MASTER OF SCIENCE
IN
INFORMATION TECHNOLOGY MANAGEMENT

NETWORK CONFIGURATION USING XML
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The primary goal of this thesis is to investigate the use of the Extensible Markup Language (XML) as a network configuration language. Network configuration is a difficult and time-consuming task. Current network configuration solutions are based on proprietary configuration languages and parsers. XML is a platform-neutral data representation language and worldwide standard. It potentially advantageous to use XML to configure networks. However, XML was not developed for network configuration. A new XML based configuration solution for the Server and Agent Active Network Management System (SAAM) is provided to marshal evidence that XML can be used effectively as a network configuration language.

DoD KEY TECHNOLOGY AREA: Computing and Software

KEYWORDS: XML, Quality of Service, Network Configuration, Next Generation Internet, Networks

AN OPTIMIZATION OF A NETWORK STRUCTURE FOR A BRIGADE LEVEL MILITARY ORGANIZATION
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Networking is vital for all computer-using organizations. No computer can be thought of as a stand-alone computer. Organizations need to analyze and develop the optimal network structures with consideration of their hierarchical structures. Their needs are to be analyzed as well. The topology and the technology of the network to be developed needs to be considered and then planned

This thesis presents the different types of network topologies and network technologies. The structure of a brigade is analyzed and different topology combinations for different levels hierarchical structure are analyzed. The flow of the network traffic and network load is optimized using Extend v4, a general purpose simulation tool.

The results show that the optimal network topology for the subject Brigade is Star topology at all levels. The type of technology to be used is Fiber Distributed Data Interface technology.

DoD KEY TECHNOLOGY AREA: Command, Control and Communications

KEYWORDS: Brigade, Network Topologies (Star, Ring, Bus), Network Technologies (Ethernet, FDDI, ATM), Network Simulation, Extend® Version 4.0

SITUATIONAL AWARENESS DATA REQUIREMENTS FOR A COMBAT IDENTIFICATION NETWORK

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The modern battlefield is extremely lethal. Many weapons systems provide the capability to engage a target far in excess of the range at which positive target identification can be made. This capability increases the likelihood of inadvertent engagement of friendly forces or, fratricide. Numerous initiatives have been undertaken to provide solutions to reduce fratricide. These solutions generally focus in one of two areas: target identification or situational awareness. Several situational awareness systems are under development. The Marine Corps has explored the concept of improving situational awareness through a mobile network application; however, the requirements for this system are not well understood.

One method of identifying the situational awareness requirements, which was used in this research, was through simulation. Three simulated combat environments were modeled (urban, mixed, and mountainous desert terrain) and the interaction of forces in the environments was observed. Based on the observations and the author's experience, conclusions were drawn about the requirements for a network situational awareness system. Principle findings of this research include system update rates, visual display resolution, and when situational awareness or target identification systems are preferred.

DoD KEY TECHNOLOGY AREA: Command, Control, and Communications

KEYWORDS: Combat Identification (CID), Data Requirements, Situational Awareness

WEB SERVER CONFIGURATION FOR AN ACADEMIC INTRANET

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The Internet has undergone a tremendous growth in the past decade. After the evolution of personal computers and the radical decrease of their prices, people have the ability to access all the massive information that only the Internet and the World Wide Web can provide. One of the factors that boosted this ability was the evolution of the Web Servers. Using the web server technology man can be connected and exchange information with the most remote places all over the world. So, the web can be thought as a mass medium. This study will provide the necessary information required to configure a Web Server within the boundaries of an academic Intranet. It will also serve as an example for both Greek and US DoDs or other organizations seeking to implement a Web Server as an improvement to their existing Servers.

DoD KEY TECHNOLOGY AREA: Computing and Software

KEYWORDS: Web Server, Web Browsers, Intranet

A NEW PARADIGM FOR MIGRATING TO CONVERGED INTEROPERABLE NETWORKS

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In both the military and the commercial sector, requirements for interoperability between systems have grown. The fact that requirements change rapidly in the information age and that customer needs are unknown and often impossible to correctly predict has created the need for an architecture for communication systems that affords flexibility and interoperability. As an alternative to solving the interoperability problem for individual systems, the thesis introduces an object-based network interoperability model in which every system should be designed as a network object. In this thesis a case study of replacing technologies for the existing IPv4 protocol is presented.

At the same time that the demand for interoperability increases, the customer demands that modern communication solutions like telephony- and video-conferencing is implemented to incur savings. Evolving constraint-based routing technology for implementation of a multi-service network that can support full communication interoperability is also investigated as part of this thesis. As a practical example, the Norwegian Defense InterLAN (a nationwide military WAN in Norway) is used to discuss architectural issues and the techniques for migration strategies towards multi-service networks.

DoD KEY TECHNOLOGY AREA: Command, Control, and Communications

KEYWORDS: Networking, Interoperability, Communication, Converging Networks, Real-Time Services, Quality of Service, Multi-Service Networks, and IPv6

TOWARDS RE-ENGINEERING THE UNITED STATES NAVY ENLISTED MANPOWER AND PERSONNEL SYSTEMS - A DATA WAREHOUSE APPROACH

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Historically, stovepiped information systems have been developed to meet the needs of individual departments or users. Over time, attempts to increase the usefulness of these systems often involved adding layers of additional programming and data structures, resulting in complex and difficult to maintain legacy-based systems. The United States Navy enlisted personnel and manpower database system epitomizes this problem. The current system consists of several mainframe systems and a multitude of front-end systems that often require personnel managers to perform manual data extraction to execute routine activities. To illustrate the problem, focus is on the Navy Enlisted Classification (NEC) reutilization, a critical aspect of the personnel assignment process. First, a series of contemporary database topics that form the basis for solving the problems associated with file-based legacy databases is presented. Second, details are provided of the make-up and problems associated with the current system. Third, a prototype relational data mart is developed to prove the value of a data warehouse/data mart driven relational system. Fourth, using the prototype relational data mart as a source system, a contemporary OLAP application is used to prove the effectiveness of using a multi-dimensional data tool to analyze NEC reutilization. Finally, issues involving data quality and their impact on a data warehouse solution to integrating legacy systems are discussed.

DoD KEY TECHNOLOGY AREA: Computing and Software

KEYWORDS: OLAP, Data Warehouse, Enterprise Data Warehouse, Data Mart, Legacy System, Navy Enlisted Classification, Enlisted Personnel System, Enlisted Manpower System

AN EXPERT SYSTEM FOR REWARD SYSTEMS DESIGN

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Today's business environment is a highly competitive marketplace. In this competition, organizations distribute numerous rewards to motivate, attract and retain employees, such as pay, fringe benefits and promotions. However, not all managers have the necessary knowledge and expertise to effectively decide and structure reward systems.

This thesis presents an expert system to assist managers with designing the most appropriate reward system in their organizations. The system queries the user about the organization's goals, structure, culture, technology and its management's vision. This information is then filtered through decision matrixes in the knowledge base to generate the results along with an explanation and an estimated accuracy factor. The system was designed and programmed using Microsoft Visual Basic 6.0. The decision tables in the knowledge base were designed and structured using a Microsoft Access database.

The results show that similar knowledge base expert systems could be designed and programmed to assist managers for other purposes in organizations.

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

KEYWORDS: Artificial Intelligence, Expert Systems, Visual Basic, Organizations, Reward Systems

KNOWLEDGE MANAGEMENT INNOVATION OF THE COAST GUARD COUNTERNARCOTICS DEPLOYMENT PROCESS

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The major contribution this thesis provides is the application of a "break through" knowledge management system design methodology to a knowledge intensive military work process. Specifically, the methodology was used to develop a knowledge management system (KMS) for the United States Coast Guard (USCG) Pacific Area Tactical Law Enforcement Team (PACAREA TACLET). The focus was on applying knowledge management innovation using the above mentioned methodology to the Law Enforcement Detachment (LEDET) Counternarcotic (CN) Deployment Process, which depends on the combined experience and expertise of all members of the detachment in order for the process to be completed successfully. This thesis provides evidence that this methodology, which was developed by Nissen, Sengupta, and Kamel, is robust enough to be used in civilian knowledge work processes, as well as military environments.

The knowledge management system design process used acknowledges that the knowledge transfer required for the primary process to succeed is dependent upon other processes that do not directly relate to it. These processes are referred to as vertical-flow processes. Knowledge management innovation of the CN Deployment process is focused on the vertical-flow processes because the knowledge required for a LEDET to meet the horizontal process goal is dependent on the efficiency of the identified vertical-flow processes

DoD KEY TECHNOLOGY AREAS: Command, Control, and Communications, Manpower, Personnel, and Training

KEYWORDS: Coast Guard, Tactical Law Enforcement Team, Law Enforcement Detachment, Maritime Law Enforcement, Knowledge Management, Information Technology, Counternarcotics

TRUST AND ITS RAMIFICATIONS FOR THE DOD PUBLIC KEY INFRASTRUCTURE (PKI)

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In order to incorporate trust into e-commerce, public key cryptography, and basic communication, one must understand and effectively manage trust. Various Internet security protocols have attempted to address this lack of trust. However, these protocols do not incorporate the user's trust into these protocols. Computational models of trust have been developed in an attempt to automate the logic, variables, and thought processes that a human performs when making a trust-decision. Due to the fact that trust is based on a subjective belief, the models require the assignment of metrics to belief variables or attributes that will have value when evaluating trust. These models address the notion of trust in many different ways and both their definitions and metrics vary significantly. This thesis evaluates the various trust models. It is necessary to understand how trust is defined in each model in order to evaluate how well the operation of a system based on the model satisfies the requirements of the users. Trust models are evaluated based on their characteristics, environmental references, metrics, variables used, and outputs. This thesis concludes with the assessment of a practical application of a trust model to the DoD's PKI system.

DoD KEY TECHNOLOGY AREA: Computing and Software

KEYWORDS: Trust Models, Trust Management, Public Key Infrastructure (PKI), Computer Security

FRAME RATE EFFECTS ON HUMAN SPATIAL PERCEPTION IN VIDEO INTELLIGENCE

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This thesis examines the effect that the frame rate of a streaming video feed has on one's ability to maintain spatial perception. It defines the current technologies available to capture and encode digital video. It describes the current and near future wireless information systems that could be utilized to support streaming video.

This thesis investigates through experimental trials of subjects viewing video streams at different frame rates, the effect those frame rates have on the subject's spatial perception. This thesis analyzes and summarizes the data collected from this experiment and provides recommendations. It is determined that the inherent chaotic nature of tactical movement and the method used to encode digital video are not compatible for video streams with high motion in the three dimensional planes. Results of this analysis suggest that a large amount of bandwidth would be consumed to provide the minimum quality of service indicated by the data and suggests that video to the commanders at the frontline is not a useful allocation of bandwidth.

DoD KEY TECHNOLOGY AREAS: Command, Control, and Communications, Computing and Software, Human Systems Interface, Modeling and Simulation

KEYWORDS: Reconnaissance, Digital Video Imagery, Real-time Video, Wireless Communications, Bandwidth, Spatial Perception

INNOVATION OF THE NAVAL POSTGRADUATE SCHOOL'S STUDENT THESIS RESEARCH PROCESS THROUGH KNOWLEDGE MANAGEMENT

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This thesis examines the student thesis research process at Naval Postgraduate School (NPS), Monterey, CA. Research in the academic environment by Leavitt (1965), Davenport (1993), and Nissen (1998), makes a case for the integration of information technology (IT) with the process it supports. This thesis examines how the NPS population discovers and shares knowledge in the thesis research process. Additionally, it analyzes how a knowledge management (KM) tool such as a knowledge portal might improve the thesis research process. This thesis explores the culture of knowledge sharing and knowledge hoarding in the academic environment of NPS. This thesis also investigates the relevancy of student theses to Navy needs and how this relevancy might be enhanced through a knowledge portal (KP).

The findings indicate that the student thesis process at NPS can be innovated through a KM tool such as a KP. Development and implementation of the KP must be executed using an iterative, integrated approach through gradual addition of resources, functionality, and user groups. Weaknesses identified in the current thesis process require re-engineering efforts. Finally, the differences in the academic and military cultures at NPS must be minimized for successful innovation to occur.

DoD KEY TECHNOLOGY AREA: Computing and Software

KEYWORDS: Knowledge, Knowledge Management (KM), Knowledge Portal (KP), Thesis, Research, Process Innovation, Re-Engineering, Qualitative Analysis, Culture, Amalgamated KM Life Cycle Model

THE APPLICATION SERVICE PROVIDER MARKET: A GUIDE FOR NAVY LINE MANAGERS

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This study explores the use of application service providers (ASP) as an alternative to the traditional practices of procuring, managing and maintaining software applications and the associated hardware infrastructure. The ASP model is a method of outsourcing that calls for an ASP to acquire and manage all of the hardware and software required to meet the end-user's needs. This includes all elements of support including configuration management and maintenance. The customer purchases this service on a subscription basis.

The findings show that ASPs have the potential to be a viable and financially stable solution in meeting the Navy's and the federal government's needs of reducing the complexity and cost of providing software applications. However, a cost and benefit analysis should be performed to verify the final costs prior to any implementation. Further, the enabling thin client and server-based computing technologies all show they can provide benefits for an organization interested in centrally managing and maintaining applications.

DoD KEY TECHNOLOGY AREA: Computing and Software

KEYWORDS: Application Service Provider, Outsourcing, Pricing Models, Total Cost of Application Ownership, Thin Client, Server-based Computing, Service Level Agreements, Information Systems

WHAT DO CHIEF INFORMATION INTEGRATION OFFICERS (CI^2O) NEED TO KNOW AND WHAT IS THEIR ROLE?

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As DoD and the Navy move into the 21st Century, information technologies are abounding not only in volume but also in complexity. In order to manage and leverage these technologies, there needs to be a clear vision and it must start at the very top of the DoD Enterprise. With this vision, it will then become the responsibility of the Chief Information Integration Officer (CI^2O), previously known as the Chief Information Officer (CIO), at each command to implement that vision. The real challenge is determining what exactly the CI^2O needs to know and the role the CI^2O should play in the command. Once the requirements are identified, how do we ensure the officer's success? This thesis examines these questions. The results of a meta-analysis from a variety of studies are portrayed in a matrix which identify the critical success factors, reporting levels, roles, core competencies, education and experience to clearly define the requirements for an effective CI^2O to be implemented into Navy organizations.

DoD KEY TECHNOLOGY AREA: Manpower, Personnel, and Training

KEYWORDS: Navy Officers, Information Technology, Information Management, Core Competencies, Chief Information Officer

A FORMAL MODEL FOR RISK ASSESSMENT IN SOFTWARE PROJECTS

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The current state of the art techniques of risk assessment rely on checklists and human expertise. This constitutes a weak approach because different people could arrive at different conclusions from the same scenario. The difficulty on estimating the duration of projects applying evolutionary software processes contributes to add intricacy to the risk assessment problem. This thesis introduces a formal method to assess the risk and the duration of software projects automatically. The method has been designed according the characteristics of evolutionary software processes such as productivity, requirement volatility and complexity. The formal model based on these three indicators estimates the duration and risk of evolutionary software processes. The approach introduces benefits in two fields: a) automation of risk assessment and, b) early estimation method for evolutionary software processes.

DoD KEY TECHNOLOGY AREA: Computing and Software

KEYWORDS: Risk Assessment, Software Engineering

INNOVATING OUTPATIENT PRESCRIPTION DISPENSING IN NAVY MILITARY TREATMENT FACILITIES TO IMPROVE COST PERFORMANCE

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The current environment of constrained financial resources and manpower reductions requires all organizations to make their business processes more efficient to meet the needs of their stakeholders. This thesis analyzes the potential of business process re-engineering (BPR) to dramatically improve the efficiency of the United States Navy Outpatient Pharmacy Dispensing Process (OPDP) from both a cycle time and manpower standpoint to improve customer service while controlling costs. Using the Nissen methodology and computer modeling and simulation, four OPDP process redesign alternatives are developed that have the potential of yielding order of magnitude improvements in cycle time or cost. Simulations of the OPDP demonstrate that cycle time and/or cost can be significantly reduced at Navy pharmacies by redesigning the process of filling outpatient prescriptions. The redesigned alternatives start with workflow reconfiguration to reduce the responsibilities of the patient in the OPDP, and they build on this process streamlining through the use of information technology and automation. The research concludes that the Navy OPDP can be dramatically improved by utilizing information technology, available today, to support or automate activities in the OPDP, which reduces non value added activities in the process of filling of prescriptions.

DoD KEY TECHNOLOGY AREA: Modeling and Simulation

KEYWORDS: Business Process Re-Engineering, Outpatient Prescription Process

MANAGING KNOWLEDGE IN THE BATTLE GROUP THEATER TRANSITION PROCESS (BGTTP)

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At a time when theater environments are frequently hostile, changing rapidly, and uncertain, the need to improve the Battle Group Theater Transition Process (BGTTP) between carrier battle groups is intense. Recent developments in information technology help facilitate the transition process, but only data and information are transferred at present, not knowledge. This study provides in-depth analysis of the current BGTTP being employed by the Department of the Navy (DoN) in the Arabian Gulf. The purpose of this study is to design a knowledge management system that significantly reduces carrier battle group theater familiarization periods. This study builds upon recent work that focuses on knowledge management and system design from three integrated perspectives: 1) re-engineering, 2) expert systems knowledge acquisition and representation, and 3) information systems analysis and design. This paper uses an integrated framework for knowledge process and system design. This integrated framework covers the gamut of design considerations from the enterprise process in large, through alternative classes of knowledge in the middle, and on to specific systems in detail. This study applies the integrated framework to the BGTTP to improve process performance.

DoD KEY TECHNOLOGY AREA: Other (Information Technology)

KEYWORDS: Analysis and Design, Expert Systems, Information Systems, Knowledge Management, Re-Engineering, U.S. Navy, Information Technology

AUTOMATING AVIATION TRAINING RECORDS

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Over the years with advances in computer technology, the Navy has gradually transitioned into a paperless operation. Personnel training records have provided a standardized, documentable individual qualification record for Navy aviation maintenance personnel, however, these records continue to be kept in folders, stored in file cabinets. In addition, paper records create a maintenance burden, in that continued handling and possibility of errors made during data entry and normal wear and tear of documents contained in these records, require pages to be periodically repaired, replaced or completely recreated. A torn and missing page also causes valuable training information to become lost, decreasing the information integrity of the record.

This thesis will examine the benefits and problems in automating aviation training records, and further discuss database design issues and considerations to maximize the flexibility and functionality provided by automation. Incorporating a distributed database is discussed as a solution, with further discussion on further considerations for the proper implementation of a training record database. Interface and alternate local networking options will also be discussed. Recommendations for further research is also presented.

DoD KEY TECHNOLOGY AREA: Manpower, Personnel, and Training

KEYWORDS: Distributed Database, Training, Automation, Paperless, Records, Network Database System

EXAMINATION OF AUTOMATED INTEROPERABILITY TOOLS FOR DOD C4I SYSTEMS

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This thesis examines the ability of C4I systems within DoD to exchange information in the operational battlespace. With the advent of the Information Age and resultant development of the strategy of network-centric warfare, interoperability has become increasingly significant as a criterion for mission success, while also becoming increasingly difficult to achieve as well. The PPBS cycle bears some responsibility for this by creating competition amongst the Services for finite resources, perpetuating the environment that contributes to "stovepipe" C4I systems development. This thesis examines DoD's attempts to solve the interoperability dilemma by using policies and procedures. This thesis demonstrates that a cooperative effort among components, services, and agencies to integrate methodologies within PPBS should enhance the efforts of planners and developers in designing interoperability through the integration of C4ISR architecture development processes. As a part of this examination, several automated software tools are also evaluated that have been designed to facilitate interoperability, and recommendations are presented as to how these tools could be integrated to complement their effectiveness within the requirements generation and capabilities development processes.

DoD KEY TECHNOLOGY AREA: Command, Control, and Communications

KEYWORDS: Interoperability, JCAPS, MSTAR, LISI

COMBAT IDENTIFICATION WITHIN THE JOINT AIR-TO-GROUND ENVIRONMENT

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Combat Identification (CID) has tremendous impact on joint warfighting and is critical to success on the battlefield. Numerous CID systems are being fielded by each Service to improve Situational Awareness (SA) and Target Identification (TI) capabilities in an effort to reduce fratricide while simultaneously improving combat effectiveness. Many of these systems are not interoperable and thus cannot exchange critical information with one another. Recently published joint vision statements emphasize that joint missions will continue to predominate in the future strategic environment. If this is truly the case, achieving an acceptable degree of interoperability among Theater Commander-In-Chiefs, Services, and Agencies (C/S/As) is paramount – particularly in the area of CID. This thesis examines the nature of CID in the joint environment focusing on Close Air Support (CAS) within the Air-to-Ground (A-G) mission area. This thesis then explores interoperability problems associated with CID systems, seeks to elucidate the sources of these problems, examines recent Department of Defense (DoD) efforts to address these problems, and makes recommendations to improve interoperability within the CID warfighting area.

DoD KEY TECHNOLOGY AREA: Command, Control, and Communications

KEYWORDS: Combat Identification, Fratricide, Interoperability, Close Air Support

REQUIREMENTS ANALYSIS AND INFRASTRUCTURE ASSESSMENT METHODOLOGIES FOR INTRANET DEVELOPMENT

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This is a study of intranet planning methodologies with specific focus on two aspects of project planning, requirements analysis and infrastructure assessment. This thesis examines both qualitative and quantitative aspects of assessing and planning for intranets. Thoroughly completing these two areas is important in order to bring success to an intranet project. This thesis examines variables necessary in each area that require consideration during planning. Chapter II is a study of requirements analysis. A three-step methodology will guide planners through a logical process that assists in creating a well-organized plan. Chapter III is a study of infrastructure assessment. Items of infrastructure are defined and listed to assist planners to assess existing infrastructures. A five-step methodology will guide planners through a logical process of assessing enterprise infrastructure. Chapter IV is a case study of the U.S. Marine Corps Collaborative Planning Network, an enterprise-wide intranet project designed to augment the existing Marine Corps Enterprise Network. Methods and processes in this case study closely parallel methods of planning recommended in this thesis. Chapter V contains a summary and recommendations. This chapter also provides recommendations for areas of further study in intranet planning.

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

KEYWORDS: Computer Networks, Intranets

IPSEC VIRTUAL PRIVATE NETWORKS

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In the Information Age, information itself is a weapon due to the speed of transmitting data. However, to be usable, the information must be accurate, timely, and relevant. To ensure these three basic tenets, we must have strong Information Assurance.

Internet Protocol Security Virtual Private Networks offer a standards-based solution to the problems of transmitting sensitive data across an open source extranet such as the Internet. As a security solution for computer networks, they offer a strong method for encryption and authentication. However, due to the complexity of the technology, effective implementation requires detailed understanding of the setup process and painstaking attention to detail during the setup process.

Due to the threats that abound in today's world, the overall approach to the management of the Navy's Information Technology systems must be restructured. To have a consistent and standard policy is of utmost importance, as is the training of those that must install and maintain the systems and policies.

Cisco System routers offer the hardware required to fulfill the Virtual Private Networking requirements. The framework needed to develop an overall plan for consistently employing the Information Technology systems used today can be found in the Navy Nuclear Power program.

DoD KEY TECHNOLOGY AREAS: Battlespace Environments, Command, Control, and Communications, Computing and Software, Electronics, Electronic Warfare, Human Systems Interface, Manpower, Personnel, and Training

KEYWORDS: Information Age, Information Assurance, Virtual Private Networks, Internet Protocol Security, Firewalls, Information Technology, Information Technology Management, Cisco Routers

KNOWLEDGE MANAGEMENT OF THE SPECIAL WARFARE AUTOMATED PLANNING SYSTEM (SWAMPS): HOW TO PROVIDE TIMELY, RELEVANT AND ACCURATE KNOWLEDGE TO THE OPERATOR DURING THE MISSION PLANNING PROCESS

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This research evaluates the feasibility of implementing a knowledge management scheme into the Special Warfare Automated Mission Planning System (SWAMPS). The objective is to determine not only what type of knowledge is required by the operator but also how to get that knowledge to him within constraints imposed by factors such as time, location and prior experience. This research focuses on utilizing information technology, along with other enablers, to access and retrieve knowledge pertinent to the mission. This knowledge will be accessed as close to real time as possible in order to allow the operator to review the information when and where it is most relevant. Research includes conducting a detailed analysis of the applicable mission planning processes and consolidating technological, operational and human enablers to develop requirements for implementing a knowledge management architecture. Various operators are interviewed in order to clarify what knowledge needs to be presented

DoD KEY TECHNOLOGY AREAS: Command, Control, and Communications, Manpower, Personnel, and Training, Other (Knowledge Management)

KEYWORDS: Knowledge Management, SWAMPS, Mission Support Center, MSC, Push, Naval Special Warfare, NSW, Mission Planning

IMPACT OF INCLUDING REALISTIC COMBAT IDENTIFICATION REQUIREMENTS ON A LARGE SCALE INFORMATION SYSTEM ARCHITECTURE VERSUS THE USE OF A SEPARATE COMBAT IDENTIFICATION INFORMATION SYSTEM NETWORK

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This thesis reports the findings of a simulation to determine the most effective solution between a dedicated Combat Identification (CID) situational awareness network versus including CID information on a full functioning network. The architecture used to make this determination was based on the Navy and Marine Corps Extended Littoral Battlespace (ELB) Advanced Concept Technology Demonstration (ACTD). This demonstration implemented a wide-area wireless battlenet using WaveLan and VRC 99A technologies. The simulation was accomplished with the use of a leading edge simulation tool, EXTEND^{TM}, and the specifications inherent to wireless communications. EXTEND was used to replicate the protocols that are inherent within the WaveLAN and VRC-99A systems. A feasible sized architecture was modeled utilizing scaling techniques, which simulated the operation of a Marine Expeditionary Brigade (MEB), covering a 200X200 mile wireless tactical battlespace. A full functioning network was developed and then modified to include CID information requirements. A comparison of the data latency between the models was the determining factor. This thesis demonstrates that a full functioning network is capable of handling CID information requirements.

DoD KEY TECHNOLOGY AREAS: Command, Control, and Communications, Modeling and Simulation

KEYWORDS: Combat Identification, Networks, Tactical Networks, Communications, Systems

IMPLEMENTATION OF A SUBMARINE SHIP-WIDE, COMMON NETWORK ARCHITECTURE

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This thesis will examine the proliferation of multiple Local Area Network (LAN) and information technologies aboard United States Navy submarines. The author will examine the evolution of Congressional Defense Acquisition Reforms which mandates the use of Commercial Off-The-Shelf (COTs) and commercial items. The resulting impacts of this policy on the submarine force as it relates to burdens imposed with regard to training of personnel, technology refresh and insertion, obsolescence, and logistics will be addressed.

The study will examine the implementation of a submarine shipwide, mission critical, tactical network, based upon open systems architecture, which provides the ability to process classified and unclassified data; as well as providing a migration path to a common hardware and software baseline across all submarine classes. The implementation of this technology would be the initial instantiation of such an information system on any class of United States Navy warship and may potentially provide a template for use Navy wide. Finally, a sound, programmatic recommendation to implement a Submarine Ship-Wide, Common Network Architecture will be made.

DoD KEY TECHNOLOGY AREAS: Command, Control, and Communications, Computing and Software, Surface/Under Surface Vehicles - Ships and Watercraft

KEYWORDS: Submarine, Local Area Network, LAN, Submarine Network, Submarine Architecture, Shipboard Network

INFORMATION MANAGEMENT SYSTEM DEVELOPMENT FOR THE CHARACTERIZATION AND ANALYSIS OF HUMAN ERROR IN NAVAL AVIATION MAINTENANCE RELATED MISHAPS

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The purpose of this thesis was to develop a prototype safety information management tool to capture human error in Naval Aviation maintenance mishaps. The Human Factors Analysis and Classification System-Maintenance Extension taxonomy, an effective framework for classifying and analyzing the presence of maintenance errors that lead to mishaps, incidents, and personal injuries, is the foundation of this management tool. The target audience for this information management system tool included safety personnel, mishap investigators, Aircraft Mishap Board (AMB) members, and analysts. A review of three areas was needed to produce the prototype: (1) the collection, use, and management of accident information, (2) human error theories as related to aviation mishaps, and (3) the design of an effective mishap database tool. A usability study was conducted using potential end-users (Naval Aviation Safety Officers). The participants were given both written procedures to navigate through the prototype and an exit survey. The results of the survey, including objective and subjective responses about the prototype were gathered. The resulting data indicated an improved version of the prototype could directly lead to a decreased mishap rate and overall increased mission readiness due to the training and analysis opportunity it provides.

DoD KEY TECHNOLOGY AREAS: Air Vehicles, Computing and Software, Human Factors, Human Systems Interface

KEYWORDS: Aviation Accidents, Aviation Mishaps, Accident Classification, Maintenance Mishaps, Maintenance Error, Human Factors, Human Error, Naval Aviation, Trend Analysis, Information Management System

THE FEASIBILITY OF USING DESIGN RATIONALE TO AUGMENT THE IMPLEMENTATION STRATEGY OF MANAGED CARE

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The feasibility of using argumentation based design rationale capture techniques for improving the implementation strategy of managed care is investigated. The hypothesis is made that managed care is failing because it deals in “wicked” problems, which are fundamentally different than the “tame” problems encountered in traditional medicine, and that the organizational structure of managed care is not equipped to handle wicked problems. It is shown that argumentation based design rationale tools are an excellent candidate for bridging the ideals of traditional medicine to the realities of managed care for three reasons: the tools are specifically designed to explore the resolution of wicked problems, the problems encountered

in managed care possess many similarities to problems that have been shown to have successful utilization of design rationale capture techniques, and the power relationships within managed care are most fitting with a collaborative implementation strategy. Recommendations for a collaborative implementation strategy of managed care, using design rationale capture tools as a mechanism of collaboration, are given.

DoD KEY TECHNOLOGY AREAS: Computing and Software, Human Systems Interface

KEYWORDS: Knowledge Management, Design Rationale, Medicine, Managed Care, Human Computer Interaction, Process Knowledge