

MASTER OF SCIENCE IN INFORMATION TECHNOLOGY MANAGEMENT

IMPLEMENTATION OF A PRICING SYSTEM FOR DECISIONNET

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This thesis describes an implementation of DecisionNet which uses updated, more efficient web technology and includes a pricing system. DecisionNet is an organized electronic marketplace of Internet-accessible decision support systems. Providers register their decision support technologies in an online index. When consumers need a particular type of decision support system that they do not have, they can search the index to locate a system accessible over the web which might meet their needs, thus avoiding the purchase of a stand-alone system.

Previous implementations of DecisionNet have assumed that decision support system providers allowed the use of their systems at no cost. The present implementation incorporates a simple pricing system for recovering fixed and variable costs associated with providing systems over the Internet. Pricing of services over the Internet is still in its earliest stages and there is no single, generally accepted model that applies to pricing of Internet services. This thesis examines some academic studies of Internet pricing and some pricing policies currently in use, then describes a flexible pricing system which permits the provider to experiment to find optimum prices for a changing market.

DoD KEY TECHNOLOGY AREA: Computing and Software

KEYWORDS: DecisionNet, Decision Support, World Wide Web, Information Goods

VOICE OVER INTERNET PROTOCOL (VOIP): AN ANALYSIS OF SIGNALS INTELLIGENCE (SIGINT) APPLICATIONS

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Audio communications over the Internet is becoming a rapidly growing industry. It is being used for both commercial and personal applications. Many of the large hardware and software manufacturers including Microsoft, CISCO, and Intel are developing products to provide civilian, military, and foreign users with the hardware and software necessary to implement audio communications over the Internet.

As more vendors continue to enter this growing market, the requirement for standardization of protocols becomes increasingly important. Currently, there are several standard protocols for the

INFORMATION TECHNOLOGY MANAGEMENT

implementation of voice over the Internet. Although, there are many types of networks available today, the primary use of these applications is implementing Voice over Internet Protocol (VoIP) for packet switched Internets and Local Area Networks (LANs) that employ Transport Control Protocol/Internet Protocol (TCP/IP). Therefore, many of the standard protocols developed rely on TCP/IP. These protocols include H.323, the International Telecommunications Union (ITU) standard; Session Initiation Protocol (SIP), the Internet Engineering Task Force (IETF) standard; and ReSerVation Protocol (RSVP).

DoD KEY TECHNOLOGY AREA: Other (Information Operations)

KEYWORDS: Voice Over IP, ReSerVation Protocol, Session Initiation Protocol, and Signals Intelligence

BENEFITS OF MULTICASTING APPLICATIONS WITHIN THE UNITED STATES MARINE CORPS

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This thesis investigates the efficiency of multicasting, a relatively new network technology that allows low bandwidth delivery of real-time and archived information. Bandwidth efficiency is derived from relieving the transmission source from the current burden of transporting and replication of a unique data stream for each individual recipient. Voice, video, and data are carried in a single transmission on any transport medium to any number of preselected users or group of users.

It will allow commanders a synchronized, real-time logistics and intelligence information capability for making critical force employment decisions. In addition, multicasting's open standard architecture allows it to run over almost all of DoD's existing communication infrastructure.

Research concentrates on the specific technologies and supporting equipment necessary to provide effective delivery of real-time or on-demand multimedia without major costs to the user and in compliance with the Defense Information Infrastructure/Common Operating Environment (DII/COE). While technical specifics are discussed, this paper focuses on the characteristics of multicasting that can increase the Marine Corps' combat and administrative effectiveness. With the increasing need to save time and money, multicasting offers a substantial advantage over currently used technologies.

DoD KEY TECHNOLOGY AREA: Computing and Software

KEYWORDS: Multicasting, Networked-based Video, Streaming Video, MPEG, United States Marine Corps

APPLYING ASYNCHRONOUS TRANSFER MODE TO THE MARINE CORPS BASE LEVEL INFORMATION INFRASTRUCTURE

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This thesis reports the findings of a simulation comparing network architecture configurations in terms of interactions and performance in the face of varying traffic demand. It models the U.S. Marine Corps Base Level Information Infrastructure using a top-down approach. Extend® queuing theory modeling software was used to decompose the network model with a bottom-up approach to testing and integration. Feasible network configurations were identified and modeled under varying load parameters. Asynchronous Transfer Mode was found to be suited as a distribution protocol at the infrastructure levels of backbone and

INFORMATION TECHNOLOGY MANAGEMENT

area distribution node. Fast Ethernet and Ethernet were found to be optimal at lower levels of infrastructure. Network design recommendations are made for network engineers.

DoD KEY TECHNOLOGY AREA: Command, Control, and Communications

KEYWORDS: Systems, Networks, ATM

**RECRUIT STATION LOCATION EVALUATION SYSTEM: AN ARCHITECTURAL
IMPLEMENTATION OF A DECISION SUPPORT SYSTEM FOR
OPTIMAL RECRUIT STATION LOCATION**

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This thesis describes a component-based methodology for developing a decision support system (DSS) for optimal location of military recruiting stations in regional recruiting markets. The DSS is designed to ensure that stations are selected that minimize cost for a given level of production. The interface allows users to perform “what if” analysis to determine if there are better locations to meet desired objectives. The Recruit Station Location Evaluation System (RSLES) integrates a user interface, a database, a GAMS optimizer model and a geographic information system (GIS) mapping engine to provide a flexible environment that leverages operational recruiting, market analysis, and demographic information for decision making.

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

KEYWORDS: Decision Support Systems, Geographic Information Systems, Application Development, Recruiting, Site Location

**AN ANALYSIS OF FORENSICS EVIDENCE GATHERING FOR ASSISTANCE IN
NETWORK INTRUDER PROSECUTION**

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This research develops a roadmap of legal evidence-gathering steps to assist law enforcement agencies in the identification of network intruders. This checklist will not only assist administrators in conducting network defense and safeguarding evidence but will assist them in remaining within the guidelines of the law in their network defense efforts. Legal responsibilities of network managers are highlighted with respect to legal document requirements and issues of U.S. Marine Corps liability. The aforementioned roadmap development is achieved by: 1) examining the latest advances and trends in network intrusion techniques, 2) investigating current U.S. Navy and U.S. Marine Corps Computer Network Incident Response Policies, 3) researching the current and proposed legislation covering the issue of forensic evidence requirements and preservation, and 4) examining forensics evidence gathering techniques with a focus on individual privacy rights.

DoD KEY TECHNOLOGY AREA: Computing and Software

INFORMATION TECHNOLOGY MANAGEMENT

KEYWORDS: Intrusion Detection, Forensic Evidence, Hacking, Legal Liability, Network Intrusion, Incident Response

INFORMATION TECHNOLOGY CORE COMPETENCIES OF A MARINE CORPS REGIMENT

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This thesis provides a detailed description of existing and projected C4I systems within a regiment as well as the Information Technology (IT) architectures necessary to inter-connect those assets. An overview of the Individual Training Standards (ITS) and their relationship to IT services and support is addressed in addition to the shortcomings of existing ITS for the 06XX and 40XX Military Occupational Specialties (MOS). The methodology used to identify task descriptions and performance steps required to support specific C4I systems is identified as well as a proposed MOS structure for the IT related fields. The results obtained from identifying tasks and competencies of the Tactical Combat Operations system, Intelligence Analysis System, Intelligence Operations Workstation, and Tactical Data Network are applied to a competency progression model. This model is used to identify the core and core plus competencies necessary to support specific C4I systems employed at the regimental level. Applying survey instrument and interview questions, a hypothesis regarding IT competencies was tested. The survey questionnaire and interview questions focus on IT related standard operating procedures, existing IT competencies, IT related functional redundancies, commercial outsourcing of IT support, unit priorities, and IT skill requirements.

DoD KEY TECHNOLOGY AREAS: Command, Control, and Communications, Other (Computers and Intelligence)

KEYWORDS: Information Technology, Core Competencies

NAVAL MEDICAL PAPERLESS OFFICE: THE WAY OF THE FUTURE?

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In this thesis the authors study the paperless office concept in the naval medical community. A paperless office is defined as an, "environment where the transmission, storage, and retrieval of information is not done through the medium of paper; rather, it is done through electronic data networks (Hicks, 1997)." The objective of this thesis is to investigate what the Naval Medical Treatment Facility Chief Information Offices (CIOs) are doing to move towards a paperless office and what the determinants are in developing a paperless office.

In order to accomplish the objective, hypotheses were constructed in the following manner: "The greater the resource, leadership, and technology the higher the probability of success in creating a paperless office." Data was gathered using a web-based survey approach. The survey was sent to all the Naval Medical Treatment Facilities (MTFs) (CIOs). Upon receipt of the survey data, SPSS software was used to conduct the statistical analysis. The analysis showed the hypotheses were not supported, however, the data identified both accomplishments (such as intranet creation, installation of fax server, etc.) and current activities undertaken by the MTFs CIOs in the paperless office environment.

INFORMATION TECHNOLOGY MANAGEMENT

DoD KEY TECHNOLOGY AREA: Computer and Software

KEYWORDS: Paperless Office, EDI, Internet, Intranet, Database, CIO, Workflow Management, Imaging, Scanning, E-mail, ADT

RESPONDING TO THE THREAT OF CYBERTERRORISM THROUGH INFORMATION ASSURANCE

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The number of people connecting to the Internet is growing at an astounding rate: estimates range from 100% to 400% annually over the next five years. This unprecedented level of interconnectedness has brought with it the specter of a new threat: *cyberterrorism*. This thesis examines the impact of this threat on the critical infrastructure of the United States, specifically focusing on Department of Defense issues and the National Information Infrastructure (NII). A working definition for cyberterrorism is derived, and a description of the Nation's critical infrastructure is provided. A number of possible measures for countering the threat of cyberterrorism are discussed, with particular attention given to the concept of *information assurance*.

Information assurance demands that trustworthy systems be developed from untrustworthy components within power-generation systems, banking, transportation, emergency services, and telecommunications. The importance of vulnerability testing (or *red teaming*) is emphasized as part of the concept of information assurance. To support this, a cyberterrorist "red team" was formed to participate in the Marine Corps' Urban Warrior Experiment. The objective of this thesis is to address the impact of these issues from a systems management perspective. This includes taking into account the changes that must occur in order to improve the U.S.' ability to detect, protect against, contain, neutralize, mitigate the effects of, and recover from attacks on the Nation's Critical Infrastructure.

DoD KEY TECHNOLOGY AREAS: Command, Control, and Communications, Computing and Software, Electronics Warfare, Manpower, Personnel, and Training, Other (Terrorism)

KEYWORDS: Terrorism, Information Terrorism, Cyberterrorism, Information Infrastructure, Critical Infrastructure, Information Assurance, Information Warfare, Vulnerability Testing

UTILITY OF ENTERPRISE RESOURCE PLANNING FOR THE DEPARTMENT OF THE NAVY

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This thesis examines how Enterprise Resource Planning solutions can be effectively implemented within the Department of the Navy. Best practices and lessons learned from "world class" commercial businesses and government agencies are discovered from secondary data analysis and experience surveys. The value-added of intangible benefits resulting from information technology solutions is assessed with a cross-sectional survey administered at pre-implementation for comparison with value-added at post-

INFORMATION TECHNOLOGY MANAGEMENT

implementation. Recommendations are made regarding implementation of Enterprise Resource Planning solutions in the Navy, including the development of a comprehensive change management plan that emphasizes the use of Enterprise Resource Planning as an information technology change lever for business process innovation.

DoD KEY TECHNOLOGY AREAS: Computing and Software, Other (Commercial Business Practices)

KEYWORDS: ERP, Enterprise Resource Planning, Commercial Business Practices, Private Industry Best Practices, Outsourcing

STREAMLINED AUTOMATED LOGISTICS TRANSMISSION SYSTEM PROGRAM MANAGEMENT AND COMMERCIAL SATELLITE SYSTEMS ANALYSES

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Today's fleet logistics operators maintain responsibility for Naval Force sustainment. Without vital data and useful information systems, substantive logistics improvements are difficult to realize. Exploitation of current satellite technology provides unique opportunities for improvements in data-transfer capacity to fleet units. As private industry takes the lead in technological development, the military must closely monitor commercial space-based communications systems. This research analyzed five commercial satellite systems that possess various capabilities, and provides an overview to distinguish their operational characteristics. Information systems must also be developed using an appropriate program management structure, which offers guidance and support. Conclusions are presented for SALTS program management and recommendations are made for several satellite systems that may meet the Navy's requirements.

DoD KEY TECHNOLOGY: Command, Control, and Communications

KEYWORDS: Program Management, Satellite Communications

MIGRATING FROM NETWARE TO WINDOWS NT NETWORK OPERATING SYSTEM

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Migration from an existing information technology system to a new system presents many managerial challenges. There are technological challenges associated with running the old system, maintaining data integrity and bringing the new system online all without seriously impacting daily operations. There are human factors to consider like resistance to change and conflict management. In addition, organizational issues like management support and cross-functional communication channels need to be addressed. This thesis reviews the technical migration from an operational NetWare network to Windows NT completed at the Defense Manpower Data Center (DMDC) in Monterey, CA. The DMDC case presents a typical set of issues that an IT manager is likely to face when implementing technology-driven change. Technical, human and organizational factors of technical change are discussed. A list of lessons learned and a set of

INFORMATION TECHNOLOGY MANAGEMENT

technical management guidelines are derived from analysis of the DMDC case. Details of Windows NT 4.0 and 5.0 features are included.

DoD KEY TECHNOLOGY AREA: Computing and Software

KEYWORDS: NT, Change Management, NetWare, NOS Migration

THE IMPACT OF RECRUIT SOCIOECONOMIC BACKGROUND AND COMPUTER LITERACY ON U.S. NAVY INITIAL TRAINING

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Advances in technology in the Navy, specifically its IT-21 initiative, and academic setback rates in high-tech ratings raises concern about the level of computer literacy in Navy accessions. This study examines household income data, computer, telephone, and on-line penetration rate data by socioeconomic level, student computer use data, and data from the DoD's Survey of Recruit Socioeconomic Background. These data were analyzed for relationships between recruit socioeconomic status (SES) background and computer literacy. Findings here show that individuals from lower socioeconomic strata have less access to computers and computer technology, and Navy accessions come from lower SES backgrounds. Therefore, they can be expected to have lower computer skills upon entering the Navy. This implies the Navy should consider adding basic computer/IT skills training at boot camp and follow-on computer and IT training at a Sailor's apprentice level ("A" school) training.

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

KEYWORDS: Socioeconomic, Computer Literacy, Navy Accessions

USABILITY EVALUATION OF THE AVIATION COMMAND SAFETY ASSESSMENT WEB-BASED QUESTIONNAIRE

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Computer software has taken an increasingly larger role in the U.S. Navy. It is used in nearly every facet of naval operations, from administrative chores to controlling complex weapons systems. Because of the high cost of software and the potential for inadvertent misuse, it is important that software be easy to use and understand. This thesis explores the methods and techniques available for conducting software usability evaluations. Using what described in this thesis, actual software usability testing is done on a recently developed Web site. The Web site [<http://spitfire.avfsafety.nps.navy.mil>] evaluated in this study is designed to allow aviation units to complete a safety survey online. This thesis describes the usability test conducted on the Aviation Command Safety Assessment (ACSA) Web site and establishes a methodology that can be used on any future Navy Web site. The results of this usability test show that improvement can be made to the interface design and presentation of Web site material.

DoD KEY TECHNOLOGY AREAS: Human Systems Interface, Other (Design Interface, Web Design)

KEYWORDS: Human Computer Interface, Interface Design, Internet, Web site design, Web Site Survey, World Wide Web, Usability, Usability Guidelines