in education, queries, and analysis of complex problems.

An important aspect of this research is the development of a new architecture which conforms to the complexities specific to Web-based Decision Support Systems. Prompted by the additional interactions required for WWW connectivity, this architecture incorporates agents for negotiating transactions between the functional components of a standard DSS.

### **ECONOMIC EVALUATION OF VOICE RECOGNITION (VR) FOR THE CLINICIANS' DESKTOP AT THE NAVAL HOSPITAL ROOSEVELT ROADS (NHRR)**

**Erik Threet-Lieutenant, United States Navy**

**B.S., University of Central Arkansas, 1987**

**M.B.A., City University, 1991**

**Master of Science in Information Technology Management-September 1997**

**Advisors: Monique P. Fargues, Department of Electrical and Computer Engineering**

**William R. Gates, Department of System Management**

Beyond keyboards, mice, trackballs, and other means to communicate with computers, the spoken word remains the ultimate, if not elusive, user interface. Recent developments in hardware and software have brought the ability to control a computer with the spoken word closer to reality. This thesis investigates the current status of VR technology, its use in support of Joint Vision 2010, its use in the Healthcare environment and provides an analysis of the VR Pilot Project at NHRRs. The objective of the analysis is to determine the viability and economical benefits of using a commercial-off-the-shelf (COTS) VR application as a clinicians input device for transcribing clinical encounter (SOAP) notes. The VR application used in this study was the DragonDictate Classic Edition with the DragonMed add on module for healthcare professionals.

The results show that VR technology is a viable tool that can add numerous economical benefits, such as, a decrease in the time clinicians spend transcribing SOAP notes, eliminates the need to hire medical transcriptionists and reduces Graphical User Interface (GUI) overload for Window's based Navy Medical Standard systems. In addition, findings indicate that the use of computer technology, during clinical encounters, has no significant effect on patient/clinician relationships.

### **AN INVESTIGATION OF THE EXPECTED IMPACT OF THE SPACE BASED INFRARED SYSTEM (SBIRS) ON CUEING ANALYSIS OF THE APPLICATION OF MODELING AND SIMULATION WITHIN THE ARMY OPERATIONAL TEST AND EVALUATION PROCESS IN SUPPORT OF WEAPONS SYSTEMS ACQUISITION**

**L. Neil Thurgood-Captain, United States Army**

**B.A., University of Utah, 1986**

**Master of Science in Management-June 1997**

**Advisors: Walter Owen, Department of Systems Management**

**Dan C. Boger, Department of Systems Management**

The purpose of this thesis is to analyze the application of Modeling and Simulation (M&S) within the Army Operational Test and Evaluation (OT&E) process in support of weapons systems acquisition. This thesis considers the Army's current acquisition process, M&S technologies, infrastructure, and policies that guide the Program Manager (PM) in the application of modeling and simulation in operational testing. An analysis of the potential strengths and weaknesses of M&S in addressing OT&E issues is presented. Lessons learned from past OT&E efforts are analyzed for process improvement through M&S applications. The analysis indicates that M&S is a viable tool for assisting the PM in completing OT&E. M&S techniques can assist in test design validation, expand testing in areas of limited resources and environmental concerns, and validate live testing data. From this analysis, a set of recommendations are formulated, indicating where the PM can integrate M&S into the OT&E process.

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### **THE UNITED STATES MARINE CORPS MILITARY OCCUPATIONAL SPECIALTY 9656: A STUDY FOR GREATER UTILIZATION**

**William R. Tibbs-Captain, United States Marine Corps  
B.S., United States Naval Academy, 1989**

**Master of Science in Management-December 1996**

**Advisors: David V. Lamm, Department of Systems Management**

**Danny A. Shockley, Department of Systems Management**

The Marine Corps' current utilization of its Officers designated with the secondary Military Occupational Specialty (MOS) 9656, Contracting Officer, is strictly limited to the Marine Corps Field Contracting Structure. This Field Contracting Structure is made up of only 22 billets, all which are designated for officers with a rank of either Captain or Major.

This thesis researches the potential for utilizing 9656 designated officers into organizations outside the current Field Contracting Structure. It will present a set of criteria used to determine which potential organizations should incorporate a 9656 billet. Potential organizations were selected from the Marine Corps, the Department of the Navy, and other Department of Defense activities. This thesis also examines a proposed acquisition career path and its affect on the 9656 MOS.

Recommendations regarding 9656 billet incorporation and the need for an acquisition career path are presented.

### **AN EXAMINATION OF THE RISKS FACING THE ARMAMENT SUBSYSTEM OF THE ARMY'S CRUSADER PROGRAM**

**Ronald C. Todd, Jr.-Major, United States Army  
B.A., Seattle University, 1985**

**Master of Science in Management-March 1997**

**Advisor: Gregory Walls, Department of Systems Management**

**Keith Snider, Department of Systems Management**

The decline in defense budgets has forced acquisition officials to continue to seek ways to leverage scarce resources. Careful, well-thought out use of risk management techniques is a prudent method of providing such leverage. This thesis examines one program's approach to risk management. With the decision to replace the fleet of M109 howitzers in the Army, the Crusader Program Office selected an aggressive, streamlined approach which emphasized the use of proactive risk management. This approach has proven its value by contributing to the recent decision to switch from liquid to solid propellant. Although extremely difficult technical risks have been eliminated, the armament's product office continues to face challenges which can only be met through proactive risk management. This thesis focuses on identifying and analyzing ten of the significant schedule risks facing the armament subsystem of the Army's Crusader program. It concludes with recommendations on the risk management techniques which may best apply to the risks.

### **PROMOTING ECONOMIC DEVELOPMENT IN AMERICA'S INNER CITIES WITH FEDERAL CONTRACTING INCENTIVES**

**Guy A. Torres-Captain, United States Marine Corps  
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**Master of Science in Management-September 1997**

**Advisors: Mark W. Stone, Department of Systems Management**

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

For over 30 years, the United States has faced the challenge of revitalizing its deteriorating urban communities. Throughout the 1980s and early 1990s, U.S. policy-makers have shown an interest in geographically targeted urban economic development strategies, specifically in the form of Enterprise Zones. Now renamed Empowerment Zones, these are sections of poverty-stricken communities in which the Government hoped to promote economic development by providing businesses with incentives to locate in the zones. These Empowerment Zones primarily used tax incentives to convince businesses to relocate. Studies revealed that this approach to attracting businesses to the targeted region has met with minimal success.

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In the past two years, U.S. policymakers have proposed two initiatives that use the Federal procurement system as a means to incentivize firms to locate into economically distressed urban and rural areas. This study analyzes the Federal Government's recent initiatives to stimulate economic development in America's inner cities with Federal contracting incentives. It answers questions surrounding the potential economic impact of such initiatives on the inner city. Lastly, the study recommends alternative policy approaches to applying Federal contracting incentives to create jobs and spur business investment in America's inner cities.

**AN INVESTIGATION OF THE EXPECTED IMPACT OF THE  
SPACE BASED INFRARED SYSTEM (SBIRS) ON CUEING  
OF NAVY THEATER BALLISTIC MISSILE DEFENSE SHIPS(U)**

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**M.B.A., Chaminade University, 1992**

**Master of Science in Information Technology Management-March 1997**

**Advisors: Dan C. Boger, Command, Control, and Communications Academic Group**

**Carl R. Jones, Department of Systems Management**

This thesis studies tactical ballistic missile (TBM) position and velocity measurement accuracy available from the current Overhead Non-Imaging Infrared (ONIR) Defense Support Program (DSP) space-based sensors, and compares this measurement accuracy with the measurement accuracy improvements expected from the Space Based Infrared System (SBIRS). SBIRS is to replace the existing space-based sensors in the near future. The analysis is motivated by a requirement to improve the lethality of AEGIS class ships performing a defended area theater ballistic missile defense (TBMD) mission or a theater-wide TBMD mission.

TBM position and velocity measurements from space-based IR sensors can be handed off to the AEGIS TBMD ship as cueing information which enables earlier acquisition of the TBM by the shipboard AN/SPY-1B/D phased array radar. Earlier acquisition can enable earlier engagement and intercept of the missile at a greater distance from the ship. An analysis of the factors that introduce ONIR space sensor measurement error to the current satellites is performed and used as a baseline for comparison with the design approach and measurement improvements offered by the SBIRS spacecraft and ground processing stations. The result is investigated within the context of lethality improvements to the AEGIS TBMD ship against TBMs of various ranges.

**SPREADSHEET DECISION SUPPORT MODEL FOR TRAINING  
EXERCISE MATERIAL REQUIREMENTS PLANNING**

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**B.S., Virginia Military Institute, 1984**

**Master of Science in Management-June 1997**

**Advisors: Paul J. Fields, Department of Systems Management**

**Kevin R. Gue, Department of Systems Management**

This thesis focuses on developing a spreadsheet decision support model that can be used by combat engineer platoon and company commanders in determining the material requirements and estimated costs associated with military training exercises. The model combines the business practice of Material Requirements Planning and the commercial spreadsheet software capabilities of Lotus 1-2-3 to calculate the requirements for food, consumable supplies, petroleum products, and major end items of equipment. The demand for these materials are directly dependent on the quantities of personnel and equipment items to participate in the training exercise. The model takes into consideration existing on-hand and on-order supplies and materials, and the anticipated effects of lead times in determining the net requirement and time period an item must be placed on order to ensure its availability for the training exercise. The capability of this model to enhance planning through what-if analysis and the investigation of variability and stochastic influence on the model is also explored. The add-in program Crystal Ball is used to simulate the effects of lead time variability on the model.

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### **PROCESS IMPROVEMENT TO THE INSPECTION READINESS PLAN IN CHEMICAL WEAPONS CONVENTION CHALLENGE INSPECTIONS**

**William M. Triplett-Lieutenant, United States Navy  
B.S., United States Naval Academy, 1989**

**Master of Science in Information Technology Management-September 1997**

**Advisors: James J. Wirtz, Department of National Security Affairs**

**William J. Haga, Department of Systems Management**

This thesis identified current Information Technology initiatives to help improve the Navy's Inspection Readiness Plan for Chemical Warfare Convention (CWC) Challenge Inspection. The CWC is an intrusive inspection. The Challenge Inspection allows for a team of international inspectors to inspect a naval facility suspected of violating the CWC on very short notice

This thesis begins with a review of the CWC Challenge Inspection timeline. It then describes the Navy's Inspection Readiness Plan for CWC Challenge Inspections as well as the Navy Tiger Team that is sent to naval facilities to assist the Commanding Officer and base personnel during inspections. One of the initiatives evaluated by this analysis is the use of videoconferencing. To ascertain the feasibility of using videoconferencing in the CWC Challenge Inspection process, this thesis reviews the current videoconferencing systems and standards, and the results of a questionnaire that was sent to various naval commands. This thesis concludes with recommendations for inclusion of videoconferencing and various other Information Technology initiatives in the CWC Challenge Inspection process.

### **ANALYSIS OF CONSOLIDATING DEFENSE ACQUISITION INFORMATION ON THE INTERNET**

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**Mark W. Stone, Department of Systems Management**

The Internet began over 30 years ago as a method of providing vital military communications following a nuclear attack. Today, due to the introduction of the World Wide Web and recent commercial interests, the Internet has grown into a multimedia source of information, and has become overloaded with information. Acquisition professionals in both the government and civilian defense acquisition sectors are attempting to use the Internet as an efficient and effective communications tool. However, due to the overloaded nature of the Internet, they are having difficulty finding relevant information in a timely manner.

This thesis provides an overview of the current Internet tools available to acquisition professionals. It also demonstrates why these tools are not effective in providing timely acquisition information. This thesis proposes the development of a defense acquisition information center that would consolidate all acquisition information into one user-friendly location on the Internet. By organizing and consolidating information, the Internet can be transformed into a highly efficient and effective communications tool for the acquisition community.

### **THE ANATOMY OF JAPAN'S POSTWAR ECONOMIC DEVELOPMENT**

**Hsiung Yuan Tsao-Lieutenant Colonel, Taiwan Army**

**B.S., Taiwan Army Academy, 1983**

**Master of Science in Management-September 1997**

**Advisor: Edward A. Olsen, Department of National Security Affairs**

**Second Reader: Roger D. Evered, Department of Systems Management**

This thesis examines the anatomy of postwar Japanese economic development. It is illustrated by the reform and reconstruction era (1945-52) and those factors which caused the Japanese economy to grow during the 1953-73 period. Furthermore, on the basis of Japanese economic successes, the role of the Japanese in world affairs again became important. However, due to the world experiencing economic inflation and an oil shock after 1974, the Japanese economy also expe-

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rienced slower growth. Discussed in detail are those factors that made the Japanese economy slow down in this period. This thesis stresses the three decades of Japanese economic development after World War II. Evaluation of the Japanese economy is necessary to analyze its weaknesses and strengths which will shape its further development and competitiveness. In particular, the end of the Cold War brought new kinds of thinking and concern about what type of problems Japan might face in the next century. Of course those issues include regionalism, economic strategy shifts after the end of the Cold War, and intricate major power relations among Japan, China, and the United States. In reality the post-Cold War challenges are also a turning point for Japan, compelling it to deal with new problems and to decide what kind of roles it is going to play.

### **A GOAL PROGRAMMING APPROACH FOR DETERMINING THE FORCE STRUCTURE OF NAVAL SURFACE GROUPS USING THE ANALYTIC HIERARCHY PROCESS**

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**Master of Science in Operations Research-March 1997**

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Gregory Hildebrandt, Department of Systems Management**

A methodology for determining the force structure of naval surface groups is developed. A survey of naval surface officers is used to determine a surface ship's relative superiority over the others with respect to several factors (e.g., speed, warfare capabilities, surveillance capabilities, and fuel consumption). The Analytic Hierarchy Process (AHP) is employed to convert survey judgments into numerical preference weights. The AHP weights are then used as objective function coefficients in the mixed integer goal programming model formulations. The object of each model formulation is to select a preferred mix of ship types by minimizing the total deviation from one or more force level goals given certain system constraints such as budget, weapon requirements, and/or existing force levels.

### **ANALYSIS OF CIVILIAN EMPLOYEE ATTRITION AT THE NAVAL POSTGRADUATE SCHOOL AND NAVAL SUPPORT ACTIVITY-MONTEREY BAY**

**Xavier F. Valverde-Lieutenant, United States Navy  
B.A., University of Washington, 1990**

**Master of Science in Management-March 1997**

**Advisors: Paul R. Milch, Department of Operations Research  
Linda Wargo, Department of Systems Management**

The purpose of this thesis is to assist management at the Naval Postgraduate School (NPS) and Naval Support Activity-Monterey Bay (NSA-MB) to determine what civilian non-faculty employee jobs are likely to be left vacant in the next three years due to attrition and to identify what training and skills will be needed by personnel whose jobs may be eliminated in order to be transferred to jobs left vacant due to attrition. The research methods include forecasting and work-analysis. The data were obtained from the Defense Civilian Personnel Data System files for fiscal years 1989 to 1996. The results show ten jobs, based on average number of accessions, attrition rates, forecasted vacancies, and qualification similarities, that may be left vacant to receive transferred personnel. The results also show that the training needed to effectively transfer personnel will be minimal and can be provided at local technical/vocational schools for those working in Clerical and Administrative positions and at NPS for those working in Administrative and Managerial positions. Because of job specialization and low attrition rates, Firefighters, Police Officers, Heavy Mobile Equipment Mechanics, and Automotive Mechanics will need much more training if they are to be transferred to other jobs at NPS and NSA-MB. It is recommended that management intervene to change hiring practices to increase future vacancies in jobs whose vacancies may not be sufficient enough in number or may not appear quickly enough to receive personnel. Three scenarios using the forecasting model are presented to provide alternative methods of increasing those vacancies.

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### **APPLYING COMMERCIAL PRACTICES TO NAVY HUSBANDING SERVICES CONTRACTS**

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**Master of Science in Management-December 1996**

**Advisors: David V. Lamm, Department of Systems Management**

**Danny A. Shockley, Department of Systems Management**

This thesis focuses on the application of commercial practices to Navy husbanding services contracts. It examines the general background and framework for the use of husbanding agents within the Department of the Navy and explores the pre-award and post-award issues associated with these husbanding services contracts. Through personal interviews and a review of the available literature, the research provides beneficial insight into the practices currently being utilized by commercial ship operator firms and commercial port agencies. The research identifies several best commercial practices as they relate to husbanding services and examines the benefits and the barriers for the Navy to implement these practices.

### **JOINT PROFESSIONAL MILITARY EDUCATION AND ITS EFFECTS ON THE UNRESTRICTED LINE NAVAL OFFICER CAREER**

**Daniel J. Walsh-Lieutenant Commander, United States Navy**

**B.S., University of Notre Dame, 1984**

**Master of Science in Management-March 1997**

**Advisors: William R. Bowman, United States Naval Academy**

**Gregory G. Hildebrandt, Department of Systems Management**

The results of this thesis show Joint Professional Military Education (JPME) has four primary impacts on the Unrestricted Line (URL) Naval officer career. First, JPME is an effective retention tool. Second, almost all URL officers completing JPME do so between the 10 and 22 year points in their career. Third, a URL officer completing any form of JPME prior to the 0-5 promotion board does not have a significantly better chance of promoting to 0-5; whereas, a URL officer completing resident JPME prior to the 0-6 promotion board has a significantly better chance of promoting to 0-6—except in the case of nonresident JPME, intermediate level Phase I/II, and the equivalents (Federal Executive Fellowships or Foreign Service Colleges). For these three forms of JPME, the effect on promotion is insignificant at all levels. Fourth, unlike JPME, a URL officer completing any form of graduate education prior to the 0-5 promotion board has a significantly better chance of promoting to 0-5. In contrast, a URL officer completing graduate education after the 0-5 promotion board does not have a significantly better chance of promoting to 0-6. These results seem to indicate the potential for a critical point in the URL officer career with respect to JPME and graduate education. Combining the proper mix of JPME and graduate education in relation to this point has the potential effect of increasing URL Naval officer career efficiency and effectiveness.

### **FORECASTING NAVY ISSUE AND RECEIPT WORKLOAD AT DEFENSE LOGISTICS AGENCY DEPOTS**

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**Master of Science in Management-December 1996**

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**Shu Liao, Department of Systems Management**

Each year the Defense Logistics Agency (DLA) asks the military services to estimate their future issue and receipt workload demands at DLA distribution depots. DLA uses these estimates to determine expected costs and revenues at the distribution depots. Accurate workload forecasting allows DLA planners to establish appropriate surcharges for their services. Inaccurate estimates can lead to higher costs to DLA and, ultimately, to the Navy. We evaluate current Navy forecasting methods and develop several causative factors that influence issue and receipt workload. We present single and multiple regression models to predict future issue and receipt demands and compare these models with those currently used by Naval Supply

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Systems Command. Our results suggest that causal-based modeling is a feasible alternative to current models and may more accurately estimate future issue and receipt workload for the Navy.

### **PAST PERFORMANCE POLICY IMPLEMENTATION AT THE PORTSMOUTH NAVAL SHIPYARD**

**David C. Warunek-Lieutenant, Supply Corps, United States Navy  
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**Master of Science in Management-December 1996**

**Advisors: Danny A. Shockley, Department of Systems Management  
Mark W. Stone, Department of Systems Management**

The use of past performance as a factor in the source selection process intuitively makes sense. A contractor's record of past performance is a good indicator of future performance and should be used to make best value vice low cost contract awards. The Federal Government recognizes the value of assessing past performance and mandates its use by all agencies. This study discusses the issues surrounding the use of past performance. It also provides an overview of current mandatory and discretionary past performance guidance, and describes several past performance information systems applicable to the Portsmouth Naval Shipyard, Portsmouth, NH. An analysis of the shipyard environment is then used to form the basis for an effective policy implementation plan. Currently past performance shall be a significant factor in all competitively negotiated procurements above one million dollars. Similarly, evaluations must be prepared for each contract valued at five hundred thousand dollars or above. These thresholds will soon be lowered to one hundred thousand dollars each. Implementing the highly discretionary Federal policies at the command level requires a thorough understanding of the issues surrounding past performance such as fairness, the prescriptive versus tailored approaches, new entrant treatment, information validity, and implementation costs. Successful implementation is also dependent upon command specific needs and limitations. This study investigates the issues surrounding the implementation of the Federal past performance policies at the Portsmouth Naval Shipyard.

### **INSTRUMENTING THE NAVAL POSTGRADUATE SCHOOL GLOBAL BROADCAST SERVICE TESTBED FACILITY**

**John A. Watkins-Lieutenant, United States Navy  
B.A., University of San Diego, 1990**

**Master of Science in Information Technology Management-June 1997**

**Advisors: Paul H. Moose, Department of Electrical and Computer Engineering  
Carl R. Jones, Department of Systems Management**

The work reported in this thesis used readily available components to implement a data acquisition system for a Global Broadcast Service Testbed data collection facility. Use of hardware with controlling software is necessary to collect signal power content of satellite signals at a given distance from the transmitting source. Precise measurement and calibration of a satellite receive signal is accomplished by use of an Hewlett-Packard 8568B spectrum analyzer. A personal computer is used to collect and store retrieved data. These components are brought together using LabVIEW instrumentation software. This system provides an efficient means to collect signal data which can be used to verify satellite link performance estimates. Calculations are performed using Matlab statistical analysis software. This thesis contains calculated and measured values of total average carrier power and background noise levels for the three satellite receive systems that comprise the Naval Postgraduate School Global Broadcast Service Testbed facility.

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### **AN ANALYSIS OF AUTOMATIC IDENTIFICATION TECHNOLOGY APPLICATIONS IN NAVAL LOGISTICS**

**David M. Watt-Lieutenant Commander, United States Navy  
B.S., Jacksonville University, 1985  
Master of Science in Management-March 1997**

**and**

**David P. Smith-Lieutenant, United States Navy  
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Master of Science in Management-March 1997**

**Advisors: David G. Brown, Department of Systems Management  
Paul F. Fields, Department of Systems Management**

This thesis evaluates potential uses of automatic identification technologies (AIT) in support of Naval logistics. AIT includes a range of technologies and techniques which incorporate the rapid and accurate capture of data and its subsequent processing for cognitive recognition and identification. An introduction to the various AIT system components, from the well established bar coding technology to the more versatile radio frequency identification (RFID) technology, is presented. Additionally, the underlying fundamentals of Naval logistics principles, functions, and elements are discussed, including how these themes translate into promising potential uses of AIT. Recent Naval AIT applications are featured and the results and lessons learned evaluated. In this era of joint operations and use of coalition forces, this work places emphasis on compatibility, interoperability, and the importance of enforcing standardization of AIT symbologies in the commercial and military sectors. The DoD is in the midst of great change and restructuring, especially in the area of logistics. This study provides Naval logistics stakeholders a broad overview of the prevalent AIT system component capabilities and limitations. An AIT implementation model is also featured that delineates the various program elements which have significant impact on the efficiency and effectiveness of procured AIT systems. A thorough understanding of the technology and its associated integration issues should enable Naval leadership to make sound AIT acquisitions.

### **FACTORS THAT IMPACT A VIRTUAL COMMANDER IN A CONCURRENT COMMAND STRUCTURE**

**Alexander J. Waugh-Captain, United States Marine Corps  
B.S., United States Naval Academy, 1991  
Master of Science in Management-March 1997**

**Advisors: Alice Crawford, Department of Systems Management  
Barry Frew, Department of Systems Management  
Gail Fann Thomas, Department of Systems Management**

This thesis analyzes factors that impact a Virtual Commander. In-depth interviews with personnel at the Naval Postgraduate School and the George C. Marshall Center for European Studies informed the development of a case study documenting the implementation and maintenance of a virtual command structure. Qualitative and archival data are analyzed to inform the professional officer corps about factors that impact a virtual command structure. Based on a systems approach, seven factors frame the research: executive leadership style, skills, virtual command structure, strategic implementation factors, staff employment, advanced information technology systems, and organizational culture. Strengths, weaknesses, opportunities, and threats are discussed for implementing and maintaining a virtual command presence. Propositions are provided for future analysis.

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### **THE CIVILIAN MARINERS OF MILITARY SEALIFT COMMAND: PRELIMINARY ASSESSMENT OF ORGANIZATIONAL CULTURE AND VALUES**

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**Master of Science in Management-March 1997**

**Advisor: Susan P. Hocevar, Department of Systems Management**

**Linda Wargo, Department of Systems Management**

This thesis serves as a preliminary assessment of culture and values, and the resultant effect on performance and moral at Military Sealift Command (MSC), from the perspective of its largest subculture, the civilian mariners (CIVMARS). The study gathered qualitative data from 83 CIVMARS aboard seven of MSC's ships. The objective was to raise the issues of concern to CIVMARS, and based on this information, to develop and pilot test a survey for future use to quantitatively study a larger sample of CIVMARS. The data was gathered during focus group meetings with CIVMARS who were asked to evaluate MSC's six core value areas: customer focus, teamwork, honesty and integrity, innovation, empowerment, and people.

The results show that: 1) CIVMARS do not feel valued by MSC; 2) relations between afloat and ashore personnel reflect low levels of trust and poor communication; and 3) numerous process problems inhibit MSC's effectiveness. Since these results are preliminary, it is recommended that MSC implement the culture survey developed by this research. Using a more substantial, representative sample of mariners will provide information that can guide action in the following areas which emerged from this research: 1) increase focus on human resource practices; 2) improve communications; 3) examine the detailing process of CIVMARS; and 4) reassess the validity of the core value areas.

### **AN ASSESSMENT OF THE EFFECTS OF CHANGING FAMILY CIRCUMSTANCES ON THE SIZE AND DIVERSITY OF FUTURE MILITARY ACCESSIONS**

**Jeffrey S. Weis-Major, United States Marine Corps**

**B.S., United States Naval Academy, 1983**

**Master of Science in Management-March 1997**

**and**

**Alvin J. Van Steenberg-Major, United States Marine Corps**

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**Master of Science in Management-March 1997**

**Advisors: Michael D. Cook, Department of Systems Management**

**Stephen L. Mehay, Department of Systems Management**

This thesis examines the relationship between changing family circumstances and the educational outcomes of children, and derives the implications of changes in family background on the quality and diversity of future military recruiting pools. The data sources for this thesis were the Panel Study of Income Dynamics, maintained and published by the University of Michigan, and the March Current Population Surveys, maintained and published by the U.S. Bureau of Labor Statistics. We estimated the effect of family background variables such as family income, parental education levels, and number of siblings, on the likelihood of children either completing high school or attending college. We then used these relationships to simulate the rates of high school completion and college attendance for nationally representative samples of children selected from the March 1974/1975 and 1993/1994 Current Population Surveys. The results indicate that today's children from white families will likely complete high school at lower rates but attend college at somewhat higher rates, as compared to people who were children in the early 1970s. Today's children who are growing up in minority families will likely graduate from high school at lower rates, and today's black and Hispanic children who do complete high school will be less likely to attend college, again compared to children from the 1970s. These trends suggest that military recruiters will likely have more difficulty recruiting from among all youth for enlistment and may have less success in finding minority officers.

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### **A METHODOLOGY FOR AN IMAGERY VULNERABILITY ANALYSIS**

**Joseph R. Wessling-Lieutenant, United States Navy**

**B.S., Michigan State University, 1988**

**Master of Science in Space Systems Operations-September 1997**

**Advisor: Carl R. Jones, Department of Systems Management**

**Dan Boger, Command, Control, and Communications Academic Group**

The proliferation of high resolution commercial remote sensing satellites over the next ten years will allow potential adversary countries to possess high quality imagery which can be used for intelligence purposes against U.S. forces. This thesis first provides a functional description of each segment of an imagery system, discusses relevant concepts of Command and Control Warfare, and examines three existing vulnerability analysis taxonomies. The author then combines those elements of each taxonomy applicable to an imagery system with the principles of Command and Control Warfare and develops an imagery system vulnerability analysis methodology. This three-phased methodology describes how to determine the vulnerable nodes of an imagery system, provides a framework for developing ways to attack such a system, and presents a method to measure the effects of an attack on the system. Illustrations are provided to "walk " the reader through the methodology.

### **COMMERCIAL TECHNOLOGY FOR AVIATION CONFIGURATION MANAGEMENT**

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**B.S., Virginia Military Institute, 1982**

**Master of Science in Management-June 1997**

**Advisors: Donald R. Eaton, Department of Systems Management**

**William J. Haga, Department of Systems Management**

This thesis examines the current policy and procedures used to manage naval aviation configuration control. It recommends that the Navy consult with SABRE Decision Technologies, or a company with a similar background, to re-engineer the process for approving configuration changes and create an information technology system to manage the process.

During this study, two major challenges to naval aviation configuration policy were identified. They are: (1) the process used to review and approve Engineering Change Proposals (ECPs) is too complex and has too many stakeholders and (2) the current method for management of approved configuration changes is man-hour intensive, has potential for administrative error, and requires physical inspection to positively verify aircraft and equipment configurations.

Finally, this study presents the theory that there are many common requirements between naval aviation maintenance and commercial airline maintenance. We should take advantage of the experience and technological innovations of industry and use them to make the configuration policy, and the entire maintenance effort, more effective for the users in the fleet.

### **AN ANALYSIS OF THE EFFECTS OF MILITARY HOUSING ALLOWANCES AND OTHER MILITARY RELATED FACTORS ON PRIVATE SECTOR RENTAL HOUSING PRICES**

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**LCDR M. J. Murdter, Publics Works Officer**

Privatization of Military Family Housing will place a greater reliance on private sector rental housing. Before the DoD embarks on any policy changes that place a greater emphasis on private sector housing, the DoD must be certain that rental property landlords do not raise rental prices based on changes in a service member's housing allowances. This thesis explores the relationship between changes in military housing allowances and changes in private sector rental prices. A multiple regression model was used to determine this correlation. Department of Housing and Urban Development (HUD) Fair Market Rent data was used to measure the changes in private sector rent prices in 25 cities. Basic Allowance for

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Quarters (BAQ), Variable Housing Allowance (VHA) rates, and a ratio that measured the presence of military members in a given area were used as the independent variables. Using the three independent variables described above, the result did confirm the popular impression that rent prices do rise with increases in housing allowances. However, the correlation was not as significant as anticipated. In an effort to make the model more useful as a policy tool, recommendations are provided for an expanded dependent variable data source and additional independent variables.

### **CANNIBALIZATION AT THE PACIFIC FLEET F/A-18 TRAINING SQUADRONS**

**Racquel M. Williams-Lieutenant, United States Navy**

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**Master of Science in Management-September 1997**

**and**

**Karon R. Lewis-Captain, United States Marine Corps**

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**Master of Science in Management-December 1997**

**Advisors: Donald R. Eaton, Department of Systems Management**

**William R. Gates, Department of Systems Management**

This thesis analyzes cannibalization as it affects the Pacific Fleet Navy and Marine Corps F/A-18 Fleet Replacement Squadrons. This thesis researches the supply/support posture of the F/A-18, identifies its shortcomings, analyzes the cannibalizations performed by the squadrons and determines the impact and usefulness of cannibalizations. An increase in cannibalizations increases component failure rates. Cannibalization doubles maintenance man-hours and depletes valuable resources. The data showed no clear linear relationship between cannibalizations and mission capable rate, flight hours completed, sorties completed or direct maintenance man-hours. There were many inconsistencies between different data sources. Cannibalizations should be kept to a minimum. More specific guidance is needed for cannibalization. A better tracking system is needed to capture all cannibalization data. Incentives should be incorporated to encourage truth and accuracy in reporting.

### **ANALYSIS OF DECISION MAKING IN THE ACQUISITION OF TECHNOLOGY**

**Michael E. Williamson-Major, United States Army**

**B.S., Husson College, 1982**

**Master of Science in Management-June 1997**

**Advisors: Nancy Roberts, Department of Systems Management**

**James E. Suchan, Department of Systems Management**

This research effort examines decision-making processes involving technology acquisition in large organizations. A considerable amount of resources are committed by senior managers to technology and the technology acquisition process. Resource constraints dictate that senior managers commit resources to technologies that ensure an organization's ability to remain relevant as a manufacturer or service provider. Senior managers are responsible for the decisions that ensure the effective employment of limited resources. A clearer understanding of the decision-making process and the tools available to decision-makers will potentially assist other senior managers in making decisions related to technology.

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### **AN ANALYSIS OF THE PRODUCTION RECRUITING INCENTIVE MODEL (PRIME) IMPLEMENTATION WITHIN THE UNITED STATES ARMY RECRUITING COMMAND**

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**Advisors: Katsuaki L. Terasawa, Department of Systems Management**

**Keebom Kang, Department of Systems Management**

The Government Accounting Office (1994) recommended the United States Army Recruiting Command (USAREC) alter its quota-based recruiting system. USAREC responded by implementing a team-oriented recruiting system known as Success 2000. Most recently, USAREC experimented with the Production Recruiting Incentive Model (PRIME) at the Albany Recruiting Battalion. PRIME is an alternative to the quota-based system. It is designed to motivate recruiters to access the highest number of quality recruits possible, based on their own market research and demand forecasts.

The primary objective for this research is to analyze PRIME's effectiveness at the Albany Battalion. PRIME production results were compared with Albany's prior year production and with the results of a control group. An assessment was also provided of PRIME's impact on recruiter's quality of life. USAREC committed several errors which impede the implementation and execution of the experiment. Additionally, the individual recruiter's production data was missing, which is vital for completing a thorough evaluation of the program. Although the results are inconclusive, USAREC still hopes to retain some of the positive aspects of the model. The conclusion contains recommendations for the implementation of PRIME within other battalions in the command.

### **CASE STUDIES OF MERGER ACTIVITY IN THE DEFENSE INDUSTRY SINCE 1993**

**Gary R. Zegley-Captain, United States Marine Corps**

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**Master of Science in Management-June 1997**

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To cope with a shrinking defense budget, the U.S. defense industry has undergone an unprecedented wave of consolidation. Since 1993, Moody's Investors Service has counted over 20 defense industry mergers and acquisitions. Reasons given for the consolidation include achieving critical economies of scale and combining complementary resources in a bid to remain competitive in a capital intensive industry. This thesis examines the financial impact of three merger/acquisition events: Northrop's purchase of Grumman, Lockheed's merger with Martin Marietta, and Raytheon's acquisition of E-Systems. Analysis is conducted to assess financial condition as revealed in an examination of financial ratios and financial prospects as revealed in an examination of market value and market returns.

Financial condition of the firms was marked by a decline in relative profitability and a degradation in solvency for those that made purchase type acquisitions. Despite negative impacts to many financial performance measures, stocks of these companies achieved total returns in excess of the Standard and Poor's 500 index in the year of the merger event. Price earnings ratios also increased in relation to the S&P 500 P/E, showing that investors may have looked past short term costs of restructuring for longer term gain as a result of the consolidation.

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## 1997 THESIS ABSTRACTS

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### **CHANGING ROLES AND MISSIONS OF THE MEDICAL BRANCH OF THE NAVAL RESERVE DURING THE PERIOD 1987-1995**

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**Master of Science in Management-December 1996**

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This thesis examines the changing roles and missions of the medical branch of the Naval Reserve in the post-Cold War period. These changes were brought about by the end of the Cold War, the subsequent drawdown, and the need to make better use of the resources of the United States Navy. It draws primarily on Navy and Department of Defense Instructions, General Accounting Office and Department of Defense Inspector General reports and Congressional hearings. Personal interviews with CNRF, CNSRF, and BuMed were also utilized. Four areas of change were identified. These areas are use of the Reserves to provide: (1) a reduction in Active Component OPTEMPO/PERSTEMPO, (2) contributory support at CONUS MTF's, (3) humanitarian and peacekeeping assistance, and (4) single-sourcing of Fleet Hospitals. Two changes, reduction in Active Component OPTEMPO/ PERSTEMPO and contributory support at CONUS MTF's have been fully implemented. Humanitarian and peacekeeping assistance is an area in which the medical branch of the Naval Reserve expects (but has yet to) be employed. Singlesourcing of Fleet Hospitals is a new initiative that has additional requirements for the medical branch of the Naval Reserve. Finally, the relationship between training policies and programs and these changed roles and missions is discussed.

### **U. S. MARINE CORPS COMPANY – GRADE OFFICER RETENTION**

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This thesis analyzed factors which influenced the retention of male, junior Marine Corps officers who were serving within their initial period of obligated service. A broad social science approach combining organizational and individual behavioral factors was used to model the turnover decision. A multivariate logistic regression model was estimated using these factors to determine their relative importance in explaining differences in the actual retention behavior of these officers. Subsequent models were then estimated to identify and explain differences in the factors affecting the retention between married and single personnel.

Data for this study were drawn from a matched file of responses to the *1992 Department of Defense Survey of Officers and Enlisted Personnel and Their Spouses* with 1996 follow-up retention information from the Defense Manpower Data Center's Master Loss File. The factors found to influence significantly the sample members' decisions to remain on active duty included: commissioning source; occupational specialty; deployment to Operation Desert Shield/Storm; satisfaction with various intrinsic aspects of life in the Marine Corps; concerns with the force drawdown; whether or not the officer had searched for civilian employment in the last twelve months; whether or not the officer believed that the skills he had acquired in the Marine Corps would be transferable to the civilian market; and the influence on the career decision of the officer's spouse. Finally, recommendations regarding future policy as well as areas for further related research were made.

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