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Compilation of THESIS ABSTRACTS

March 2011



**Office of the Vice President and Dean of Research
Naval Postgraduate School**

PREFACE

This publication contains abstracts of unrestricted or unclassified theses submitted for the degrees doctor of philosophy, master of business administration, master of science, and master of arts for the December 2010 graduation.

This compilation of abstracts of theses is published in order that those interested in the fields represented may have an opportunity to become acquainted with the nature and substance of the student research that has been undertaken. Copies of theses are available for those wishing more detailed information. The procedure for obtaining copies is outlined on the last page of this volume.

For additional information on programs, or for a catalog, from the Naval Postgraduate School, contact the director of admissions.

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Summary of Research, an annual compilation of research projects and publications, is also available online, at <http://www.nps.edu/Research/SummaryRes.html>.

INTRODUCTION

Mission

The Naval Postgraduate School (NPS) was established to serve the advanced educational needs of the Navy. The broad responsibility of the school is reflected in its stated mission:

Increase the combat effectiveness of U.S. and allied armed forces and enhance the security of the United States of America through advanced education and research programs focused on the technical, analytical, and managerial tools needed to confront defense–related challenges of the future.

To fulfill its mission, the Naval Postgraduate School strives to sustain excellence in the quality of its instructional programs, to be responsive to technological change and innovation in the Navy, and to prepare officers to introduce and utilize future technologies.

The research program at NPS exists to support the primary mission of graduate education. Research at NPS:

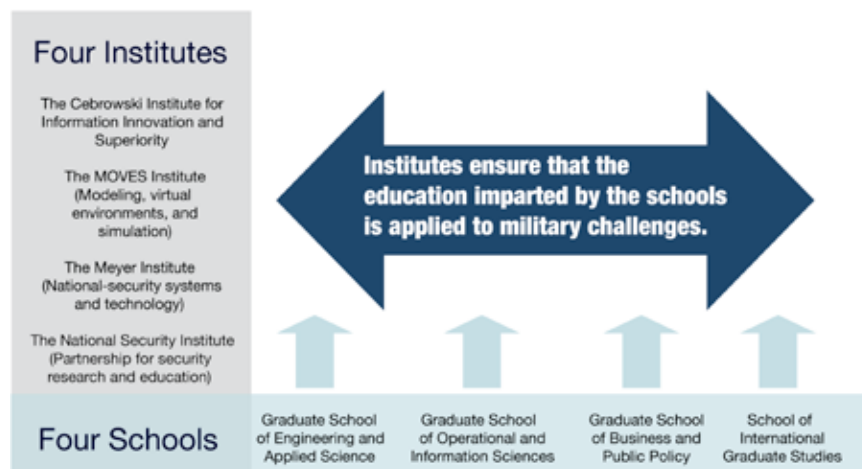
- maintains upper–division course content and programs at cutting edge;
- challenges students with creative problem solving experiences on DoD–relevant issues;
- advances DoN/DoD technology;
- solves warfare problems; and
- attracts and retains quality faculty.

Academic Programs

To meet its educational requirements, the Navy has developed a unique academic institution at the Naval Postgraduate School through the use of specially tailored academic programs, and a distinctive organization tying academic disciplines to naval and joint warfighting applications.

The Naval Postgraduate School has aligned its education and supporting research programs to achieve

Integrated • Systems Oriented • Flexible • Partnered for Strength



INTRODUCTION

three major goals: 1) academic programs that are nationally recognized and support the current and future operations of the Navy and Marine Corps, our sister services, and our allies; 2) research programs that focus on the integration of education and research in support of current and emerging national security technologies and operations, and 3) executive and continuing education programs that support continuous intellectual innovation and growth throughout an officer's career. Programs of graduate studies at NPS are grouped as follows:

Graduate School of Operational and Information Sciences

- Computer Science
- Computer Technology
- Electronic Warfare Systems
- Human Systems Integration
- Information Sciences
- Information Systems and Operations
- Information Systems and Technology
- Information Warfare
- Joint C4I Systems
- Joint Information Operations
- Modeling, Virtual Environments, & Simulation
- Operations Analysis
- Operational Logistics, Joint
- Software Engineering
- Special Operations and Irregular Warfare
- Systems Analysis

Graduate School of Engineering and Applied Sciences

- Applied Mathematics
- Combat Systems Science and Technology
- Electronic Systems Engineering
- Meteorology
- Meteorology and Oceanography
- Naval/Mechanical Engineering
- Oceanography
- Operational Oceanography
- Reactors–Mechanical/Electrical Engineering
- Space Systems Engineering
- Space Systems Operations
- Systems Engineering
- Systems Engineering Management
- Undersea Warfare
- Underwater Acoustic Systems

Graduate School of Business and Public Policy

- Acquisition and Contract Management
- Contract Management
- Executive Management
- Executive Master of Business Administration
- Financial Management
- Information Systems Management
- Defense Business Management
- Defense Systems Analysis
- Defense Systems Management, International
- Material Logistics Support
- Manpower Systems Analysis
- Program Management
- Resource Planning and Management for International Defense
- Supply Chain Management
- Systems Acquisition Management
- Transportation Management

School of International Graduate Studies

- Civil–Military Relations
- Combating Terrorism: Policy, Strategy
- Defense Decision Making and Planning
- Homeland Security and Defense
- Security Studies
- Stabilization and Reconstruction
- National Security and Intelligence:
 - Middle East, South Asia, Sub-Saharan Africa
 - Far East, Southeast Asia, Pacific
 - Europe and Eurasia
 - Western Hemisphere

The student body consists of U.S. officers from all branches of the uniformed services, civilian employees of the federal government, and foreign military officers and government civilians. The resident degree/subspecialty student population for March 2011 is shown in Figure 1 on the following page.

INTRODUCTION



**Army Reserve, Army Reserve National Guard, Coast Guard, National Oceanographic and Aeronautics Administration*

Figure 1: Resident Degrees/Subspecialty Student Population for March 2010 (1,612 total)

Academic Degrees

Curricula meet defense requirements within the traditional degree framework. All curricula lead to a master's; additional study may yield an engineer's or doctoral degree. Below is a listing of the degrees offered at NPS:

Master of Arts

Security Studies

Master of Business Administration

Master of Science

Applied Mathematics
Applied Physics
Applied Science
Astronautical Engineering
Combat Systems Technology
Computer Science
Computing Technology
Contract Management
Defense Analysis
Electrical Engineering
Electronic Warfare Systems Engineering
Engineering Acoustics
Engineering Science
Human Systems Integration
Information Operations
Information Systems and Operations
Information Technology Management
Information Warfare Systems Engineering
Management
Materials Science and Engineering
Mechanical Engineering
Meteorology
Meteorology and Physical Oceanography
Modeling, Virtual Environments, and Simulation
Operations Research
Physical Oceanography
Physics
Product Development

Program Management

Software Engineering

Space Systems Operations

Systems Analysis

Systems Engineering

Systems Engineering Analysis

Systems Engineering Management

Systems Technology

Engineer

Astronautical Engineer

Electrical Engineer

Mechanical Engineer

Doctor of Philosophy

Applied Mathematics

Applied Physics

Astronautical Engineering

Computer Science

Electrical Engineering

Engineering Acoustics

Information Sciences

Mechanical Engineering

Meteorology

Modeling, Virtual Environments, and Simulation

Operations Research

Physical Oceanography

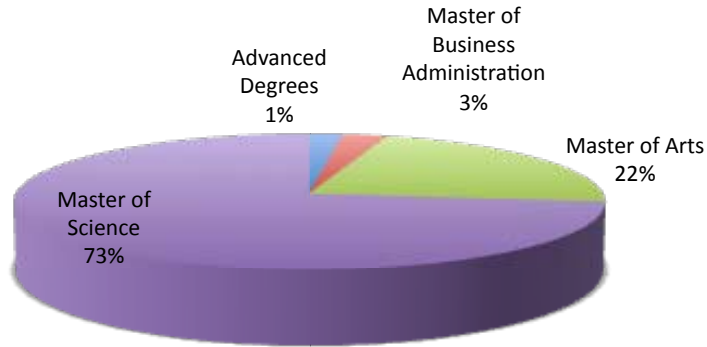
Physics

Security Studies

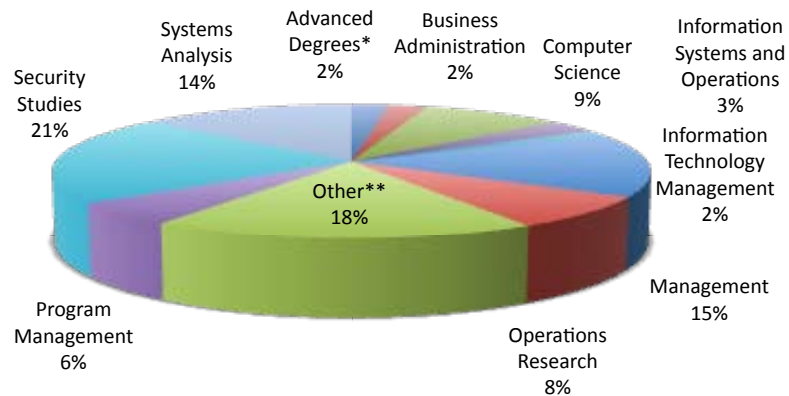
Software Engineering

INTRODUCTION

In March 2011, 148 degrees were conferred. Figure 2 indicates distribution by type, Figure 3 by degree area.



**Figure 2. Distribution by Degree Type
(148 Degrees Conferred)**



* *Advanced degrees: doctorate in computer science (1), mechanical engineering (1), physical oceanography (1)*

** *Other master's degrees: Applied math (1), defense analysis (3), electrical engineering (2), engineering acoustics (2), human systems integration (3), mechanical engineering (3), meteorology (2), meteorology and physical oceanography (2), physical oceanography (1), physics (1), software engineering (2), systems engineering (1)*

**Figure 3. Degrees Conferred in March 2011
(148 Degrees Conferred)**

INTRODUCTION

Theses

The thesis is the capstone of the student's academic endeavor at NPS. Thesis topics address issues ranging from the current needs of the fleet and joint forces to the science and technology that is required to sustain long-term superiority of the Navy/DoD.

Aided by faculty advisors, NPS students represent a vital resource within the DoD for addressing warfighting problems, one especially important at present, when technology in general, and information operations in particular, is changing rapidly. Our officers think innovatively and possess the knowledge and skill to apply nascent technologies in the commercial and military sectors. Their first-hand grasp of operations, when combined with a challenging thesis project that requires them to apply their focused graduate education, is one of the most effective elements in solving fleet/joint-force problems. NPS graduate education encourages a lifelong capacity for applying basic principles to the creative solution of complex problems.

NPS is unique in its ability to conduct classified research. Restricted theses are available on the NPS SIPR-NET.

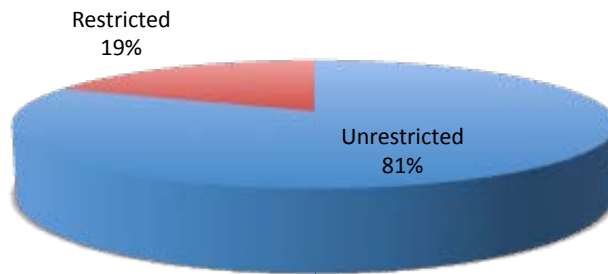


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ADVANCED DEGREES

Doctor of Philosophy

DOCTOR OF PHILOSOPHY

THE BERING SEA: COMMUNICATION WITH THE WESTERN SUBARCTIC GYRE, MESOSCALE ACTIVITY, SHELF-BASIN EXCHANGE, AND THE FLOW THROUGH BERING STRAIT

Jaclyn Clement Kinney–DoD Civilian

B.S., University of Tennessee, May 2000

M.S., University of Tennessee, August 2002

M.S., Naval Postgraduate School, June 2005

Doctor of Philosophy in Physical Oceanography, March 2011

Advisor: Wieslaw Maslowski, Department of Oceanography

A 1/12th-degree, pan-Arctic ice-ocean numerical model is used to better understand the circulation and exchanges in the Bering Sea. Understanding the physical oceanography of the Bering Sea is significant for the U.S. Navy due to the expected increase in ship traffic and exploration of natural resources that will likely coincide with the ongoing retreat of sea ice in the Western Arctic. This model represents a large step forward in the ability to simulate the mesoscale eddies and meanders in the Alaskan Stream and the deep Bering Sea basin, which are shown to exert a strong control on the flow into and out of the western Aleutian Island passes. Model results show that upwelling of deep Bering Sea water, which is the primary source of nutrients for important ecosystems of the Bering, Chukchi, and Beaufort seas, is enhanced by the presence of cyclonic eddies in the vicinity of canyons along the slope. High values of eddy kinetic energy in Bering and Anadyr straits help explain the areas of high biological productivity located just downstream in the Chirikov Basin and north of Bering Strait. Model results show significant horizontal and vertical shear in the flow through Bering Strait, and indicate a need for more observations of the flow structure on a continuous basis.

KEYWORDS: Bering Sea, Physical Oceanography, Polar Oceanography, Arctic Oceanography.

NEW FRAMEWORK FOR CROSS-DOMAIN DOCUMENT CLASSIFICATION

Anjum Gupta–DoD Civilian

B.S., University of California, San Diego, 2001

M.S., University of California, San Diego, 2005

Doctor of Philosophy in Computer Science- March 2011

Advisor: Craig Martell, Department of Computer Science

Automatic text document classification is a fundamental problem in machine learning. Given the dynamic nature and the exponential growth of the World Wide Web, one needs the ability to classify not only a massive number of documents, but also documents that belong to wide variety of domains. Some examples of the domains are emails, blogs, wiki articles, news articles, newsgroups, online chats, etc. It is the difference in the writing style that differentiates these domains. Text documents are usually classified using supervised learning algorithms that require large set of pre-labeled data. This requirement, of labeled data, poses a challenge in classifying documents that belong to different domains. Our goal is to classify text documents in the testing domain without requiring any labeled documents from the same domain. Our research develops specialized cross-domain learning algorithms based the distributions over words obtained from a collection of text documents by topic models such as Latent Dirichlet Allocation (LDA). Our major contributions include (1)

empirically showing that conventional supervised learning algorithms fail to generalize their learned models across different domains and (2) development of novel and specialized cross-domain classification algorithms that show an appreciable improvement over conventional methods used for cross-domain classification that is consistent for different datasets. Our research addresses many real-world needs. Since massive number of new types of text documents is generated daily, it is crucial to have the ability to transfer learned information from one domain to another domain. Cross-domain classification lets us leverage information learned from one domain for use in the classification of documents in a new domain.

KEYWORDS: Cross Domain Classification, Text Mining, Machine Learning, Genre Shift, Document Classification.

ON ALGORITHMS FOR NONLINEAR MINIMAX AND MIN-MAX-MIN PROBLEMS AND THEIR EFFICIENCY

Eng Yau Pee—Singapore Defense Science and Technology Agency

B.Eng., National University of Singapore, 1996

M.S., Naval Postgraduate School, 2002

Doctor of Philosophy in Operations Research- March 2011

Advisor: Johannes O. Royset, Department of Operations Research

This dissertation approaches the solution of optimization models with uncertain parameters by considering the worst-case value of the uncertain parameters during optimization. We consider three problems resulting from this approach: a finite minimax problem (FMX), a semi-infinite minimax problem (SMX), and a semi-infinite min-max-min problem (MXM). In all problems, we consider nonlinear functions with continuous variables. We find that smoothing algorithms for (FMX) may only have sublinear rates of convergence, but their complexity in the number of functions is competitive with other algorithms. We present two new smoothing algorithms with novel precision-adjustment schemes for (FMX). For (SMX) algorithms, we present a novel way of expressing rate of convergence in terms of computational work instead of the typical number of iterations, and show how the new way allows for a fairer comparison of different algorithms. We propose a new approach to solve (MXM), based on discretization and reformulation of (MXM) as a constrained finite minimax problem. Our approach is the first to solve (MXM) in the general case where the innermost feasible region depends on the variables in the outer problems. We conduct numerical studies for all three problems.

KEYWORDS: Finite and Semi-Infinite Minimax, Generalized Min-Max-Min, Discretization, Rate of Convergence, Complexity.

MASTER OF BUSINESS ADMINISTRATION

THE EFFECT OF DEPLOYMENT FREQUENCIES ON THE MILITARY DIVORCE RATE

Stacy J. Arenstein –Lieutenant, United States Navy

B.S., United States Navy Academy, May 2002

Master of Science in Management–March 2011

Master of Business Administration–March 2011

Co-Advisor: Yu-Chu Shen, Graduate School of Business and Public Policy

Co-Advisor: Elda Pema, Graduate School of Business and Public Policy

Co-Advisor: Philip Candreva, Graduate School of Business and Public Policy

The primary goal of this research is to investigate whether the length and frequency of deployments affect the likelihood of divorce. The study uses data from the Contingency Tracking System (CTS) and the Active Duty Military Personnel file. The sample includes all active duty Navy and Marine Corps members from 2000 to 2009. Three models of divorce are estimated, each with a different control for the stress of deployment on the family: length of deployment, number of deployments, and a combination of both. The results suggest that in the general active duty population, the frequency of deployments instead of the length of deployments induces the greatest level of marital conflict.

In addition to investigating the divorce effects for the entire population of Navy and Marine Corps personnel, the study also focuses attention on a selected sample of individuals with complete marital and deployment histories—this group tends to be younger and at the early stage of marriage. For this group, the number of days deployed was a positive and significant predictor of divorce rates for both Navy and Marine Corps enlistees. Additionally, the study shows that the length of the deployment also induced a significant amount of marital conflict.

KEYWORDS: Deployment, Divorce, Work-Family Conflict, Manpower Policy Issues, Retention and Quality of Life, Worker Productivity

UNITED STATES NAVY CONTRACTING OFFICER WARRANTING PROCESS

Mark A. Cowans–Lieutenant, United States Navy

Matthew D. Kremer–Lieutenant Commander, United States Navy

Master of Business Administration–March 2011

Co-Advisor: Max Kidalov, Graduate School of Business and Public Policy

Co-Advisor: Janie L. Maddox, Graduate School of Business and Public Policy

The purpose of this project was to investigate how Navy contracting activities warrant the contracting officers under their purview. The FAR and DAWIA establishes minimum training, education, and experience requirements for federal contracting officers. However, most commands implement supplementary requirements. Additionally, we wanted to discover the basis for the selection criteria utilized. The goal was to discover the general, “unwritten” requirements for Navy warranting, and whether the process created inconsistencies in the contracting workforce. We expected to find that all commands set different internal procedures for warranting above DAWIA minimums. Furthermore, we expected to find ad hoc processes tailored to the organization’s mission and to the individual Appointing Official.

MASTER OF BUSINESS ADMINISTRATION

According to this research, we discovered that warranting procedures were fragmented within and across Navy contracting commands. This fragmentation could potentially lead to inconsistencies in contracting officer knowledge, abilities, and capabilities. While this project was limited in scope, it is an initial step into the much broader research area of DoD contracting officer warranting processes.

KEYWORDS: contracting, warranting, DAWIA, COMFISCS, NAVSEA, NAVAIR, SPAWAR

ASSESSMENT OF THE USE OF PORTALS TO REDUCE EXCESS MATERIAL IN AFLOAT LOGISTICS SYSTEMS

**Joanna D. Kalvig–Lieutenant Commander, United States Navy
Master of Business Administration–March 2011**

Lead Advisor: Glenn R. Cook, Graduate School of Operational and Information Sciences

Support Advisor: Douglas E. Brinkley, Graduate School of Business and Public Policy

The purpose of this project is to assess the benefit of utilizing portals to manage and reduce excess materials in the Afloat Logistics System (ALS). Through this process, this report shall identify: 1) What IT system(s) are currently in use for managing excess material in ALS; 2) What policies are present for managing excess material in the current ALS; 3) What benefit might portals add to the management of excess material in ALS; and 4) What impact might this portal have on preventing future excess material in ALS.

The Navy's Afloat Logistics System (ALS), composed of 30 Oliver Hazard Perry class Frigates and 57 Arleigh Burke class Destroyers, is overburdened with excess material. Currently, the combined 87 ships contain over 228,000 line items of excess material within their logistics systems. This report looks at the supply chain and the effects of excess material, the current systems used to manage excess material, the issues dampening the success of current excess-material management systems, and the possible uses of portals to streamline the excess-material management systems.

KEYWORDS: Excess Material, Web Portals, Supply Chain, Bullwhip Effect, Realtime Reutilization Asset Management, NAVSUP

MASTER OF SCIENCE

Computer Science
Defense Analysis
Electrical Engineering
Engineering Acoustics
Human–Systems Integration
Information Systems and Operations
Information Technology Management
Management
Meteorology
Meteorology and Physical Oceanography
Operations Research
Physical Oceanography
Program Management
Software Engineering
Systems Engineering

MASTER OF SCIENCE IN COMPUTER SCIENCE

AUTOMATICALLY DETECTING AN AUTHOR'S NATIVE LANGUAGE

Charles S. Ahn–Lieutenant, United States Navy

B.S., Binghamton University, May 2002

Advisor: Craig H. Martell, Department of Computer Science

Second Reader: Pranav Anand, University of California, Santa Cruz

When non-native speakers learn English, their first language influences how they learn. This is known as L1-L2 language transfer, and linguistic studies have shown that these language transfers can affect writing as well. If there were a model that exploits L1-L2 language transfer to identify the authors' native language, it would be an invaluable tool for the intelligence community as well as in the field of education. Therefore, the objective of this research is to find out if it is possible to automatically detect the author's native language based on his/her writing in English using traditional machine learning techniques. For this research, we used eight different collections of writings by speakers of eight different nationalities: native English speakers as well as speakers of Bulgarian, Chinese, Czech, French, Japanese, Russian, and Spanish. Among the various feature sets used in this research, character trigrams and bag of words alone achieved higher than 80% accuracy, and the empirical analysis of character trigrams revealed that the character trigrams just model lexical usage. When content words were extracted, the performance dropped and the results revealed that the topic words were doing all the work.

KEYWORDS: Machine Learning, Natural Language Processing, Supervised Learning, Naive Bayes, Maximum Entropy, L1-L2 Language Transfer, Native Language Detection

AUTHORSHIP ATTRIBUTION OF SHORT MESSAGES USING MULTIMODAL FEATURES

Sarah R. Boutwell–Lieutenant, United States Navy

B.S., Johns Hopkins University, May 1996

Master of Science in Computer Science–March 2011

Co-Advisor: Robert Beverly, Department of Computer Science

Co-Advisor: Craig Martell, Department of Computer Science

In this thesis, we develop a multimodal classifier for authorship attribution of short messages. Standard natural language processing authorship attribution techniques are applied to a Twitter text corpus. Using character n-gram features and a Naïve Bayes classifier, we build statistical models of the set of authors. The social network of the selected Twitter users is analyzed using the screen names referenced in their messages. The timestamps of the messages are used to generate a pattern-of-life model. We analyze the physical layer of a network by measuring modulation characteristics of GSM cell phones. A statistical model of each cell phone is created using a Naïve Bayes classifier. Each phone is assigned to a Twitter user, and the probability outputs of the individual classifiers are combined to show that the combination of natural-language and network-feature classifiers identifies a user to phone binding better than when the individual classifiers are used independently.

KEYWORDS: Authorship Attribution, Machine Learning, Twitter, GSM, Device Identification, Multimodal Classifier, Naïve Bayes

BANDWIDTH AND DETECTION OF PACKET LENGTH COVERT CHANNELS

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Master of Science in Computer Science—March 2011
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Co-Advisor: James Bret Michael, Department of Computer Science

This thesis explores the detectability and robustness of packet length covert channels. We discovered that packet length covert channels, where a rogue user modulates the length of a Transport Control Protocol packet, can be detected while monitoring traffic of a large network. The bandwidth of these channels can be successfully estimated as well as the channels themselves detected using statistical inference.

In addition, we observed that there is an inverse relationship between the volitionality in networks with respect to packet lengths and the detectability of these channels, and between packet length and channel bandwidth. For a large network like a college department, the bandwidth of a covert channel could be in the tens of megabytes over the course of a day.

KEYWORDS: Computer Security, Computer Networking, Covert Channels, Intrusion Detection Systems

AUTHOR DETECTION ON A MOBILE PHONE

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Second Reader: Craig Martell, Department of Computer Science

Traditional author detection is conducted on powerful computers using documents such as books and articles. With the explosion of mobile phone computing use, modern author detection needs to be lean enough to operate on a resource restrained mobile phone and robust enough to handle the terse and non-standard wording in text messages, Tweets, and emails. By testing natural language and machine learning techniques for size and speed, not just effectiveness, this thesis identifies feature and technique combinations appropriate for author detection on a mobile phone. Specifically this thesis will examine effectiveness versus storage size for word grams of size 1, 2, and 5 as well as Gappy Bigrams and Orthogonal Sparse Bigrams. To deal with the robust nature of Tweets and text message, the Google Web1T corpus will be tested for size versus effectiveness in combination with the word grams. Once appropriate feature and technique combinations are found, those combinations will be tested on actual Android mobile phones to gauge how effective the chosen techniques are on a real mobile phone.

KEYWORDS: Machine Learning, Natural Language Processing, Support Vector Machine, Naïve Bayes, Gappy Bigrams, Orthogonal Sparse Bigrams, Google Web1T, Mobile Device, Mobile Phone

NOVEL TOPIC AUTHORSHIP ATTRIBUTION

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Master of Science in Applied Mathematics—March 2011
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Co-Advisor: Raluca Gera, Department of Applied Mathematics

The practice of using statistical models in predicting authorship (so-called author-attribution models) is long established. Several recent authorship attribution studies have indicated that topic-specific cues impact author-

attribution machine learning models. The arrival of new topics should be anticipated rather than ignored in an author attribution evaluation methodology; a model that relies heavily on topic cues will be problematic in deployment settings where novel topics are common. In order to effectively deal with novel topics, we create author and topic vectors and attempt to project out the topic influences from each document. Although our experiments did not validate our assumptions, they do point out a possible problem with a common assumption in authorship attribution research.

KEYWORDS: Novel Topic Cross-Validation, Author Attribution, Genre Shift, Vector Projection

A MOBILE DISTRIBUTED FILE SYSTEM (MDFS)

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Master of Science in Computer Science – March 2011

Co-Advisor: Geoffrey Xie, Department of Computer Science

Co-Advisor: Robert Beverly, Department of Computer Science

The goal of this research is to provide a way for frontline troops to securely store and exchange sensitive information on a network of mobile devices with resiliency. The first portion of the thesis is the design of a file system to meet military mission specific security and resiliency requirements. The design integrates advanced concepts including erasure coding, Shamir’s threshold based secret sharing algorithm, and symmetric AES cryptography. The resulting system supports two important properties: (1) data can be recovered only if some minimum number of devices are accessible, and (2) sensitive data remains protected even after a small number of devices are compromised. The second part of the thesis is to implement the design on Android mobile devices and demonstrate the system under real world conditions. We implement and demonstrate a functional version of MDFS on Android hardware. Due to the device’s limited resources, there are some issues that must be explored before MDFS could be deployed as a viable distributed file system.

KEYWORDS: Android, Erasure Code, Shamir’s Secret Sharing Algorithm, Java, Mobile Networking

A REAL-TIME SYSTEM FOR ABUSIVE NETWORK TRAFFIC DETECTION

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Second Reader: Lt Col Joel D. Young, USAF, Department of Computer Science

Abusive network traffic—to include unsolicited e-mail, malware propagation, and denial-of-service attacks—remains a constant problem in the Internet. Despite extensive research in, and subsequent deployment of, abusive-traffic-detection infrastructure, none of the available techniques addresses the problem effectively or completely. The fundamental failing of existing methods is that spammers and attack perpetrators rapidly adapt to and circumvent new mitigation techniques. Analyzing network traffic by exploiting transport-layer characteristics can help remedy this and provide effective detection of abusive traffic.

Within this framework, we develop a real-time, online system that integrates transport layer characteristics into the existing SpamAssassin tool for detecting *unsolicited commercial e-mail* (spam). Specifically, we implement the previously proposed, but undeveloped, SpamFlow technique. We determine appropriate algorithms based on classification performance, training required, adaptability, and computational load. We evaluate system performance in a virtual test bed and live environment and present analytical results. Finally, we evaluate our system in the context of SpamAssassin’s auto-learning mode, providing an effective method to train the system without explicit user interaction or feedback.

AUTHORSHIP ATTRIBUTION IN THE E-MAIL DOMAIN: A STUDY OF THE EFFECT OF SIZE OF AUTHOR CORPUS AND TOPIC ON ACCURACY OF IDENTIFICATION

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Master of Science in Computer Science—March 2011
Thesis Advisor: Craig Martell, Department of Computer Science
Second Reader: Lt Col Joel D. Young, USAF, Department of Computer
Second Reader: Peter J. Denning, Department of Computer Science**

We determined that it is possible to achieve authorship attribution in the e-mail domain when training on “personal” e-mails and testing on “work” e-mails and vice versa. These results are unique since they simulate two different e-mail addresses belonging to the same person where the topic of the e-mails from the two different addresses do not intersect. As we only used one classification technique, these results are preliminary and may serve as a baseline for future work in this area. The corpus of data was the entirety of the Enron corpus as well as a subsection of hand-annotated work and personal e-mails. We discovered that there is enough author signal in each class to identify an author in a sea of noise. We included suggestions for future work in the areas of expanding feature selection, increasing corpus size, and including more classification methods. Advancement in this area will contribute to increasing cyber security by identifying the senders of anonymous derogatory e-mails and reducing cyber bullying.

KEYWORDS: Authorship Attribution, E-mail, naïve Bayes, Enron

FILETYPE IDENTIFICATION USING LONG, SUMMARIZED N-GRAMS

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Past research into file type identification has employed many different techniques in an attempt to accurately classify files and file fragments including N-gram analysis. However, naive application of n-grams breaks down when handling n-grams that are greater than two bytes, due to the sparseness of the feature. As a result, other researchers have generally ignored long n-grams for filetype identification. This thesis explores the use of long n-grams for whole file and file fragment classification by building feature distributions of commonly occurring n-grams for single filetypes and using those distributions to classify unknown files and file fragments. This thesis also utilizes summarized n-grams in order to “collapse” similar n-grams within a file type into common n-grams. The algorithms developed to both generate and compare unknown files are presented as well as results from an experiment that was conducted using another researcher’s data set.

MALWARE MIMICS FOR NETWORK SECURITY ASSESSMENT

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Master of Science in Computer Science–March 2011

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Second Reader: John H. Gibson, Department of Computer Science

In this thesis, we present a novel approach for the training of network administrators. For computer network infiltration and defense training within the Navy and Department of Defense, the use of Red Teams results in the most effective, realistic, and comprehensive training for network administrators. This training is highly desired because it pits the network administrator against a highly trained adversary and is conducted on the operational network. Our thesis is meant to mimic that highly trained adversary. We developed a framework that would exist in that operational network, that mimics the actions of that adversary or malware, that creates observable behaviors concomitant with those actors, and that is fully controllable and configurable.

The framework is based upon a client-server relationship. The command and control server is a Java multi-threaded server that issues commands to the Java client software on all of the hosts of the operational network. Our thesis proved that commands could be sent to those clients to generate scanning behavior that was observable on the network, that the clients would generate or cease their behavior within five seconds of the issuance of the command, and that the clients would return to a failsafe state if communication with the command and control server was lost.

The framework that was created can be expanded to control more than twenty hosts. Furthermore, the software is extensible so that additional modules can be created for the client software to generate additional and more complex malware mimic behaviors.

KEYWORDS: Malware, Red Team, Computer Network Defense Training, Network Analysis, Java Multi-threaded Server

MASTER OF SCIENCE IN DEFENSE ANALYSIS

IMAGINING THE IMPOSSIBLE: INSURGENCY IN THE U.S.A.

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Master of Science in Defense Analysis—March 2011

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Second Reader: Michael Freeman, Department of Defense Analysis

As the United States focuses on external threats will internal threats sufficient to enable the overthrow of the United States government materialize? Most contemporary literature prescribes a myriad of solutions to counter a foreign nation's insurgency after it has already manifested. A prudent way to counter an insurgency is to identify it and prevent it before it starts. To know when an insurgency is developing is difficult, but is an important measure for any government to pursue to ensure its survival. Historically, the United States has not been immune to insurgent impulses. Although not necessary for insurgent mobilization, a Perfect Storm of converging existing conditions (globalization, demographic shifts, anti-Christian attitudes, and increasing domestic militarization) may threaten America's white non-Hispanic Christian population and potentially foment an insurgency. Current trends suggest this may already be happening in an area within the United States. This research seeks to determine the mechanisms by which an insurgency could manifest itself in the United States and assist the U.S. government in considering how to preemptively counter a domestic insurgency.

KEYWORDS: globalization, domestic, demography, insurgency, counterinsurgency, United States, militarization, Perfect Storm, white, non-Hispanic, Christian

TARGETING TERRORIST LEADERS: A CASE STUDY

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Targeting terrorist leadership is a common strategy used by governments. The appeal of a quick strike with minimal casualties, combined with the possible swift defeat of the terrorist organization, makes it a very attractive approach. It is important to understand the circumstances under which targeting terrorist leaders will be effective, and the circumstances where such an attack will increase support for the terrorists. This thesis utilizes the Freeman Terrorist Leadership Targeting Model to analyze the effectiveness of Israel's campaign to target Hamas leaders from 1987—2007.

Israel's campaign to target Hamas leaders produced mixed results. Hamas' political influence increased in spite of (and possibly in some degree because of) Israeli operations. However, targeting leadership deprived Hamas of key leaders and contributed to a declining frequency and effectiveness of Hamas suicide attacks.

KEYWORDS: Leadership targeting, Terrorism, Terrorist Leaders, Terrorist leader targeting, Israel, Occupied Territories, Hamas, Sheikh Yassin

**THE DEVELOPMENT OF THE HUNGARIAN SPECIAL
OPERATIONS FORCES BETWEEN 2003–2009**
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Master of Science in Defense Analysis–March 2011
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Second Reader: George Lober, Department of Defense Analysis

Hungarian Special Operations Forces have the potential to enhance the security of Hungary. Seven years have passed from 2002, when the Cubic advisory team first recommended creating the Hungarian Special Operations Forces, until 2009 when these forces began operating in Afghanistan. In 2003, the Hungarian Ministry of Defense’s comprehensive defense review identified special operations forces as a “niche” capability that could add strength to the defense forces and fill critical shortfalls in Peace Support Operations. The Hungarian political leadership endorsed developing a special operations capability package to enhance national security, contribute to the collective security of the North Atlantic Treaty Organization and the European Union, and fill shortfalls in Peace Support Operations led by these two international organizations.

In the last seven years, the Hungarian Defense Forces have created the legal framework for developing and employing their Special Operations Forces, assigned and trained units involved in the capability package, and made progress in establishing a special operations oversight structure and integrating these forces into the Hungarian defense establishment. Mentored by U.S. instructors, the Hungarian Defense Forces have made great progress, but there remains much to do. Most importantly, the political and military leadership should fully exploit capabilities of these forces for the security of Hungary.

KEYWORDS: Effectiveness, Hungary, NATO, Special Forces, Special Operations

MASTER OF SCIENCE IN ELECTRICAL ENGINEERING

DEVELOPMENT OF THREE-PHASE SOURCE INVERTER FOR RESEARCH AND LABORATORIES

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Master of Science in Electrical Engineering–March 2011

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Second Reader: Roberto Cristi, Department of Electrical and Computer Engineering

The small-scale implementation of a power system that explores a three-phase voltage source inverter (VSI) controlled by a Field Programmable Gate Array (FPGA) is investigated in this thesis. The Naval Postgraduate School (NPS) continuously develops new power systems that explore FPGA control of power electronics. The development, testing and documentation of a three-phase voltage source inverter interfacing with an FPGA and hardware is focused on in this thesis. The development of a three-phase VSI, the thermal and power loss analysis of a three-phase VSI and the hardware interface between the FPGA and the three-phase VSI used for research and laboratory procedures at NPS are particularly concentrated on.

KEYWORDS: Three-Phase Source Inverter, Field Programmable Gate Array (FPGA), Circuit Board Design and Thermal Behavior Analysis

EXTENDING THE ENDURANCE, MISSIONS, AND CAPABILITIES OF MOST UAVS, USING ADVANCED FLEXIBLE/RIDGED SOLAR CELLS AND NEW HIGH-POWER-DENSITY BATTERIES TECHNOLOGY

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The extension of flight time for military mini unmanned aerial vehicles (UAVs) has been demonstrated through the implementation and incorporation of thin film photovoltaic (TFPV) cells presented in the previous thesis work. Although most of the electric mini-UAVs nowadays are powered by high energy density lithium-ion or lithium polymer batteries, however, the flight endurance is usually only limited to 60-90 minutes before launching a forced recovery to replace the exhausted batteries with new ones. In this thesis, we will continue to explore and investigate the viabilities of extending the flight endurance by complementing the battery source on-board the mini-UAV using advanced TFPV cells that are made of Copper Indium Gallium Di-Selenide (CIGS) semiconductor materials. Aiming to achieve a higher efficiency, part of the testing phase in this research will also incorporate the use of DC-to-DC converter and a maximum power point tracking device to provide a desired output voltage and delivering maximum power from the TFPV cells to the battery and load. Beyond the application of existing TFPV cell technology, we have also extended our research findings on current and future development of new high power/energy density batteries and fuel cells technologies, as well as the potential benefit of applying less mature, high-efficiency photovoltaic cells to military UAVs.

KEYWORDS: Thin-Film Photovoltaics, CIGS, UAV, Solar Array, Power Point Tracker (MPPT)

MASTER OF SCIENCE IN ENGINEERING ACOUSTICS

**AN EFFICIENT IMPLEMENTATION OF A BATCH-ORIENTED, MULTITARGET,
MULTIDIMENSIONAL ASSIGNMENT TRACKING ALGORITHM
WITH APPLICATION TO PASSIVE SONAR**

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Advisor: Tod E. Luginbuhl, Naval Undersea Warfare Center Division, Newport

Co-Advisor: Robert G. Hutchins, Department of Electrical and Computer Engineering

This research investigates the use of two versions of a batch-oriented, multidimensional assignment tracking algorithm to examine target crossings that are on the order of 100 scans in duration. The simulations use outputs in one dimension (bearings only) from a passive sonar line array. Linear programming relaxation is used to solve the assignment problem for an exhaustive set of measurement-to-track N-tuple costs along the batch. The implementation of the cost evaluations used for the objective function is analyzed for efficiency. The objective function is minimized subject to certain constraints. The constraints are set up such that each measurement-to-track assignment is exclusive per scan along the batch. The algorithm is generic and can be extended to N dimensions (ND). Missing measurements are accounted for as part of the assignment model. An efficient version of the ND assignment is developed to increase the batch length for acceptable runtime performance. Batch lengths of up to 15 scans, equivalent to a 16D assignment, have been developed and tested on various levels of clutter data. Results are tested via 100-trial Monte Carlo simulations for the two algorithms as applied to the long-duration passive sonar crossing targets case with various clutter density and filter settings.

KEYWORDS: Batch Tracking, Clutter, Kalman Filter, Multidimensional Assignment, Multitarget Tracking, Passive Sonar, Tracking

MASTER OF SCIENCE IN HUMAN-SYSTEMS INTEGRATION

THE SCOPE OF BACK PAIN IN NAVY HELICOPTER PILOTS AND WAYS TO MITIGATE THE HAZARDS

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This thesis investigates issues such as long hours in the cockpit, ineffective seat padding, night-vision goggle (NVG) use, and the constant vibrations involved in flying rotary wing aircraft. Pain is subjective and severity is difficult to compare between individuals. Does back pain affect safety of flight? In the military helicopter aviator community, 60–80% of helicopter pilots are estimated to be suffering from back pain (Sargent and-Bachmann, 2010). The Sargent and Bachmann article, written by flight surgeons, suggests that back pain is a problem in the helicopter community. This article also suggests that back pain may be affecting safety of flight but did not have data to support that claim. This thesis provides an analysis of the scope, incidence and severity of back pain in the naval aviation helicopter pilot community. Of the helicopter pilots who responded to the survey, 88.1% are experiencing back pain during at least 50% of their flights and 34.4% admit this pain is affecting their situational awareness. This thesis gives the Navy information to decide whether to invest R&D funds in anti-vibration seat technology and whether flight safety is affected.

KEYWORDS: Back Pain, Navy Helicopter Pilots, Whole Body Vibration, Ergonomics, Helicopter Seat System

MASTER OF SCIENCE IN INFORMATION SYSTEMS AND OPERATIONS

THE IMPACT OF PRE-PERSUASION SOCIAL INFLUENCE TACTICS ON MILITARY DECISION MAKING

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Master of Science in Information Systems and Operations—March 2011

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Second Reader: Anthony Pratkanis, DoD Contractor

Military decision making is influenced by a commander's perception of the physical environment. The information presented in the physical domain and how it is processed may be altered to persuade an adversary into making predetermined decisions. Pre-persuasion social influence tactics may be used to structure a situation to establish a favorable climate for influence. Examples of how pre-persuasion influence has impacted the military decision making process have been demonstrated in several international conflicts. One goal of pre-persuasion influence is to have an adversary choose a predetermined course of action, on their own accord, that best suits the needs of the communicator. A second goal is to have an individual use pre-persuasion to influence a large audience to support his decisions. Pre-persuasion influence has been used effectively in the past because communicators, individuals or groups, have successfully impacted their audience's cognitive domain and shaped their perceptions. The ability to identify and resist the social influence tactics used to influence the military decision making process will benefit future commanders. What impact do pre-persuasion influence tactics have on the military decision making process? This paper will answer this research question and offer recommendations on how military decision makers can resist pre-persuasion influence.

KEYWORDS: Military Decision Making, OODA Loop, Social Influence, Pre-persuasion, Storytelling, Agenda Setting, Expectation Setting, Deception, Cognitive Dissonance, Perception vs. Reality

OPERATIONAL SOCIAL INFLUENCE IN THE VIETNAM WAR: AN ANALYSIS OF INFLUENCE TACTICS USED BY THE U.S. MARINE'S COMBINED ACTION PROGRAM AND THE VIET CONG IN SOUTH VIETNAM

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Shortly after Marine forces landed in Vietnam in March, 1965, leaders in the field began experimenting with pacification/combined action. Although this concept went directly against the military strategy of the top leaders, which involved unlimited combat operations, four combined-action platoons (CAPs) were formed into a combined-action company in the summer of 1965.

The Marine Corps CAP was viewed by many as one of the only successful pacification programs conducted in South Vietnam during the Vietnam War. The CAP concept in Vietnam combined a squad of Marines and a platoon of South Vietnamese Popular Forces to assist villages in resisting VC influence. By combining forces and living inside the villages, the Marines believed they could win the "hearts and minds" of the villagers.

Although they may not have been aware that the science of social influence even existed, the Marines who were part of the CAP used several social influence tactics in their effort to gain the trust of the villagers and

deny influence attempts from the VC. What they accomplished by chance should not be lost to history; it should be studied within the context of established social influence theory so future operations may benefit from their experience.

This study views the combined-action program conducted by the U.S. Marines in South Vietnam through a lens of the science of social influence. A social influence analysis is conducted using cognitive centers of gravity and specific social influence tactics. The analysis results provide an insight into which social influence tactics can be applied during counterinsurgency operations.

KEYWORDS: Marine Corps, Combined Action Program, Combined Action Platoon, CAP, Social Influence, Influence, Pratkanis, Viet Nam, Viet Cong, Pacification, Centers of Gravity, COG, Social Influence Analysis, SIA, Counterinsurgency, COIN.

AN INFLUENCE ANALYSIS OF DISSUADING NATION STATES FROM PRODUCING AND PROLIFERATING WEAPONS OF MASS DESTRUCTION (WMD)

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Second Reader: Anthony Pratkanis, DoD Contractor

This thesis analyzes the influence of deterrence and dissuasion measures against nation-states in an effort to further prevent the production and proliferation of weapons of mass destruction (WMD) among emerging nation-states. The case study within provides a historical background for the evolution of WMD programs, emphasis on nuclear programs, in India and Iraq. The study then examines the influences that prompted the nation-state leaders to convert their commercial nuclear programs to into militarized nuclear weapons programs with the intended goal of producing nuclear weapons. The study addresses dissuasion and deterrence measure used against these nation-states at the nation strategic level. Social influence techniques are then analyzed for their adaptation from the tactical (person-to-person) level to the strategic (nation-on-nation) level. The final analysis provides indications of which social influence techniques are apparently the most successful and unsuccessful in dissuading and deterring emerging nation-states in their potential quest to obtain WMD. Indications suggest that social influence tactics, such as fear appeals, coalition formulation, repetition of a message, be a credible source, guilt sells, public audience, and norm of reciprocity will only be successful in deterring and dissuading emerging nation-states in their quest to produce and proliferate WMD, if the appropriate nation deterrence/dissuasion strategy is selected.

KEYWORDS: Weapons of mass destruction, India, Iraq, social influence tactics, deterrence, dissuasion

MASTER OF SCIENCE IN INFORMATION TECHNOLOGY MANAGEMENT

THE IMPLEMENTATION OF INFORMATION SCIENCES ON KNOWLEDGE MANAGEMENT AND MENTAL MODELS IN THE DECISION-MAKING PROCESS

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Advisor: Mark Nissen, Department of Information Sciences

Second Reader: Tarek Abdel-Hamid, Department of Information Sciences

The emphasis of this research is to leverage Knowledge Flow Theory to enhance extant Decision Theory and decision support systems, to improve the decision-making process in military organizations in general, and to outline a research agenda for subsequent application to the Hellenic Navy. Thus, the challenge of this research effort is to expose the major factors that define the problem of the decision maker for correct decisions through their synthesis.

The areas of the dynamic knowledge as well as the mental models have special gravity among the military personnel since they determine the decision making process. Therefore, the intention of the author will be to conduct an introduction of the existed literature and provide greater fidelity and insight into the mechanism within which the emerging technology can either support or in some cases improve our decisions. Hence, the basis of this thesis is to enlighten the technological approach for timely integrated decisions.

The method that will be followed focuses on theoretical integration, and is expected to result in a general decision-making process for the military that reflects explicit incorporation of Knowledge Flow Theory.

KEYWORDS: knowledge management, mental models, decision-making process

WIDE-AREA NETWORKS AUTHORIZATION: A BUSINESS PROCESS RE-ENGINEERING AND KNOWLEDGE-VALUE-ADDED APPROACH

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Second Reader: Thomas Housel, Department of Information Sciences

Wide-area networks (WAN) have become more prevalent with the expansion of global organizations. WANs have provided more geographical flexibility, shared resources, and have even eased the workload in most organizations when performing at optimal levels. Historically, however, such IT configurations have not been found to provide a measurable level of productivity despite the rapid advances in computing technology. This shortfall has prompted decision makers to explore the knowledge-value added (KVA) aspects of IT solutions to define the true return on investment associated with each adoption. The purpose of this study is to evaluate the impact of Cascade, a WAN optimization tool, within the context of the C4I helpdesk model. The actual repair portion of the WAN is beyond the scope of this research; however, the technical support process from notification to corrective action has been modeled and then reengineered to demonstrate the KVA benefits in optimizing the WAN with Cascade and Steelhead products made available through Riverbed Technology.

KEYWORDS: WAN, Optimization, Knowledge Value Added, Return on Investment, Software Selection Process, Business Process Reengineering, Process Modeling, Information Technology Economics

MASTER OF SCIENCE IN MANAGEMENT

THE EFFECT OF DEPLOYMENT FREQUENCIES ON THE MILITARY DIVORCE RATE

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Master of Science in Management–March 2011

Master of Business Administration–March 2011

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Co-Advisor: Elda Pema, Graduate School of Business and Public Policy

Co-Advisor: Philip Candreva, Graduate School of Business and Public Policy

The primary goal of this research is to investigate whether the length and frequency of deployments affect the likelihood of divorce. The study uses data from the Contingency Tracking System (CTS) and the Active Duty Military Personnel file. The sample includes all active duty Navy and Marine Corps members from 2000 to 2009. Three models of divorce are estimated, each with a different control for the stress of deployment on the family: length of deployment, number of deployments, and a combination of both. The results suggest that in the general active duty population, the frequency of deployments instead of the length of deployments induces the greatest level of marital conflict.

In addition to investigating the divorce effects for the entire population of Navy and Marine Corps personnel, the study also focuses attention on a selected sample of individuals with complete marital and deployment histories—this group tends to be younger and at the early stage of marriage. For this group, the number of days deployed was a positive and significant predictor of divorce rates for both Navy and Marine Corps enlistees. Additionally, the study shows that the length of the deployment also induced a significant amount of marital conflict.

KEYWORDS: Deployment, Divorce, Work-Family Conflict, Manpower Policy Issues, Retention and Quality of Life, Worker Productivity

ANALYSIS OF SWO FUNDAMENTALS EXAM SCORES

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Master of Science in Management–March 2011

Co-Advisor: William Bowman, United States Naval Academy

Co-Advisor: Alice Crawford, Graduate School of Business and Public Policy

Since August 2008, the newly commissioned Surface Warfare Officer (SWO) has been trained for SWO Qualification through the INTRO/ASAT program. Through this program, USNA and NROTC officers check onto their first ship and subsequently attend a five-week introductory course given by the Afloat Training Group (ATG) located in one of the Fleet Concentration Areas, and OCS officers attend the course in Newport, RI. Following this training, they report to their ship for on-the-job training (OJT). Computer Based Training (CBT) discs are available to use as references. About 17 months following commissioning, the officer then reports to Surface Warfare Officer School (SWOS) for three weeks of Advanced Shiphandling and Tactics (ASAT) training. Upon arrival at ASAT, the officer is administered the SWO Fundamentals exam, designed to measure knowledge and retention of information covered during the OJT period. This thesis analyzes the SWO Fundamentals exam scores from 2007 to 2010 to determine which demographic and background vari-

ables affect a student's success and failure rates on the exam. Significant differences were found in gender, race, commissioning source, ship type, homeport and class year.

KEYWORDS: SWO, SWOS, ASAT, SWO Fundamentals Exam

**THE EFFECT OF DEPLOYMENT ON THE RATE OF MAJOR DEPRESSION
AND SUBSTANCE ABUSE IN ACTIVE DUTY MILITARY FROM 2001–2006**

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Operation Iraqi Freedom and Operation Enduring Freedom have affected the mental health of the U.S. military, as evidenced by an increasing trend in mental health illness. This thesis evaluates the effects of deployment history on major depression and substance abuse in the active duty population from 2001 to 2006. The research specifically evaluates cumulative effects of deployment (location, total days, frequency of separate tours) on major depression and substance abuse across the different branches of the military.

Probit regressions were used to estimate the effects of deployment characteristics on the rate of major depression and substance abuse using 2001–2006 data from TRICARE and DMDC, and all models control for service members' demographic and service characteristics, as well as time trend.

In general, the results support that deployments, especially to Iraq and Afghanistan, significantly affect the probability of active duty personnel across all services being diagnosed with major depression or substance abuse. Furthermore, personnel deployed only once under OEF/OIF have the highest probability of both conditions compared to those with multiple deployments, indicating a selection bias: those diagnosed were excluded from future deployments. Lastly, the risk of both conditions, in particular substance abuse, increases as cumulative days of deployment increases.

KEYWORDS: Major Depression, Substance Abuse, PTSD, Probit Regression, Rates of Major Depression, Rates of Substance Abuse, Deployment Effects, OEF, OIF, Comorbidity, Mental Health Illness

**AN ANALYSIS OF THE EFFECT OF COMMISSIONING SOURCE ON THE RETENTION
AND PROMOTION OF SURFACE WARFARE OFFICERS (SWOS) IN THE U.S. NAVY**

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This thesis investigates the effect of commissioning programs on career progression for Navy surface warfare officers (SWOs). This study specifies and estimates three multivariate regression models to analyze the relationship between commissioning source and officer performance using retention and promotion to O-4 as performance measures. As a measure of retention, we used retention after expiration of the initial minimum service requirement. The data was acquired from Officer Master File (OMF) via the Navy Econometric Modeling (NEM) online data system. The file contained 10,295 observations. All observations were surface warfare officers who were before the promotion board between fiscal years 1994 through 2004. The data contained information about demographics, professional and educational background, and separation and

promotion information for officers.

The analysis of all three multivariate regression models indicates that commissioning source is a significant determinant of retention and promotion for the SWO community. Contrary to the initial assumption, while OCS graduates have the highest probability of staying in the SW community, USNA graduates have the lowest probability. Although USNA graduates were initially expected to have higher promotion rates, the results suggest that they are less likely to promote to the grade of O-4 than officers commissioned through the NROTC-contract program. However, USNA graduates have a higher probability of promotion than officers from OCS, the NROTC-scholarship program, and from “other sources.”

KEYWORDS: U.S. Navy, Retention, Promotion, Officer Commissioning Sources, Navy HR, Surface Warfare Officer (SWO)

ANALYSIS OF SELECT MILITARY OCCUPATIONAL SPECIALTY SCHOOLS IN THE MARINE CORPS ENLISTED ENTRY-LEVEL TRAINING PIPELINE

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The Marine Corps Enlisted Entry-Level Training (EELT) pipeline is a complex system responsible for transforming civilians into Marines capable of performing a myriad of tasks required to sustain the Marine Corps. This report provides a detailed process description and throughput analysis of four Military Occupational Specialty (MOS) schools. This description and analysis is performed using process analysis techniques found within the Operations Management (OM) discipline of study to determine structural and procedural inefficiencies within the system responsible for delayed throughput times and increased costs. This report offers analysis of course capacity, course and class utilization rates, annual and trimester student throughput forecast errors, and a cost estimation of delays within the EELT pipeline. Additionally, observations of the Training Input Plan and two different information technology systems used within this system are provided. This report concludes by offering six process improvement recommendations that provide the opportunity to increase efficiency in the EELT pipeline.

KEYWORDS: Enlisted Entry-Level Training, Process Analysis, Operations Management, Military Occupational Specialty, Training and Education Command, P2T2

ANALYSIS OF THE PREVENTIVE/CORRECTIVE MAINTENANCE RATIO FOR DDG CLASS SHIPS

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This thesis provides an analysis of the Preventive Maintenance to Corrective Maintenance Ratio (PM:CM) as part of the Ship Manpower Document (SMD) requirements development process by NAVMAC. Established in 1968, the PM:CM ratio has never been revised. Previous research indicates that the PM:CM ratio used by NAVMAC underestimates CM performed. The research seeks to determine if the 1:1 (electrical) and 2:1 (me-

chanical) ratios are accurate means of forecasting future CM. The study analyzes SMD effects if CM hours from OARS are used. This study focused on the Engineering and Combat Systems work centers on DDG 51 class ships. CM data was provided by NAVSEA through the OARS database. PM data was provided by NAVMAC. The findings indicate that across all DDG flights, the PM:CM ratio understates the amount of CM performed. The resulting ratio for electrical maintenance was 1:10.9 and for mechanical maintenance it was 1:1,64. When CM from OARS was used to determine SMD requirements as outlined in OPNAVINST 1000.16K, it resulted in increased requirements on all DDG flights. These findings highlight the need for further analysis of PM and CM documentation on surface vessels and the data used by NMRS to determine manpower requirements.

KEYWORDS: Manpower, Manning, Personnel, Requirements, Maintenance, Corrective Maintenance, Preventive Maintenance, PM:CM ratio, DDG

NAVY AND MARINE CORPS OFFICERS' ATTITUDES TOWARD THE "DON'T ASK, DON'T TELL" (DADT) POLICY

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The present research seeks to identify trends in the attitudes of Navy and Marine Corps officers toward the policy known as "Don't Ask, Don't Tell" (DADT), which was enacted in 1993 and bars homosexuals from serving openly in the U.S. military. The study includes a survey of Navy and Marine Corps officers, administered in October through November 2010 at the Naval Postgraduate School (NPS). The study replicates similar research conducted at NPS in 1994, 1996, 1999, and 2004. Data analysis focuses on identifying trends in attitudinal changes over the past 17 years. Survey results show that a majority of Navy and Marine Corps officers in 2010 support allowing homosexuals to serve openly in the armed forces. Additionally, trend analyses suggest that acceptance of homosexuals in the military has steadily increased since the first study was conducted. The NPS project tracks the entire history of DADT, and the findings should prove useful to scholars, military leaders, and policy makers when the repeal of DADT is implemented.

KEYWORDS: Homosexuality, Gays, Lesbians, DADT, "Don't Ask, Don't Tell", discrimination, in-equality, prejudice, human rights, same-sex marriage, same-sex benefits, Personnel Policy, Gay Ban, DADT, LGBT, zero tolerance, military and homosexuals, Marine Corps and Homosexuals

BRAVE NEW WARFARE: AUTONOMY IN LETHAL UAVS

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The Department of Defense (DoD) is making significant strides to develop and deploy unmanned vehicles in a variety of environments. Specifically, the Secretary of the Navy is sponsoring a new program, Consortium for Robotics and Unmanned Systems Education and Research ("CRUSER"), at the Naval Postgraduate School to enhance the ability to address unmanned vehicle research in a systematic manner. The area of research in this thesis strives to position the technological advancements within an ethical framework that will guide the development and use of these technologies. Autonomous platforms may bring significant advantages and enhance our abilities for mission accomplishment. This project concludes that they are best deployed in

conventional conflicts, and may have more limited and problematic uses during irregular warfare and COIN operations. Laws pertaining to the deployment of autonomous and unmanned platforms are unclear and need to be strengthened on an international scale. Furthermore, the questions regarding what are permissible uses of autonomous platforms should also include future operators and personnel involved in the acquisition and engineering of these platforms, and should not be left solely in the hands of lawyers and diplomats. The combination of autonomy and lethality is found to work best when limited to the targeting of an enemy's weapons systems and aircraft in highly scripted environments rather than enemy combatants and personnel themselves.

KEYWORDS: UAV, Unmanned Aerial Vehicle, UCAV, Unmanned Combat Aerial Vehicle, RPA, Remotely Piloted Aircraft, RPV, Remotely Piloted Vehicle, Military Ethics, Personalism, Empathy, Creech AFB, Air Force Weapons School, NUCAS, George Lucas, Brave New, Autonomy, Lethal Force, Military Professionalism, Conventional Warfare, Unconventional Warfare, Moral Disengagement, Military Ethics, COIN, CRUS-ER

ANALYSIS OF THE EFFECTS SPECIAL PAYS HAVE ON RETENTION IN THE MEDICAL SERVICE CORPS

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Master of Science in Management—March 2011**

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This thesis examines the effects special pays have on retention in the Medical Service Corps (MSC.) The research utilized special pay guidance and data from the Bureau of Medicine Information System (BUMIS) on Officers who entered the MSC between 1997 and 2006.

Four basic and refined probit models using demographics and specialties were constructed to determine the effects of special pays on retention. Each model included a difference in difference estimator to measure the effects over time. The basic model estimated the effect of special pays on all specialties that receive a special pay. The refined models estimated the effects of special pays on retention for individual specialties, specifically psychologists, pharmacists, and optometrists.

Findings showed that when special pays are implemented, specialties that receive them have a decreased probability of leaving the service. Individually, pharmacists and psychologists had a decreased probability of leaving when their respective special pays were implemented. Optometrists had an increased probability of leaving when their special pay was implemented, a result that requires further research.

KEYWORDS: Medical Service Corps, Special Pays, Retention

PATTERNS OF MARINE CORPS RESERVE CONTINUATION BEHAVIOR: PRE- AND POST-9/11

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This thesis identifies the effects of mobilization on Marine Corps Reserve non-prior service (NPS) personnel continuation rates. The research evaluates the retention effects of reservists' expectations about mobilization by analyzing retention data from three separate time periods – Pre-9/11, Overlap-9/11, and Post-9/11.

The analysis used monthly observations for NPS reserve enlisted personnel who have completed their initial 6-year obligated drilling contracts. This research analyzed the end of contract “waterfall” period, which describes the drastic drop in reserve continuation that takes place upon the completion of NPS reservists drilling obligation. Analysis was performed using multivariate models for each time period, which consider the effects of mobilization, as well as other explanatory variables for demographics, military performance, education benefits, unit type, geographic region, and unemployment rate.

The effects of mobilization on continuation were found to differ depending on mobilization duration, frequency, and time period. Factors negatively influencing continuation were found to include general overseas deployment and longer mobilizations. However, the negative impacts on continuation were found to decrease or become statistically insignificant for those who enlisted after 9/11. Shorter mobilization durations were found to positively impact continuation rates.

KEYWORDS: Continuation Rate, Continuation, Retention, Attrition, SMCR, Activation, Mobilization, Deployment, Monetary Incentives, Marine Corps Reserve, Probit Regression, Multivariate Analysis, Statistical Analysis, End Strength, Non-Prior Service, Pre-9/11, Post-9/11

POST-9/11 FIELD GRADE OFFICER REQUIREMENTS IN THE MARINE CORPS RESERVE

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The Reserve Affairs (RA) division at Headquarters Marine Corps (HQMC) requested the development of a model to determine affiliation and participation rates for field grade officers for a projected officer population in the Selected Marine Corps Reserve (SMCR) and the Individual Mobilization Augment (IMA) program, and a corresponding mobilization requirement among un-affiliated officers. This thesis analyzes roughly 20 years of Marine Corps Reserve officer inventory history. It examines how the Marine Corps Reserves current grade strength inventory evolved and uses that inventory data to develop a reference table for use by RA to better plan for future requirements. This table will allow RA to plan for how many of each field grade rank are required in inventory to maintain an acceptable manning rate so that the Marine Reserve is not left short-handed in those categories, or have too many under-employed officers.

KEYWORDS: Reserve, Field Grade Officer, Affiliation, Affiliation Rate, Participation, Participation Rate

APPLICATION OF A UNIFORM PRICE QUALITY ADJUSTED DISCOUNT AUCTION FOR ASSIGNING VOLUNTARY SEPARATION PAY

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This thesis examined the feasibility of using a quality adjusted auction for retaining quality officers while assigning voluntary separation pay to Marine officers. The study used survey data to set parameters for the auction. Data used in the study was collected from a survey administered to approximately 500 officers assigned to I Marine Expeditionary Force, Naval Postgraduate School and Defense Language Institute. Furthermore, survey data was used to estimate the effects of personal, professional and economic factors on a Marine officer's decision to participate in a voluntary separation program.

MANAGEMENT

Results find that a quality adjusted auction for separation can provide cost savings and improve the quality of officers retained. Unlike a retention auction where higher quality officers receive higher retention bonuses, higher quality officers receive lower separation bonuses in a quality adjusted auction for separation. Probit model estimates find that expected civilian pay, personal discount rate, marital status, military occupational specialty and pay grade had a significant effect on the probability of an officer participating in a voluntary separation program. Ordinary least squares estimates find that aviation and combat service support military occupational specialties, and quality score had a significant effect on an officer's personal discount rate.

KEYWORDS: Voluntary Separation Pay, Special Separation Benefit, Voluntary Separation Incentive, Quality rating, Auction

THE EFFECTS OF COMBAT EXPOSURE ON REENLISTMENT AND ATTRITION

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The operational environment faced by today's service members is characterized by continued deployments to combat zones where large segments of the active duty population experience stressful deployments throughout their enlistments. This study examines how battlefield experiences affect retention and attrition behavior among first-term enlisted personnel. The data for this thesis comes from the Defense Manpower Data Center and the Armed Forces Health Surveillance Center. A multivariate analysis using probit models was used to estimate effects. Analyses of the models indicate that the effects of combat experiences on first-term enlisted retention and attrition rates vary depending on the Service. Witnessing the death or injury of enemy combatants while deployed increases the attrition rates among soldiers and Marines but decreases the attrition rates for sailors and airmen. Exposure to destroyed military vehicles leads to decreases in attrition rates among soldiers, sailors, and Marines while airmen experience an increased attrition rate. Among service members who have completed at least 36 months of active duty service (24 months for three-year contracts) combat exposure that is statistically significant generally increases retention among service members in the Army and Air Force but decreases retention rates for service members in the Navy and Marine Corps.

KEYWORDS: Retention, Attrition, PDHA, Deployment, Combat, OIF, OEF, Probit Regression, Multivariate Analysis, Statistical Analysis, Reenlistment, AFHSC, DMDC

STUDY OF STANDARDS USED TO SCREEN RECRUITS FOR ASSIGNMENT TO THE COMMUNICATIONS FIELD IN THE U.S. MARINE CORPS

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This thesis examines the relationship between ASVAB composite scores and success at the 06 Occupational Field Schools. The author analyzes Marine Corps personnel data obtained from the Total Force Data Warehouse. The range of the data studied covers a period from fiscal year 2006 through fiscal year 2009, including 9,921 Marines. Several multivariate regression models are estimated to determine the effects of ASVAB composites and other measures of performance on success at the Communications Schools. Results indicate that the Electronics aptitude test composite has a significant positive effect on success at the Communications Schools. Additional variables that have a positive effect on the probability of success are being married,

Hispanic, American Indian, the Clerical aptitude test composite score, enlisting in fiscal year 2007 (compared to 2009), and attending 0612 or 0651 MOS schools (when compared to 0621). Factors that had a negative effect on success include being female, having fewer than 12 years of education, and attending 0613, 0614, 0622, 0623, 0628, or 0656 MOS schools (when compared to 0621). Further research is recommended to examine additional factors and to refine the variable for years of education.

KEYWORDS: Marine Corps, Communications, ASVAB, EL, Selection, Attrition, MOS, PMOS, Regression, Probit, dProbit, Stata, Statistics

ANALYSIS OF MINORITY OFFICER RECRUITING IN THE U.S. MARINE CORPS

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Marine Corps Recruiting Command administers minority officer recruiting, the brunt of which is the responsibility of Officer Selection Officers. Currently, minority officer accessions fail to reflect the demographic composition of the nation's college market. To increase minority rates, MCRC must align minority officer applicant submission goals with the population of eligible, test-score-qualified, male, baccalaureate degree-seeking students. The purpose of this thesis is to analyze whether current minority applicant submission goals are reasonably allocated. The first phase develops a propensity-weighted Qualified Candidate Population (PW-QCP) model to provide college market estimates. Phase 2 compares these PW-QCP estimates with five-year minority officer applicant trends and minority submission goals. The third phase builds a probit model to predict the probability of accession based on applicant characteristics. The results show that submission goals should be modified to reflect the changing demographics of the nation and that the probability of minority accession is dependent on qualification characteristics that exceed those of the average applicant. The findings suggest that increasing minority representation depends on: (1) submission goals that align approximately with PW-QCP estimates; (2) submission goals that are met by Marine Corps Districts; and (3) minority applicants who can meet or exceed average eligibility requirements.

KEYWORDS: Officer Recruiting, Marine Corps, Propensity, Minority Recruiting, Probit Regression

FORECASTING ENLISTED ATTRITION IN THE UNITED STATES MARINE CORPS BY GRADE AND YEARS OF SERVICE

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The purpose of this thesis is to analyze historical United States Marine Corps enlisted attrition behavior and apply time series forecasting techniques by grade and Years of Service in order to identify methods to improve manpower analysts' ability to effectively forecast attrition behavior. This study compared the results of 1 to 5-Year Moving Average models and the results of 1 to 5-Year Weighted Moving Average models based on two Measures of Effectiveness, Mean Square Error and the Mean Absolute Percent Error. The results of the Friedman test indicate statistical significance of the results in relation to the Mean Square Error of the 1 to 2-Year Moving Average models. This thesis demonstrates that in most cases, a simple 1-Year Moving Average more effectively estimates attrition behavior than the other Moving Average or Weighted Moving Average models analyzed.

KEYWORDS: Manpower, Time Series Analysis, Forecasting, Marine Corps Enlisted Attrition

**EFFECT OF STATE UNEMPLOYMENT RATE ON ATTRITION
FOR FIRST-TERM U.S. NAVY ENLISTED ATTRITION**

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This thesis analyzes the effects of unemployment on first-term attrition for U.S. Navy enlisted personnel in the pay grades of E-1 to E-9 with no prior service that attrited between fiscal years 1999 and 2007.

Four separate probit models were formed to analyze the effect of the state unemployment rate on first-term attrition for Navy enlisted personnel for cohorts during six months of service, 12 months of service, 24 months of service and 45 months of service. A second model type analyzed attrition over a specific period of time. Attrition was estimated during six months, between 6-12 months of service, between 12–24 months of service and between 24–45 months of service. These models were developed to predict the likelihood of an enlisted sailor attriting when state unemployment rates increase by one percentage point.

The independent variables for the two models types included demographic variables, such as Black, White, Asian, Native American, other race, education years, age, female, male, AFQT_score, pay grade dependents, no dependents, first enlistment with bonus, and first enlistment no bonus. Dummy variables for 1999-2007 and dummy variables for states were created to explain any bias of attrition by circumstances, such as the economy.

Consistent negative effects on attrition included unemployment rate, Blacks, AFQT scores, years of education and pay grade. Positive influences included age, having no dependents, and females.

KEYWORDS: Probit Regression, Manpower Performance, Survival Analysis, Enlisted Attrition, First-Term

MASTER OF SCIENCE IN METEOROLOGY

LONG-RANGE FORECASTING IN SUPPORT OF OPERATIONS IN PAKISTAN

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Skillful long-range forecasts (LRFs; leads times of several weeks or longer) are a critical component of mission planning for both military and nonmilitary operations. This is especially true for countries that are susceptible to persistent climate variations, such as Pakistan. The environmental, economic, and political impacts of climate variations can be severe—particularly for countries that are economically and politically unstable, or at risk of such instability. The United States (U.S.) has characterized stability in Pakistan as a priority for U.S. national security.

These considerations led us to investigate the potential for skillful LRFs of climate variations in Pakistan summer precipitation. These variations can lead to floods and droughts, and major economic impacts, as demonstrated by, for example, the extreme flooding in the summer of 2010. In this study, we developed methods for long-range forecasting of Pakistan precipitation during the main precipitation period of July–August. We investigated the correlations between regional and global scale climate variables and Pakistan precipitation to identify the processes associated with extreme summer precipitation events in Pakistan.

From these correlations, we identified a set of 850 hecto-Pascal (hPa) geopotential heights (GPH) in the region surrounding Pakistan as a potentially skillful predictor. We developed several LRF approaches based on this predictor and linear regression, tercile matching, and optimal climate normal methods. We tested these approaches by conducting independent hindcasts for the 41-year period of 1970–2010, and found good skill in predicting above and below normal precipitation events. We also determined that using sea surface temperatures (SSTs) as a predictor of the 850 hPa heights has the potential to provide skillful LRFs of Pakistan July-August precipitation at lead times out to six months or longer. We propose that additional research be conducted using statistical and statistical-dynamical forecast methods to develop and validate a long-range forecasting system for operational use.

KEYWORDS: Pakistan, Southwest Asia, SWA, Precipitation, Precipitation Rate, Long-range Forecasting, Climate, Climate Analysis, Climate Variations, Climate Forecasting

CONTRIBUTIONS TO REMOTE SENSING OF SHALLOW WATER DEPTH WITH THE WORLDVIEW-2 YELLOW BAND

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Remote sensing of the bathymetry in shallow water of Tampa Bay is examined using the multi-spectral imagery from the Worldview-2 satellite. Utilizing the newly available yellow spectral band in a ratio algorithm,

five ratio combinations are compared against a digital elevation model of Tampa Bay. Following the work of Stumpf et al. (2003) ratio algorithm and starting with the work of Loomis (2009) and Densham (2005), the yellow band was combined with the blue, green and red bands separately. These three ratio combination results were compared with the results of the more traditional blue/green combination and a green/red combination. Three transects lines were drawn in a shallow reef area in the north portion Tampa Bay, Florida on Mullet Key near Fort de Soto State Park. In water under 2 meters depth, the substrate contributions were significant in all ratio derived bathymetries. The addition of the yellow band provided more information about the bathymetry than the previous blue/green and green/red combinations by adding more combinations that utilized a reflectance level difference. The yellow band demonstrates less sensitivity to bottom type in two of the transect lines.

KEYWORDS: Bathymetry, Worldview-2, Remote Sensing, Near Shore, ENVI, Tampa Bay, Ratio Algorithm, Yellow Spectral Band, Multi-Spectral, Satellite, Bottom Type

MASTER OF SCIENCE IN METEOROLOGY AND PHYSICAL OCEANOGRAPHY

INTENSITY CHANGES IN TYPHOON SINLAKU AND TYPHOON JANGMI IN RESPONSE TO VARYING OCEANIC AND ATMOSPHERIC CONDITIONS

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Impacts of ocean heat content (OHC) and vertical wind shear on intensity changes of Typhoon Sinlaku and Typhoon Jangmi during the Tropical Cyclone Structure-2008 and THORPEX Pacific Asian Regional Campaign are investigated. Observations of ocean structure variables were obtained in the environment of each typhoon via aircraft-deployed expendable bathythermographs (AXBTs). Strong correspondence among storm intensity changes, ocean features, and vertical wind shear is identified as each tropical cyclone passed over regions of warm and cold ocean features with varying vertical wind shears. Typhoon Sinlaku passed over a cold ocean and with a consistently low vertical wind shear, the storm did not intensify for 12 hours. Sinlaku then reached maximum intensity as it passed over a warm ocean feature while vertical wind shear remained low. Sinlaku also weakened as it passed over an intense cold eddy at a time when vertical wind shear was increasing. Similar impacts are defined for TY Jangmi. Comparison of the AXBT profiles with the East Asian Sea Nowcast/Forecast System (EASNFS) analyses consistently indicated the EASNFS mixed layer depths (MLD) were too shallow, had steeper slopes in the thermocline and a warm sea-surface temperature (SST) bias. The MLD and SST biases compensated causing OHC differences to be reduced.

KEYWORDS: Ocean Heat Content, Vertical Wind Shear, Tropical Cyclone, Ocean Profile, Intensification, Mixed Layer Depth.

SHEAR AND STABILITY AT THE BASE OF THE MIXED LAYER IN THE ARCTIC OCEAN: THE ROLE OF INERTIAL MOTIONS

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The Arctic environment changed significantly over recent decades and declines in perennial sea ice and thickness concentrations have been frequently observed. Current predictive models providing researchers with conservative estimates of sea ice concentrations, the lack of observations and understanding of the physical processes that promote changes in sea ice create inaccuracies that need to be improved. A fusion of buoy observations, satellite derived ice concentrations, and modeled wind data are made in this thesis to provide a better insight into sea ice inertial motions and its influence on the processes that occur in the Arctic Ocean mixed layer and to investigate whether these processes can be parameterized to improve predictive models.

Observations made in the Canadian Basin and the Transpolar Drift by high resolution Autonomous Ocean Flux Buoys (AOFBs), SSMI and AMSR-E satellite derived ice concentrations, and ERA-Interim winds are

used to examine the relationships between winds, ice coverage and sea ice inertial oscillations. Data collected from AOFBs and collocated Ice-Tethered Profilers (ITPs) are analyzed to investigate whether ocean mixed layer inertial oscillations contribute to shear instability at the base of the mixed layer, which serves as a mechanism for vertical transport of heat in water masses underlying the mixed layer.

Results show that simple linear regression models cannot explain the relationship between inertial sea ice velocities and modeled winds. However, they do indicate that the magnitude of the inertial sea ice velocities during summers is greater when compared to winter. Analysis further reveals a relationship between sea ice inertial oscillations and sea ice concentrations. We conclude that parameterizing the conditions that permit significant inertial motions in terms of changing areal ice conditions is viable. Inertial oscillations generated in the Arctic Ocean mixed layer do contribute significantly to the instability at the base of the mixed layer, especially during summers. However, comparisons of dynamic instability at the base of the mixed layer to satellite derived sea ice concentrations reveal no conclusive relationship.

KEYWORDS: Arctic Ocean, Inertial Motion, Inertial Oscillation, Shear velocity, Dynamic Stability, Sea Ice, Mixed Layer, Ice Concentration, Autonomous Ocean Flux Buoy, Ice-Tethered Profiler, SSMI, AMSR-E, ECMWF, Oceanic Forcing, Canada Basin, Beaufort Sea, Transpolar Drift

MASTER OF SCIENCE IN OPERATIONS RESEARCH

ACTIVE DUTY FEMALE MILITARY'S EXPERIENCE OF FEAR, EMBARRASSMENT, AND DISTRESS DURING PELVIC EXAMINATIONS

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Second Reader: Julie C. Weitlauf, Veterans Administration, Palo Alto Healthcare System

Previous research indicates that among civilians and female veterans, a history of sexual violence is associated with negative experiences with gynecological care. We attempt to extend these findings to active duty female U.S. military officers. We hypothesize that in this population (1) sexual violence history status predicts emotional reactions to the pelvic examination; (2) that this relationship is mediated by military rank; and (3) recollections of the first pelvic examination are correlated with reactions to the most recent pelvic examination.

Sixty participants completed an online survey, consisting of six questionnaires, tapping attitudes and reactions to gynecological care, history of trauma, recommendations, and demographic information.

There is insufficient statistical evidence to support either a relationship between sexual violence history and reaction to the most recent pelvic examination, or that rank mediates this potential relationship. However, there is strong evidence that the first pelvic examination experience was positively correlated with the most recent pelvic examination experience. Participants, regardless of sexual violence status, reported stronger reactions to the first pelvic examination than to the most recent examination.

The results are not consistent with previous work for several possible reasons including the definition of sexual violence, the role of Post-Traumatic Stress Disorder and homogeneity of the sample.

KEYWORDS: Female military, pelvic examination, sexual violence

ASSESSING THE EFFECTIVENESS OF BIOSURVEILLANCE VIA DISCRETE EVENT SIMULATION

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Master of Science in Operations Research—March 2011

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Bioterrorism is not a new threat, but the potential for disastrous outcomes is greater than it has ever been. In order to confront this threat, biosurveillance systems are utilized to provide early warning of health threats, early detection of health events, and situational awareness of disease activity. To date, there is little known about the performance of such biosurveillance systems in comparison to diagnosis capabilities of medical personnel. In this thesis, a discrete event simulation model of an anthrax outbreak is developed in order to analyze the performance of such biosurveillance systems in comparison to medical personnel. This research found the EARS C1 statistical algorithm is useful in early event detection of a bio-terror attack. Given an exposed population of 1,000 people, the nominal probability that the algorithm signals first is 31.5% and it is 0.3% for

an exposed population of 10,000 people. Given an exposed population of 1,000 people, the nominal time it takes for the algorithm to signal is 3.3 days and 0.38 days for an exposed population of 10,000 people.

KEYWORDS: Biosurveillance, Syndromic Surveillance, C1, Discrete Event Simulation, EARS, Early Event Detection (EED)

PRE-POSITIONING FOR FLOODING IN THE SACRAMENTO REGION

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Master of Science in Operations Research

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The Sacramento region is prone to flooding disasters. This thesis uses an optimization model to recommend where to preposition and/or expand warehouses, health-care personnel, ramp space, and transportation vehicle capacity. Adequate prepositioning helps evacuate the emergency population (EP), supply commodities to affected population (AP) that stays back in the affected areas (AAs), and transport other displaced population (DP) to the relief locations (RLs) for shelter. The goal is to minimize the expected number of EP and AP casualties, and then to maximize the DP transported to RL shelters, both during the first 72 hours after a flood disaster. We model a network of eight AAs and ten RLs, four flooding scenarios of different severity, and several budget levels for expansion of the initially prepositioned resources. We find that the RLs that the Federal Emergency Relief Agency (FEMA) has already selected have enough warehouse space to support the AP. This model recommends minor investment in additional health-care providers and emergency rescue vehicles for the EP. On the other hand, we observe a shortfall in mass housing capacity for the DP, even after fully expanding the capacity of existing facilities.

Keywords: Disaster preparation; Stochastic optimization

**THE BASIC UNDERWATER DEMOLITION/SEAL ACCESSION CALCULATOR
MODEL: DETERMINING THE OPTIMAL NUMBER OF JUNIOR
OFFICER ACCESSIONS TO MEET END-STRENGTH GOALS**

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The mission of the Naval Special Warfare (NSW) community is to provide a versatile, responsive, and offensively focused force with continuous overseas presence in order to have strategic impact in missions that include special reconnaissance, direct action, unconventional warfare, and combating terrorism. Currently, the NSW community has large manpower gaps within the officer corps especially, at the Lieutenant Commander rank. This gap threatens the operational readiness of the NSW community, which in turn affects our national security. This thesis presents the development of the Basic Underwater Demolition/SEAL (BUD/S) Accession Calculator (BAC), which uses goal programming and Markov chain analysis to determine the optimal number of new accessions needed to enter the BUD/S training program to meet target-end-strength goals for company grade ranks. By properly manning the junior ranks, the LCDR rank can be properly manned. The results demonstrate that the NSW community can closely meet target-end strength goals of 127 and 285 for Lieutenant Junior Grades and Lieutenants, respectively, with the 100 accessions to BUD/S every year. However, as the attrition rate fluctuates the number of accessions change. The most dramatic impact to BUD/S

accession requirements is observed when attrition rate increases. Decreases in attrition rate show that small changes to accession requirements occur.

KEYWORDS: SEAL, Manpower, Optimization, Markov Chain, Goal Programming, Junior Officer

FORECAST ERROR METRICS FOR NAVY INVENTORY MANAGEMENT PERFORMANCE

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Second Reader: CDR Patrick A. R. Burson, USN, Department of Operations Research

This research establishes metrics for determining overall Navy secondary inventory forecasting accuracy when compared to actual demands at the Naval Inventory Control Point (NAVICP). Specifically, two performance metrics are introduced: the average performance index (API) and the median absolute deviation performance index (MPI). API measures forecasting accuracy of secondary inventory when compared against demand or forecast performance over a four quarter period. MPI measures the quarterly variability of forecast errors over the same period.

The API and MPI metrics allow for the identification of poorly forecasted NAVICP secondary inventory items. The metrics can be applied to entire inventories or subsets of items based on type, demand, or cost. In addition, the API metric can be used to show overall inventory performance, providing NAVICP with a graphical means to assess forecasting performance improvements (or degradations) over time.

The new forecasting accuracy methods developed in this research will allow the Navy to continually gauge the overall health of their inventory management practices and provide a method for improving forecasting accuracy. Additionally, they will assist NAVICP in complying with DoD directives that require NAVICP to monitor and continually develop improvements to inventory management practices.

KEYWORDS: Inventory, Demand, Forecast, Forecast Error, Inventory Management, MAD, CHURN

**ASSESSING THE “ESSENCE” BIOSURVEILLANCE
SYSTEM: RESULTS OF A USER SURVEY**

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Second Reader: James Eagle, Department of Operations Research

The Navy and Marine Corps use the ESSENCE system for early detection of diseases and other public health threats to the force and for situational awareness on the location and spread of such diseases. In accordance with BUMEDINST 6220.12B, the NMCPHC sponsored a survey to better understand ESSENCE account holders' training on the system, employment of the system, and their perceived value of the system.

The survey was sent to 225 Navy and Marine Corps users with either an active or a disabled ESSENCE account. Ultimately, 143 of the users responded to the survey for a 64 percent response rate.

Survey findings include that, overall, nine out of 10 ESSENCE account holders, past and present, favor using the system, find it valuable, and believe the training they received has been adequate. However, users raised four issues: 1) it takes an excessive amount of time to obtain an account, 2) passwords are required to be changed too often, 3) there are too many miscodings leading to excessive false positive signals, and 4) training and training tools are insufficient.

KEYWORDS: Biosurveillance, ESSENCE, NMPHC, Surveillance System, Survey

EFFECTIVENESS OF VOLUNTARY EDUCATION IN OPERATIONAL ENVIRONMENTS: AN ANALYSIS OF THE NAVY COLLEGE PROGRAM FOR AFLOAT COLLEGE EDUCATION (NCPACE)

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The Navy College Program for Afloat College Education (NCPACE) is one of the main components of the United States Navy's Voluntary Education (VOLED) program, offering college courses and remedial academic skill modules to sailors on sea duty or stationed in remote locations.

This thesis predicts the likelihood of NCPACE course completion by course and individual participant characteristics using a logistic regression model. We found that participants who take distance learning-based and mathematics courses have lower predicted odds of succeeding, while participants with higher Armed Forces Qualification Test (AFQT) scores and levels of education have higher predicted odds of succeeding. Some variation was noticed between unit vessel types and school.

This thesis also evaluates the likelihood of attempting and successfully completing a subsequent course conditional on the outcome of the first course. Successful completion of the first course is positively associated with an enrollment in a subsequent course in addition to the successfully completion of that course.

Lastly, this thesis examines promotion, extension and reenlistment outcomes for first-term NCPACE participants with 48-month contracts. We found that those who successfully completed at least one course are predicted to be more likely to promote to E5 and are predicted to be slightly less likely to reenlist in the Navy.

KEYWORDS: Navy College for Afloat College Education, NCPACE, Voluntary Education, VOLED, course completion, promotion, extension, reenlistment, logistic regression, Hosmer-Lemeshow, Receiver Operating Characteristic, ROC

JOINT PROGRAM EXECUTIVE OFFICE FOR CHEMICAL AND BIOLOGICAL DEFENSE COLLABORATION STUDY

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The Joint Program Executive Office for Chemical Biological Defense (JPEO-CBD) is interested in how it can achieve a higher success rate of fielded items with their nine subordinate Program Management Offices. The Joint Science and Technology Office (JSTO) is the research, development, and technology organization that assesses all the new technologies that may eventually become fielded. The JPEO-CBD organization suspects that many of the research projects funded by JSTO are rarely fielded into actual Chemical Biological Defense (CBD) systems used by the end user. This study analyzes the results of a JPEO-CBD Questionnaire and compares those results to applicable JPEO-CBD and JSTO technology statistics. The aim of this study is to analyze the quality of the agency relationships and how the relationships impact the probability of projects being fielded. This study shows a significant statistical relationship between the collaboration survey score of a JPM and its anticipated future transition to the warfighter. A similar result is true for the correlation between the historical percentage of technologies that transition to warfighter use and the JPM's collaboration survey score.

KEYWORDS: Joint Science and Technology Office, Joint Program Executive Office, Joint Program Manager, survey

**COUNTERING PIRACY WITH THE NEXT GENERATION
PIRACY PERFORMANCE SURFACE MODEL**

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Second Reader: Thomas W. Lucas, Department of Operations Research

In 2009, the Naval Oceanographic Office was tasked with developing a product that uses forecasted meteorological conditions and historical pirate incidents to predict locations conducive to pirate activity in the Somali Basin Region and the Gulf of Aden. This resulted in the development of the Piracy Performance Surface (PPS) model, whose outputs are briefed daily to the Commander of the United States Naval Forces Central Command and Combined Maritime Forces in Bahrain. The Next-generation PPS (PPSN) model uses simulation to provide as output, a forecast of relative pirate presence probability over time. Effective March 1, 2011, the name of PPSN has been changed to the Pirate Attack Risk Surface (PARS) model.

This research includes interviews with counter-piracy forces that led to recommended changes in the PPSN model. In addition, using robust and realistic experimental designs, this research identifies the significant intelligence factors of the PPSN model. This gathered information is being used to refine these input variables to achieve maximum performance of the PPSN model. This research also unveiled input variables that are influential in the computing memory requirements and program runtime. This information is being used to focus efforts on setting these variables to realistic levels without sacrificing the model's efficiency and effectiveness. Finally, the results of this thesis allow for quick turnaround of updates to the PPSN model in response to gathered intelligence.

KEYWORDS: Piracy, Piracy Performance Surface (PPS) model, Next generation Piracy Performance Surface (PPSN) model, Pirate Attack Risk Surface (PARS) model, Nearly Orthogonal Latin Hypercube (NOLH), Design of Experiments (DOE), Combined Maritime Forces (CMF), Naval Oceanographic Command (NAVO),

ASSESSING THE SUCCESS OF THE ARMY HMMWV INTEGRATED LOGISTICS PLAN

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Acquisition costs of Department of Defense (DoD) weapon systems are of major concern due to their enormous annual expense. The DoD spent \$165B on acquisition in 2008. However, another budget component, Product Support, costs the government an additional \$132B annually. DoD has stated that the preferred method for providing this life-cycle sustainment is Performance Based Logistics (PBL), and 20% of all programs now use that method of support. PBL's goal is to provide maximum readiness at reasonable costs.

Unfortunately, evaluation of the success of these PBL contracts is difficult, because of the large number of metrics and vast differences among weapon systems. Several studies have attempted to do so, but they have not used DoD-prescribed metrics for evaluation. This research attempts to use two of the five DoD-prescribed metrics to analyze the PBL contract for the Army high-mobility, medium-wheeled vehicle (HMMWV) integrated logistics plan (ILP). These two are cost per unit usage (CPUU) and operational availability.

This statistical analysis found that the ILP does not appear to be decreasing cost or increasing operational availability for the HMMWV program. Further study using the other three DoD metrics is recommended.

KEYWORDS: Performance-Based Logistics, Cost Per Unit Usage, Operational Availability, Operations and Support Costs, Army HMMWV

MASTER OF SCIENCE IN PHYSICAL OCEANOGRAPHY

CONTRIBUTIONS TO REMOTE SENSING OF SHALLOW WATER DEPTH WITH THE WORLDVIEW-2 YELLOW BAND

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Master of Science in Physical Oceanography–March 2011

Master of Science in Meteorology–March 2011

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Remote sensing of the bathymetry in shallow water of Tampa Bay is examined using the multi-spectral imagery from the Worldview-2 satellite. Utilizing the newly available yellow spectral band in a ratio algorithm, five ratio combinations are compared against a digital elevation model of Tampa Bay. Following the work of Stumpf et al. (2003) ratio algorithm and starting with the work of Loomis (2009) and Densham (2005), the yellow band was combined with the blue, green and red bands separately. These three ratio combination results were compared with the results of the more traditional blue/green combination and a green/red combination. Three transect lines were drawn in a shallow reef area in the north portion Tampa Bay, Florida on Mullet Key near Fort de Soto State Park. In water under two meters' depth, the substrate contributions were significant in all ratio derived bathymetries. The addition of the yellow band provided more information about the bathymetry than the previous blue/green and green/red combinations by adding more combinations that utilized a reflectance level difference. The yellow band demonstrates less sensitivity to bottom type in two of the transect lines.

KEYWORDS: Bathymetry, Worldview-2, Remote Sensing, Near Shore, ENVI, Tampa Bay, Ratio Algorithm, Yellow Spectral Band, Multi-Spectral, Satellite, Bottom Type

MASTER OF SCIENCE IN PROGRAM MANAGEMENT

A RATIONALE AND FRAMEWORK FOR ESTABLISHING A SYSTEMS ENGINEERING COMMUNITY WITHIN THE DEPARTMENT OF THE ARMY

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Master of Science in Program Management–March 2011

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Lead Advisor: Gary Langford, Department of Systems Engineering

Support Advisor: Lisa Heidelberg, Director, C2SD, Software Engineering Center, CECOM-LCMC

Army acquisition programs are faced with increasing technical complexity and interdependence as most program products must integrate into a system of systems. Low quantity of systems engineers and poor quality systems engineering is credited as central to program failure. In an Army Systems Engineering Forum, the Army System of Systems Engineer (SoSE) asked what could be done to recruit, train, certify, and retain systems engineers. This paper answers that question, and identifies that it cannot be “fixed” in isolation of addressing an Army culture that does not focus its efforts on training the personnel it already has. Quantity issues are not being addressed at the service level with recruiting efforts. Organizations do not have formal collateral personnel exchange programs, yet many perform systems engineering functions. Training and certification gaps exist despite availability of training because personnel are not mandated to be certified to accept positions, in many cases. Systems engineering, although not blameless, is not the only issue. We also explore how the technical background of those that blame or want to “fix” systems engineering is an unbalanced perspective and omits the organizational issues and individual contributions of systems engineers and the other members of the program manager’s (PM) team.

KEYWORDS: Systems Engineering, Systems Integration

CONTRACTORS TRANSITING FROM THE BATTLEFIELD

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Throughout history, military forces have depended on civilian contractors to fulfill logistical and support functions that Soldiers do not need to do (Grey, 2006). Contractors have increasingly become an integral part of Soldier/battalion functioning particularly in overseas locations. They can find themselves performing similar missions as their military counterparts. Civilian contractors have a larger presence on today’s battlefields, no doubt related to downsizing from the 1990s. Many support functions have been transferred to private sector contractors (Hunter & Goure, 2008).

The United States Department of Labor has released data showing that more than 1,350 private military contractors have been killed in Iraq and Afghanistan in response to a Freedom of Information request filed by Reuters.

This Joint Applied Project report contends that, due to a sizable commitment of contractor personnel in

PROGRAM MANAGEMENT

the battlefield, the U.S. government should shoulder some responsibility in assisting contractor personnel returning from the battlefield. The research also examines the options contractor personnel have when they return to the United States after supporting the war in Iraq and Afghanistan (and from Kuwait, which supports both wars).

THE EVOLUTION OF THE WEAPON SYSTEM REFORM

ACT OF 2009 (PUBLIC LAW 111-23)

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In evaluating the implications of the Weapon System Acquisition Reform Act of 2009 (WSARA), we compare the position of prior acquisition acts and DoD acquisition policies to this new act. We examine the advantages and disadvantages of WSARA as it relates to major defense acquisition programs and acquisition programs in general. The rationale for changes to the policy is examined, and conclusions are drawn regarding the impact of this new policy on DoD acquisition programs.

KEYWORDS: Acquisition Reform, WSARA, Acquisition Strategy, Competitive Prototyping, Cost Growth, Conflict of Interest

MASTER OF SCIENCE IN SOFTWARE ENGINEERING

USING STATECHART ASSERTION FOR THE FORMAL VALIDATION AND SPECIFICATION OF A REAL-TIME SOFTWARE SYSTEM: A CASE STUDY

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Master of Science in Software Engineering—March 2011

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Co-Advisor: Man-Tak Shing, Department of Computer Science

Verification and validation (V&V) is one of the software engineering disciplines that helps build quality into software. V&V comprehensively analyzes and tests software to determine that it performs its intended functions correctly, and ensures that it does not perform unintended functions. However, V&V traditionally relies on manual examination of software requirements, design artifacts and the systematic or random testing of target code. As software-intensive systems become increasingly complex, traditional V&V techniques are inadequate for locating subtle errors in the software. It is even more challenging to test embedded real-time systems characterized by temporal behavior. For the past several decades, academia has actively researched the use of formal methods that help improve the quality of the software. Nonetheless, the techniques developed using formal methods still are not widely accepted in industry and in government.

Professor Doron Drusinsky from Naval Postgraduate School (NPS) has developed a novel lightweight formal specification, validation and verification technique. The technique is focused on modeling reactive real-time systems with UML-based formal specifications and log file based Runtime Verification (RV).

This thesis presents a case study as a proof of concept in support of this V&V technique, applied on a complex, already developed and fielded mission-critical system. It has successfully demonstrated a pragmatic approach in achieving a high quality V&V testing.

KEYWORDS: Formal specification, validation, verification, statechart assertion, real-time, reactive, UML

THE EFFECTIVENESS OF SOFTWARE PROJECT MANAGEMENT PRACTICES: A QUANTITATIVE MEASUREMENT

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Associate Advisor: Kadir Demir, Turkish Naval Academy

A tool that measures the effectiveness of software project management can be used to identify strengths and weaknesses, and guide improvement to practices in order to increase the chances of project success. The Software Project Management Effectiveness (PME) Metric is one such tool that has shown promise in this area of software engineering. To discover how promising the metric is, nine software practitioners assisted with measuring projects they recently worked on. A strong correlation between the PME metric and project success was identified. The software practitioners also provided feedback on the usefulness and applicability of the PME metric. Seventy-five percent of the software practitioners stated that they would use the metric on the next project they worked on. This research has found that the PME metric should be considered for use, by

project managers who continuously want to improve and deliver successful software projects.

KEYWORDS: Software Project Management, Project Management, Metric, Measurement, Management Effectiveness

MASTER OF SCIENCE IN SYSTEMS ENGINEERING

A CAPABILITY-BASED, META-MODEL APPROACH TO COMBATANT SHIP DESIGN

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Master of Science in Systems Engineering—March 2011

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This thesis continues to develop a conceptual methodology for the design of a warship that is capable of showing how naval architecture related decisions interact with operational measures of effectiveness through the use of modeling and simulation. Beginning with a brief overview of recent developments in total ship design approaches, it supports an overarching method that directly supports capability-based decisions.

Using a simple medium-tonnage patrol vessel and a Maritime Intercept Operation (MIO) mission in a fictional setting, operational and ship design synthesis models are developed. Critical design criteria (responses) in each model are measured using relevant design variables (factors) based on mission measures of performance used in creating experimental designs. The resulting models are then linked, both mathematically and using graphs, to show how decisions made by the naval architect can directly influence a single operational measure of effectiveness. Decision makers can then assess various system outcomes by trading off performance parameters to make capability-based decisions.

KEYWORDS: Capability Based Design, Combatant Ship Design, Combat Systems Design, Design of Experiments, Response Surface Methodology, Discrete Event Simulation, Model Based Systems Engineering, Measures of Effectiveness, Measures of Performance, Meta-Model

MASTER OF ARTS

Security Studies

MASTER OF ARTS IN SECURITY STUDIES

NO EMERGENCY INCIDENT RECOGNIZES BORDERS

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Master of Arts in Security Studies, March 2011

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The state of Arizona and the bordering towns of northern Mexico acknowledge the need for capability planning. They recognize the benefits of binational response and collaborative sharing of resources in times of disaster. Municipalities in southern Arizona and northern Mexico are taking a preventive approach and have created the Binational Arizona Emergency Response Task Force (BAERTF). The goal of the BAERTF is to deliver a timely, supportive response and automatic, mutual-aid capability to any jurisdiction in the state of Arizona or northern Mexico that experiences a disaster, terrorist-based or otherwise, that overwhelms the local response on either side of the border. Consequently, the expertise and application of the task force will be all-hazard (natural disasters, man-made disasters, and terrorist acts), adhering to the U.S. federal vision of comprehensive emergency management achieved through integrated emergency management systems both in the United States and Mexico. The intent is to address a perennial problem faced by small jurisdictions in both countries when dealing with disasters: events of any magnitude may quickly outstrip the ability of the jurisdiction and its local mutual aid to respond effectively while waiting for federal response.

KEYWORDS: Bi-national, framework, Arizona, Mexico, border, task force, all hazard, WMDs, counterterrorism, first responders

UNITED WE STAND, DIVIDED WE FALL: INCREASING RESPONSE CAPABILITY IN KENTUCKY THROUGH REGIONALIZATION AND LEADERSHIP

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Research indicates that the benefits of regionalization include optimal resource allocation and enhanced communication across jurisdictions. In this thesis, regionalization is defined as the act of the region collaboratively working across jurisdictional boundaries in a formal capacity to network, preplan and respond during incidents.

The 2009 Kentucky ice storm devastated the entire state. Some counties throughout the commonwealth collaborated during the response; however, only one region out of eleven formally regionalized. Possible factors related to regionalization will be explored, such as support and understanding by leaders of the concept and the importance of networking with a variety of agencies. Networking is described as interorganizational interaction and communication. Tools from social network analysis are used to visualize networking and collaboration during the 2009 Kentucky ice storm. In addition, regionalization is discussed in the context of area command.

Using a case study and interviews, this thesis investigates regionalization in Kentucky as it relates to the

2009 ice storm. Recommendations are presented for improving responses to future large-scale disasters utilizing regionalization.

KEYWORDS: Regionalization, Regions, Area Command, Leaders, 2009 Kentucky Ice Storm, Network Analysis, Collaborative Leadership, Leaders, Emergency Management

FREED: RIPPLES OF THE CONVICTED AND RELEASED TERRORIST IN AMERICA

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Master of Arts in Security Studies—March 2011

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The release of convicted terrorists from American prisons is inevitable. This thesis frames and initiates discourse about this unexplored phase of the terrorism continuum. Utilizing a grounded theory approach, we arrive at four findings: (1) we do not yet know to what extent convicted and released terrorists pose a threat; (2) convicted terrorists are treated no differently from an administrative or social standpoint from most other criminals; (3) the American public knows very little about convicted and released terrorists; (4) and there is no defined entity responsible for convicted and released terrorists. We then extrapolate the political, social, and legal implications of these findings, including whether our theoretical or structural frameworks are adequate to the threat. How might such a threat be measured or determined, by whom, and with what policy consequences? We look at existing models ranging from sex offender registries to megacommunities and existing sociological theories of terrorism as potential tools with which to address this complex and interdisciplinary issue.

KEYWORDS: Freed, Convict, Release, Terror, Prison, Reentry, Recidivism, Probation, Homeland Security, Counterterrorism, Radicalization, Rehabilitation, Sex Offender, Homegrown, Community, Intelligence, Law Enforcement, Social Work, Justice, Megacommunities, Grounded Theory

**ANALYSIS OF WEST AFRICAN DRUG TRAFFICKING: THE
DYNAMICS OF INTERDICTION AND STATE CAPACITY**

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Master of Arts in Security Studies—March 2011

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Illegal drug trafficking through West Africa has grown dramatically in the last decade, capturing the attention of U.S., European, and U.N. policymakers. Most countries in West Africa have struggled to adapt to the challenges drug trafficking has presented. A few countries, like Ghana, have made a more concerted and successful effort to confront the problem. This thesis seeks to test the hypothesis that variations in counternarcotics interdiction success Ghana and Guinea-Bissau can be explained by the level of state capacity and the ability to absorb international counternarcotics partnerships to deal with the problem. The findings of this study suggest the success of Ghana relative to Guinea-Bissau is explained by higher level of initial state capacity and its ability to absorb international assistance. The government of Guinea-Bissau, on the other hand, is caught in an incapacity trap that has thwarted its efforts towards narcotics interdiction. Efforts at international partnership in Ghana have a foundation of state capacity to build upon and a viable partner whereas in Guinea-Bissau

assistance efforts have been relegated to correcting the utter lack of capacity in an environment of political-military instability where a viable partner in the War on Drugs has not yet emerged.

KEYWORDS: Ghana, Guinea-Bissau, Narcotics, Trafficking, Law Enforcement, Interdiction, Organized Crime, State Capacity.

USING DOD ISR CAPABILITIES IN SUPPORT OF HOMELAND SECURITY AND DEFENSE; POLICY CHALLENGES AND CONSIDERATIONS FOR EFFECTIVE INCIDENT AWARENESS AND ASSESSMENT

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United States Northern Command (USNORTHCOM) is the geographic combatant command responsible for homeland defense and security. USNORTHCOM conducts Defense Support of Civil Authorities (DSCA) by providing Department of Defense (DoD) capabilities from its land, sea and air component in support of lead federal agencies in response to homeland security threats. DoD intelligence, surveillance and reconnaissance capabilities have the potential to improve situational and informational awareness to the homeland security arena. Since Hurricane Katrina, these capabilities have seen an increase in demand. Termed Incident Awareness and Assessment (IAA), these capabilities have been leveraged in response to wildfires in California, hurricanes in Texas, and most recently, during the Deepwater Horizon oil spill. There are, however, significant doctrinal, policy, legal and ethical barriers that impinge on USNORTHCOM's ability to employ these capabilities effectively in the homeland. This thesis examines these barriers, as well as the doctrine and policy disconnects between DoD and the emergency management communities. The author proposes recommendations for incorporating IAA into DoD's Joint Doctrine and the Department of Homeland Security's National Response Framework. These recommendations address policy barriers, and if implemented, have the potential to turn IAA into an important force multiplier for homeland security and emergency management.

KEYWORDS: Intelligence Surveillance and Reconnaissance, Incident Awareness and Assessment, US-NORTHCOM, AFNORTH, Joint Doctrine, National Response Framework, Hurricane Katrina, California Wildfires, Deepwater Horizon, Unity of Effort

RUSSIA'S ECONOMIC MODERNIZATION: MYTH OR REALITY?

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A successful outcome of Russian President Medvedev's recent economic modernization plan, also known as "Smart Russia," could result in a more democratic and prosperous Russia. However, corruption and an energy dependent economy in Russia continue to exist as the main barriers in preventing substantial economic liberalization and a transition to a higher level of economic development. Failure by the Russian leadership to address these issues could result in future economic and political turmoil, potentially leading to a more fragile Russian state. The understanding of corruption within an energy dependent economy, and the international tools available in Russia's economic modernization process, are critical to establishing effective U.S. foreign policy and economic partnerships. To better understand the difficult steps that lie ahead for Russia, an economic statistical analysis, using global economic indexes, was conducted in a three scenario framework to determine

which criteria Russia needs to improve in to ensure a transition to the next stage of economic development. The results of the analysis present crucial evidence for a successful economic transition. Failure by the U.S. and the West to adequately understand Russia's modernization challenges could result in a missed opportunity for future Russian political and economic liberalization.

KEYWORDS: Russia; Economy; Skolkovo, Smart Russia; Economic Modernization; Medvedev, Putin, EU, U.S.

CONSIDERATIONS TO ENHANCE THE FLORIDA DOMESTIC SECURITY STRATEGIC PLAN

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The *Florida Domestic Security Strategic Plan 2009 to 2011* does not prioritize, assign or use metrics to define its goals, objectives or subobjectives thereby making it less effective. The research found prioritization to be a necessary element for achieving results that often brings with it funding. Funding was identified as the most significant determinant for progress. Priorities should be kept to a manageable number and remain flexible to adapt to changing threats. Assignment was determined to be important with its most significant benefit coming in the form of accountability. To be effective, assignment must also come with authority. Metrics were determined to be important to accountability. They should be clearly defined, measurable in a quantifiable way and define an end state. A tracking and reporting system was found to be necessary to enhance assignment and metrics accountability. The research suggests that a state homeland security strategy and a single statewide gap analysis should guide all federal grant funding sources with a nexus to domestic security issues and not just the distribution of DHS grant funding. Implementation steps are included for Florida to integrate the primary findings of this research into its future homeland security strategies.

KEYWORDS: state strategy, domestic security, goals, objectives, subobjectives, implementation steps, prioritization, assignment, metrics, authority, accountability, strategic plan, Florida, Florida Department of Law Enforcement

ESTABLISHING THE NEOCONSERVATIVE FOOTPRINT

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This thesis evaluates efforts by neoconservatives during the George W. Bush administration to reorient and perpetuate their foreign policy principles away from the status quo realist stance dominant during the Cold War. It will examine the main principles of neoconservatives, namely the promotion of democracy through the exertion of American power, and demonstrate how these principles have changed America's foreign policy. This thesis argues that neoconservatives have advocated a forward leaning foreign policy stance by drawing on themes linked to American exceptionalism and democracy promotion. Neoconservatives further perpetuate their arguments by connecting their message to American nationalism and through access to media outlets to voice their positions on issues. Overall, many of the neoconservative policies enacted in the first term of the Bush Administration continue, albeit through different means in the Obama Administration.

KEYWORDS: Neoconservatives, George W. Bush, realists, liberalism, democracy promotion, Iraq invasion, American Power

**THE NEW YORK CITY URBAN SEARCH AND RESCUE TEAM
(NY-TF1): A CASE STUDY OF INTERAGENCY EFFECTIVENESS**

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Since September, 2001, the New York City (NYC) emergency services have striven to more closely align their component disciplines into one coordinated and collaborative effort. Despite improvements in emergency management, the New York City Fire Department (FDNY) and New York City Police Department (NYPD) are still separate operational entities. An evolution in the terrorist threat challenges NYC emergency agencies and finds them unprepared for a complex terror event. Terrorist seek to divide first-responder efforts at such an attack. Evidence from the Mumbai attacks indicates an optimal response to a similar incident requires an unprecedented level of first-responder synergy. This thesis asserts that the synergistic elements in the New York City Urban Search and Rescue Task Force (NY-TF1) are applicable to the interagency challenges in the FDNY-NYPD response relationship.

The methodology of this thesis is a single case study of NY-TF1 involving set of seven key leader interviews. Each discipline provided three levels of leadership confirmed the assertions of this thesis. The seventh interview, the senior civilian administrator for the New York City Urban Search and Rescue Task Force (NY-TF1), also supported this study's findings.

The conclusions of this study are drawn from commonalities in the data collected. The FDNY and NYPD can achieve an emergency services synergy adapting NY-TF1 organizational designs and systemic processes into the greater response relationship.

KEYWORDS: Synergy, collaboration, complex endeavors, functional complimentary, interdisciplinary, inter-agency, synchronization, New York City Fire Department

THE FIRE SERVICE'S ROLE IN MARITIME HOMELAND SECURITY

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Since September 11, 2001, the fire service role as first responders has changed to include acts of terrorism. United States ports and areas in the marine domain provide terrorists with a wide variety of targets to attack. The marine domain presents many difficult and unique problems to homeland security. The open nature of ports with the high volume of goods and services, key infrastructures, and the large number of agencies with jurisdiction create a complex environment to protect. Many fire departments that protect and respond to incidents in the marine domain have little specialized equipment, special knowledge, or training needed to respond to terrorists attacks in this area. This document looks at the roles the fire service has in homeland security in the marine domain. Based on findings from maritime leaders, five roles emerged: Homeland Security Presidential Directive-8, intelligence and information sharing, area maritime security committee, interagency exercises and training and public/private partnerships. This document demonstrates the fire department's role in each of these areas, and provide a framework fire departments can use in maritime homeland security.

KEYWORDS: Fire Service, Intelligence and Information Sharing, Public\Private Partnership

INTERNALIZING FULL SPECTRUM OPERATIONS DOCTRINE IN THE U.S. ARMY

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For the U.S. Army, the fundamentally new concept of full spectrum operations requires that stability operations be internalized into its culture and operations. The main research question of this thesis is: How can the Army internalize full spectrum operations, to the inclusion of stability operations, into its culture and operations? Internalization specifies a cultural integration of stability operations represented by organizational attitudinal responses in the execution of full spectrum operations.

It is the findings of this thesis that full spectrum operations will be internalized in the U.S. Army under the following three conditions: 1) The National Security Strategy formally and consistently embraces the use of military to conduct stability operations in support of national objectives. As answered in Chapter II, this is the best method for prompting the Army to accept full spectrum operations, and specifically stability operations, as a permanent mission-set with the accompanying imperative to internalize it. 2) The Army is able to doctrinally evolve the full spectrum concept, and devise a training model that supports the operationalizing of full spectrum operations. As described in Chapter III, addressing these imperatives requires the Army to rectify core foundational issues such as leader professional development and the optimized force structure for full spectrum operations. 3) The Army is able to hedge the conceptual gaps in the whole of government approach, and overcome internal biases as represented by the personnel system.

KEYWORDS: Full Spectrum Operations, Stability Operations, Doctrine, National Security Strategy

CONFLICT, COOPERATION, AND VIABILITY: INTERSTATE WATER RESOURCES AND DOMESTIC WATER USE IN THE MIDDLE EAST

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The Middle East is a region of vital interest, not just to the United States, but also to the entire world. It is also an area of severe water scarcity. Due to a variety of factors, the demand for water in the Middle East is rapidly increasing, placing additional stress on already constrained water supplies. Because water has no substitutes and is an important part of economies, culture, security, and life itself, it is not surprising that many warn of impending wars over water. However, conflict over scarce water resources is not the only possible outcome. Cooperation between states to share the benefits of this increasingly precious commodity is not only another possibility; it is the more likely outcome. Wars fought over water are very unlikely to end successfully for any participant, with the costs far outweighing any benefits, while cooperation maximizes the benefits from a limited resource. While interstate war over water is unlikely, water could still cause issues internal to Middle Eastern countries. Without proper management practices and forward-looking policies, lack of water could lead to internal conflicts, which could cause significant unrest in the region.

KEYWORDS: Middle East, Water Scarcity, Environmental Conflict, Resource Scarcity, Water, Security

**HIJABISTAS, MOSQUES AND FORCE: MUSLIM
WOMEN'S SEARCH FOR SELF IN BRITAIN**

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Great Britain has struggled with how to treat its Muslim population since the terrorist attacks in 2005. Prime Minister David Cameron believes that British multiculturalism is not working, and the country needs to move to a more integrative approach for its diverse population. Muslim women in Britain, however, have already integrated. They have taken on British values of social and gender equality as their own. They seek to practice their religion as freely as men. They participate in the British market and they demand the same rights as all other British citizens. They have found a hybrid identity that blends these values with Islam and have found a new, Western sense of self. These women prove that identity compromise and integration are possible in multicultural Britain.

KEYWORDS: Islam, Women, Britain, Europe, Hijab, Mosque, Integration, Muslim, Identity

**THE TRANSPORTATION SECURITY ADMINISTRATION'S FOUR MAJOR
SECURITY PROGRAMS FOR MASS TRANSIT—HOW THEY CAN BE IMPROVED
TO ADDRESS THE NEEDS OF TIER II MASS TRANSIT AGENCIES**

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The Transportation Security Administration (TSA) has established four major programs for the security of mass transit against terrorism. This thesis examined how these programs can be improved to address the terrorism security needs of the nation's 51 transit agencies in urban areas classified as Tier II.

Homegrown terrorism represents a new and changing threat to Tier II regions. The Government Accountability Office (GAO) and the National Research Council (NRC) of the National Academies examined the DHS risk analysis methodology. Both identified problems with the risk analysis methodology used for the distribution of TSA's security program resources.

This thesis used the interview and policy options methodologies to find ways to improve these security programs. The focus of the study was on high level strategic goals of increasing law enforcement officers, and increasing explosives detection canine teams for Tier II transit agencies. Strategic recommendations for achieving these goals and other tactical considerations are enumerated. These recommendations and considerations will be forwarded to the Transit Police and Security Peer Advisory Group (PAG) that advises the TSA on these types of issues. If the PAG finds them to be of merit, it may choose to present them to the TSA.

KEYWORDS: Transportation Security Administration (TSA), Greater Cleveland Regional Transit Authority, Transit Police and Security Peer Advisory Group (PAG)

**EFFECTIVE SELECTION: A STUDY OF FIRST-LINE SUPERVISOR
SELECTION PROCESSES IN THE DEPARTMENT OF HOMELAND**

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Leadership is crucial in any organization. Executive leadership provides guidance, direction and structure. First-line supervisors ensure that the vision, guidance and direction of executive leaders become reality in an organization and they also are responsible for the morale and motivation of non-supervisory employees. Historically, federal agencies have struggled with developing and implementing selection processes that produce effective first-line supervisors.

This research examines the four most important tenets of a selection process. These four tenets include laws and regulations that govern first-line supervisor selection processes, the accepted competencies associated with effective first-line supervisors, assessment tools used in the selection process and most effective measures in assessing organizational performance and first-line supervisors. Using a multi-method approach that includes survey data, interviews and policy review, this study compares first-line supervisor selection processes for effective and less effective federal agencies as measured by the Federal Human Capital Survey (FHCS)/Federal Employee Viewpoint Survey (FedView). Finally, conclusions and recommendations are offered for developing standards and improving first-line supervisor selection processes in DHS and the rest of the federal government.

KEYWORDS: Leadership, first-line supervisor, perceptible measures, Department of Homeland Security, performance measures, selection processes, national security, Federal Air Marshal Service

**ANALYSIS OF TALIBAN REVENUE AND THE IMPORTANCE
OF THE OPIUM TRADE TO THE INSURGENCY**

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The current Taliban insurgency in Afghanistan has multiple funding sources. The importance of the opium production and smuggling has been touted as essential to the continuation of the Taliban insurgency in today's media. This thesis aims to understand the true value of the opium trade to the Taliban and to explore alternative revenues sources for the Taliban both inside and from outside of Afghanistan and whether the opium trade is essential to sustain the current level of activity by the insurgency. The problem that the coalition faces is not as one-dimensional as is portrayed in the media when it comes to financially crippling the Taliban insurgency. It is also important to break down the complex situation the population in Afghanistan faces and how this contributes to the growth of the opium production. Understanding the tribal, agricultural and governmental factors helps to determine the true nature of the opium trade. Media sources often equate the Taliban and the essential link to the opium trade, coercion of the populous and opium revenue as critical factors for the success of the Taliban. The Taliban have had a mixed history in their tolerance of opium production and poppy cultivation. During their control of 95 percent of Afghanistan from 1996 through 2001, they moved from tolerating poppy cultivation to imposing a complete ban. After the coalition invasion and the Taliban resurgence as an insurgency they have encouraged poppy cultivation in the areas they exert control over. However the revenue from the opium is not the only revenue source, and the other revenue sources are quite significant and surprising. In addition the history of Afghanistan is rife with examples of the nature of fund-

ing for warfare, which need to be understood as a cultural norm. Ultimately this thesis aims to demonstrate that the focus of coalition efforts to interdict opium trafficking should not be their main focus, rather only the successful training and implementation of local competent security forces will affect the funding revenue from both narcotics and the myriad of other illicit sources.

KEYWORDS: Afghanistan, Taliban, Insurgency, Funding, Opium, Revenue, Hawala

**THE IMPACT OF CIVILIAN CONTROL ON CONTEMPORARY DEFENSE
PLANNING SYSTEMS: CHALLENGES FOR SOUTH EAST EUROPE**

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Defense planning has always been one of the most sensitive issues in promoting civilian control of the armed forces. Ensuring democratic control of defense policy is a challenging task, and southeastern Europe's (SEE) experience to date has been mixed. At this phase of the reform process, some countries from the region do not possess the necessary civilian knowledge to replace the dominance of the armed forces in the defense planning process.

The thesis provides a comparative analysis of efforts to establish civilian democratic control over defense planning in three SEE countries. Its purpose is to contribute to a better understanding of the importance and the role of civilians, especially elected leaders in defense planning and to search for models of defense planning systems that are most appropriate for countries that have very limited defense capabilities.

The thesis argues that the use of defense planning system with the necessary civilian control may result in the establishment of a modern, effective military. The thesis focuses mainly on experience of three countries: Romania, Bulgaria and Republic of Moldova. It looks at the achievements and the major challenges that these countries still face to establish greater professional civil military cooperation and effective civilian control over defense planning.

KEYWORDS: Southeast Europe, Republic of Moldova, Bulgaria, Romania, NATO (Partnership for Peace Programme), Civil–Military Relations, Democratic Civilian Control, Effectiveness, Defense Planning, Operational Planning, Capability Based Planning, Defense Reform, Defense Institution Building

CHINA AND NORTH KOREA: A PECULIAR RELATIONSHIP

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Since Beijing organized the six-party talks in 2003 and persuaded North Korea to participate, much of the international community has applauded China's leadership in attempting to stabilize the region. However, some U.S. policymakers and regional experts have mistaken China's preference for a non-nuclear Korea as indication that Beijing's policy goals are more similar to U.S. policy goals than is accurate. Some mistake China's policy priorities in the region and, therefore, do not understand why Beijing does not take a more hard-line stance against North Korea. Others overestimate China's ability to influence North Korea. The purpose of this thesis is to provide a clearer understanding of Beijing's short-term and long-term policies toward North Korea and the limits of Beijing's ability to influence Pyongyang's behavior, in order to assist U.S. policymakers in formulating realistic strategies toward interaction with China on Korean peninsula issues.

KEYWORDS: China, North Korea, United States, Japan, South Korea, Russia, Nuclear Brinkmanship, Nuclear Proliferation, Collapse, Kim Jong-Il, Kim Il-Sung, Korean peninsula, 1996 Taiwan Strait Crisis

**BRAVING THE SWARM: LOWERING ANTICIPATED GROUP BIAS IN
INTEGRATED FIRE/POLICE UNITS FACING PARAMILITARY TERRORISM**

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The Fire Department of the City of New York (FDNY) has responded to the consequences of terrorist incidents for decades, but global trends in active-shooter terrorism may force firefighters to operate in an active, hostile environment, and not just in the aftermath of attacks. In assault-style terrorism, a swift-moving, networked enemy combines small-arms with explosives or accelerants, causing extensive fires and smoke conditions and further endangering victims or hostages. To continue its position as a lead innovator in the national fire service, the FDNY must create new strategies and collaborations to frame its participation in swarm-like terrorist attacks, requiring a plurality of expertise from across the emergency-responder spectrum. In light of this emerging threat, the all-hazards approach is no longer adequate. The answer to Mumbai-style attacks may require combined fire/police units. The units can only succeed with an understanding of group bias, which must be attenuated or managed for the integrated unit to function effectively.

KEYWORDS: Fire as a weapon, fire service, group bias, joint unit, Mumbai-style, netwar, paramilitary terrorism, social identity theory, swarming, terrorism preparedness, Fire Department of the City of New York

WHY THAILAND’S MILITARY STEPPED IN

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This thesis is a comparison of the military coups d’etat that occurred in Thailand in 1991 and 2006. The thesis explores how Thailand’s military acts as a political army and determines the combination of factors necessary for the military to step into the political system. A historic narrative from the kingdom’s ancient beginnings, through the 1932 coup d’etat that overthrew the absolute monarchy, to the 1980s established the founding principles of the military and its historical role in politics, both of which contribute to the values and identity of Thailand’s military as an institution. The comparison of the pre-coup periods to the events that lead directly to the coup reveal a common set of factors necessary for the military to stage a successful coup. Specifically, these factors include political stalemate, affronts to values, and direct threats to interests. Additionally, the two cases demonstrate how Thailand’s military is compelled to act as a political army due to the birthright principle, civilian incompetence, and military competence. The thesis concludes with some recommendations for the United States in its relationship with Thailand with the better understanding of why these coups occur.

KEYWORDS: Thailand, Thai military, Coup d’Etat, Civil-Military Relations

**MOTIVES FOR EUROPEAN UNION COMMON SECURITY
AND DEFENSE POLICY MISSION SELECTION**

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The European Union (EU) currently lacks a comprehensive agreement on where the EU will engage in crisis management missions under the Common Security and Defense Policy (CSDP) framework. This thesis investigates the motives for why the European Union engages in military or civilian operations under the framework of CSDP. Predominant research suggests the three dominant factors motivating the EU to engage in CSDP are national interests of the Member States; the EU is a supranational institution seeking to balance against the U.S.; and national political parties dominate foreign policy of the Member States. These three dominant factors lead to the development of three hypotheses for why the EU engages in military operations under the framework of CSDP.

The first hypothesis suggests the EU elects to undertake CSDP missions as a means of balancing against United States' hegemony. The second hypothesis suggests the EU undertakes CSDP missions because of the national interest of the dominant nations, specifically, France, Germany, and the United Kingdom. The final hypothesis suggests that the national political parties and their political stances influence when EU will engage in military or civilian operations under CSDP. These hypotheses are tested using three case studies to examine what the dominant factor is in CSDP mission selection.

The three cases represent missions outside of Europe where there is significant risk for EU troops and, therefore, significant political risk for EU Member State politicians. The three CSDP missions used in the case study section are the EU mission EUFOR Artemis to Bunia the Democratic Republic of Congo, EUPOL Afghanistan and EUNAVFOR Somalia. After examining the three cases within the boundaries of the three hypotheses this thesis concludes that national interests of the dominant Member States is the most significant motive for CSDP mission selection. While the other two motives play a role in the decision-making process they are not nearly as dominant as that of the Member States' national interests.

KEYWORDS: Common Foreign and Security Policy, Common Security and Defense Policy, European Defense, European Security, European Union, EUPOL Afghanistan, EUNAVFOR Somalia, Artemis.

**AN EVALUATION OF MEXICO'S DECLINING OIL
PRODUCTION AND WANING PETROLEUM RESERVES**

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Since nationalizing its oil industry in 1938, Mexico has maintained high levels of fiscal dependency on oil revenues. However, oil production in Mexico is quickly declining. In fact, oil production levels in 2010 were at their lowest levels in 20 years. *Petróleos Mexicanos* (Pemex), Mexico's state-owned oil monopoly and cash cow, currently provides the Mexican government with approximately 40% of its total revenues. Mexican oil revenues have long been exploited and mismanaged by successive administrations rather than invested in exploration projects, infrastructure modernization, or process efficiency improvement. Decades of severe financial constraints placed on Pemex by the Mexican government, coupled with a weak corporate culture, have left Pemex unable to deal effectively with the oil production crisis at hand. This thesis examines the factors that explain why Mexican oil production has dwindled, despite the government's tremendous economic and political incentives to preserve revenues generated by oil rents.

KEYWORDS: Mexico, Pemex, Oil Production, Petro-States, PRI, PAN, PRD, and Petrobras

**OPERATING IN UNCERTAINTY: GROWING RESILIENT
CRITICAL INFRASTRUCTURE ORGANIZATIONS**
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Publicly owned utilities as natural monopolies have historically operated in a relatively controlled environment. As they have become increasingly networked and interdependent with similar enterprises, the level of management complexity has increased dramatically within their operating environment. The leadership skills and worldview of the management of public utilities, based on the Newtonian paradigms of the last century, have not kept pace with these rapidly changing environmental conditions. A gap exists today among leaders of public utilities in understanding that their environment and organization are part of complex adaptive systems and that the implications of operating in a complex environment are substantive.

The findings developed through a research process based on written questionnaires and interviews of industry leaders confirmed and expanded the emergent theory of the current situation facing utilities. The findings further support a framework to assess where utilities are today regarding growing resilience into their organization.

As utilities' management teams develop a clearer understanding of their current position and the nature of complexity, they can cultivate a strategy using a variety of methods developed in the research to begin the process of adjusting the tacit values, norms and assumptions that comprise the organizational culture to improve resiliency within their enterprise.

KEYWORDS: Resiliency, Organizational Change, Leadership, Obstacles to Change

**COMPSTAT 2.0: AN INNOVATIVE POLICE STRATEGIC
MANAGEMENT PLAN THAT FACILITATES PERFORMANCE IN
THE ALL CRIMES AND ALL HAZARDS ENVIRONMENT**
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The delivery of police services has been governed by various strategic management plans. Flaws exposed in the professional model gave rise to the development of community policing (COP). Eventually, dissatisfaction with COP gave rise to Compstat. Today, Compstat is the dominant strategic model for the provision of police services in the U.S. and, has been credited with significantly improving the delivery of police services. The practical implementation of Compstat has however, exposed certain flaws, paradoxes and gaps in the model that impede crime fighting effectiveness, and diminish public trust. The threats and challenges of the twenty-first century call for the police to develop a strategic management plan that facilitates not only crime fighting but also enhances the ability to prepare for, respond to, and mitigate the harm caused in the all hazards environment. This thesis provides evidence and arguments from a body of strategic management literature, and the lessons learned from prior police management practices, to suggest an innovative adaptation of Compstat.

Compstat 2.0 is a hybrid that builds on what has been shown to work best in Compstat, COP and other models while diminishing or eliminating what has been shown to be dysfunctional.

KEYWORDS: Mitig Compstat, strategic management, intelligence led policing, community policing, innovation, accountability, Virginia Beach Police Department

AN EVALUATION OF THE ARCTIC—WILL IT BECOME AN AREA OF COOPERATION OR CONFLICT?

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Climate change and the vast amount of natural resources in the Arctic region have prompted awareness of the need for new policies among Arctic states, including the U.S., and stimulated throughout the entire international community a critical assessment of the issues regarding the Arctic region. All of this could result in potential conflict in this critical region of the world. The Arctic's ice cover as of spring 2010 was the lowest it has ever been at that time of year, and it is melting faster than once thought, making it possible for the Arctic to have an ice free summer by 2013. Due to the increase of yearly ice melt, the race to extract the natural resources will speed up tremendously in future years. Research shows that the Arctic nations strongly encourage cooperation and are currently abiding by the international laws, treaties, and infrastructures in place that allow them the most potential to benefit from the Arctic resources.

However, although the Arctic nations stress cooperation in their official statements and diplomatic overtures, they are actually preparing for conflict. There are many potential flashpoints that could cause the Arctic to end in conflict, such as territorial disputes, Russia's dependency on the Arctic, and the militarization of the Arctic. The Arctic region has long been neglected by the U.S; however, due to the current situation in the Arctic and the potential for new threats to the U.S. homeland, the region is becoming a far more important issue and is gaining the attention of the U.S. government. The major question this thesis will examine concerns the future of the Arctic: is it heading for conflict, or for cooperation? In addition, the state of U.S. security with respect to the Arctic will be evaluated, and recommendations for U.S. national and homeland security policy will be provided.

KEYWORDS: Arctic, Conflict, Cooperation, UNCLOS, U.S. Arctic Policy, NSPD, HSPD.

WHAT ARE THE SECURITY REQUIREMENTS FOR A TWO-STATE SOLUTION BETWEEN ISRAEL AND PALESTINE?

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A two-state solution between Israel and Palestine requires guaranteed security for both nations, as well as commitments from surrounding nations and a cooperation of effort to prevent radical elements within society from disrupting what the majority desire, peace. This thesis will attempt to review the security conditions as spelled out in the Oslo peace process and concludes that the greatest failure was the approach. Oslo attempted to build up to a final solution through "confidence-building measures." Because the final status was nebulous, both sides postured and set policies that worked against a two-state solution. Had the borders been set and agreed to from the start, the "confidence-building measures" would have worked in favor of a two-state solu-

tion instead of against it. To prove the necessity of setting a border first, this thesis, through the use of geographic threat considerations, will conduct an Intelligence Preparation of the Battlespace (IPB) analysis. An IPB is an intelligence tool used to figure out the strengths and weaknesses of any campaign. This thesis hopes to show that setting a border first, and then working backwards through the “confidence-building measures,” will lead to a greater chance for peace.

KEYWORDS: Israel, Palestine, Security, Borders, Peace

MITIGATING DECISION MAKING PARALYSIS DURING CATASTROPHIC DISASTERS

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As experienced on 9/11 and learned from the Katrina Report (United States House of Representatives, 2006), catastrophic disasters produce environments where situational awareness is low and high levels of uncertainty and equivocality exist. As a result, due to decision-making limitations and an environment wrought with information inadequacies, decision making can become paralyzed.

Using grounded theory methodology on disaster cases, and leveraging the theories and processes of Drucker’s business model, the military decision-making process (MDMP), the observe orient decide act (OODA) loop, and recognition-primed decision (RPD), making model from the fields of cognitive, social, and decision sciences, a descriptive decision process model emerged. Catastrophic disaster decision-making model (CAT D²M²) is a simple and flexible process that can assist emergency managers in mitigating decision-making paralysis so that lives, the environment, and the economy can be sustained during catastrophic disasters. It is anticipated that the findings and process model from this thesis will contribute further to the research on decision-making; specifically during catastrophic disasters.

KEYWORDS: Mitigating Decision Making Paralysis During Catastrophic Disasters, Decision Making, Catastrophic Disaster, Emergency Management, Situation Awareness, Grounded Theory

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