MASTER OF SCIENCE
IN
INFORMATION TECHNOLOGY MANAGEMENT

INTRANET IMPLEMENTATION IN A CONTEXT OF WEB TECHNOLOGY DISCOVERY

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This thesis presents a model of intranet implementation for a military facility within the context of an organization that is in the process of discovering Web technology and the browser as a central communication application. It surveys the genesis and evolution of intranet technology, examines the interface between emerging technology and organizational culture, specifies software and hardware components, and offers recommendations on intranet security and the requirements for successful information technology implementation. Intranet pages built with Microsoft Front Page 98 and a connection from back-end to front-end constructed with ColdFusion Application Server 3.1 are presented.

DoD KEY TECHNOLOGY AREA: Other (Database, Security, and Intranet)

KEYWORDS: Web Technology, Intranet, Information Technology, Database, On-Line Transaction

SOFTWARE EVALUATION FOR DEVELOPING SOFTWARE RELIABILITY ENGINEERING AND METRICS MODELS

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Today's software is extremely complex, often constituting millions of lines of instructions. Programs are expected to operate smoothly on a wide variety of platforms. There are continuous attempts to try to assess what the reliability of a software package is and to predict what the reliability of software under development will be. The quantitative aspects of these assessments deal with evaluating, characterizing and predicting how well software will operate. Experience has shown that it is extremely difficult to make something as large and complex as modern software and predict with any accuracy how it is going to behave in the field. This thesis proposes to create an integrated system to predict software reliability for mission critical systems. This will be accomplished by developing a flexible DBMS to track failures and to integrate the DBMS with statistical analysis programs and software reliability prediction tools that are used to make calculations and display trend analysis. It further proposes a software metrics model for fault prediction by determining and manipulating metrics extracted from the code.

DoD KEY TECHNOLOGY AREA: Computing and Software

KEYWORDS: Software Reliability, Software Metrics, Excel, Database

DEVELOPMENT OF A UAV TRACK INJECTION AND IMAGERY PRESENTATION SYSTEM

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The Navy is increasingly using advanced Unmanned Air Vehicles (UAVs) to perform critical missions. UAVs have grown in capability, while the Navy's underlying Command and Control structure has changed little to take advantage of the advances in technology. While UAVs are rapidly developing the potential to be effective combat tools, learning how to utilize this potential in an integrated Command and Control environment is hampered by a lack of UAV connectivity.

This thesis develops a methodology for using UAV telemetry data packets to inject tracks of the UAV into a Command and Control system such as the Global Command and Control System (GCCS), and provide near-real-time imagery delivery from the UAV to tactical end users via a network such as the Secret Internet Protocol Router Network (SIPRNET). Focus is on the development of a proof-of-concept system utilizing the Naval Postgraduate School's Systems Technology Battle Lab (STBL) and the Center for Interdisciplinary Remotely-Piloted Aircraft Studies (CIRPAS) Altus UAV. Through the developing of this system, the Altus UAV can serve as a research tool for further development of Command and Control doctrine for operational UAVs.

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

KEYWORDS: Unmanned Air Vehicle, Track Injection, Telemetry, Imagery Presentation, Global Command and Control System, Center for Interdisciplinary Remotely Piloted Aircraft Studies, Altus

TRANSITION TO ASYNCHRONOUS TRANSFER MODE (ATM): AN IMPLEMENTATION MODEL FOR NPS SOFTWARE METRICS LAB

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With Asynchronous Transfer Mode (ATM), the emergence of a network technology has been experienced that has the potential of satisfying the requirement for a worldwide standard to allow interoperability of information, regardless of the hosts or type of information. Historically, ATM has been advertised as a Wide Area Network (WAN) technology. Recently, ATM has taken on more applications in the local area environment competing with the standard LAN technology, Ethernet. With its ability to accommodate the simultaneous transmission of data, voice, and video, ATM could potentially create a seamless network based on one standard. As a switched-based technology, some of the benefits provided by ATM are dedicated bandwidth per connection, higher aggregate bandwidth, flexible access speeds, reduced network bandwidth cost, reduced network access costs, reduced equipment cost and commitment, and improved management and flexibility. We provide a discussion of the ATM standard, an evaluation of the SML's LAN architecture, and propose three ATM implementation models using the SML that NPS could employ to provide ITM students with practical experience and exposure to this technology. Each model outlines the specifications (i.e., hardware and software) required for implementation.

DoD KEY TECHNOLOGY AREA: Computing and Software

KEYWORDS: Asynchronous Transfer Mode, Software Metrics Lab, Local Area Networks, Campus Backbone

AMPL: AN EXCLUSIVE TECHNOLOGY FOR DECISIONNET

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This thesis describes the design and implementation of an exclusive technology agent for DecisionNet -- a distributed decision support technology marketplace for the World Wide Web. Unlike the independent technologies presently supported by DecisionNet, exclusive technologies require software agents to facilitate interactions between their providers and consumers. The exclusive technology agent described herein would allow use of the AMPL mathematical modeling language through the DecisionNet environment and provide database support for AMPL objects.

An AMPL agent for DecisionNet provides a searchable repository to facilitate sharing and reuse of AMPL objects. It also provides a means for clients to formulate and execute AMPL problems without having to purchase AMPL software or learn the AMPL language.

The data structure described in this thesis has three distinct types of exclusive objects: model schema, dataset, and solver. A complete AMPL problem contains one object of each type. An AMPL agent assists DecisionNet technology providers in the registration, modification, and withdrawal of AMPL objects, and assists DecisionNet consumers in the selection and execution of AMPL problems.

DoD KEY TECHNOLOGY AREA: Computing and Software

KEYWORDS: DecisionNet, Decision Support, World Wide Web, Common Gateway Interface, AMPL, Software Agent, Exclusive Technology

SECURITY PLANNING FOR WIRELESS NETWORKS: DOD CONCERNS

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Wireless networking is a rapidly emerging technology and security must be addressed as it is incorporated into new and existing local area networks (LANs). It is important to know what unique properties of wireless LANs might amplify existing LAN vulnerabilities or introduce new ones.

Wireless transmission techniques, topologies, and vendor offerings were surveyed from a security perspective. Three rating systems were developed to analyze aspects of these survey areas. These areas were then rated using these systems and graphically displayed on Kiviat drawings to show symmetric comparisons of each analysis category.

Frequency hopping spread spectrum (FHSS) transmission technology, cellular topology, and the Jaguar product emerge as the best current approaches available. These results are applied to a case study that examines network wired segment replacement options, wireless segment attacks, and methods to detect an attacker. Current standards offer guidance that dictate how wireless technologies must operate, but do not relate to principles of LAN design. Our study and rating system results provide guidance for creating a network topology. The case study demonstrated that care must be taken in choosing wireless network segments. This work should help system administrators by providing examples of good and bad choices.

DoD KEY TECHNOLOGY AREA: Other (Security for Wireless Networks)

KEYWORDS: Security, Local/Wide Area Networks (LANs), Intranet works

DEVELOPMENT OF THE INFORMATION INFRASTRUCTURE FOR THE MINISTRY OF FOREIGN AFFAIRS OF UKRAINE
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The objective of this thesis is to determine the needs of the Ministry of Foreign Affairs of Ukraine and design an appropriate information infrastructure. Choosing the best solution for this government organization requires an in-depth understanding of the methods and technologies available and the organizational problems and needs in conditions of the deep economical crisis in Ukraine.

This thesis evaluated existing information systems, and reviewed the current architecture and problems. Research includes a detailed analysis of intranet technology, virtual private networks, secure messaging system and the development of a feasible solution for this government organization.

DoD KEY TECHNOLOGY AREA: Command, Control, and Communications

KEYWORDS: Information Infrastructure, Information Technology Management, Intranet, Virtual Private Network, Network Security

NAVAL COMMAND AND CONTROL FOR FUTURE UNMANNED AERIAL VEHICLES
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The primary purpose of this thesis is to examine the requirements of naval command and control for future Unmanned Aerial Vehicles (UAV) and to propose solutions for current limitations.

Currently, UAVs co-exist as a collection of independent systems that have poor interoperability and limited functionality beyond strategic reconnaissance. As UAVs mature, they will increasingly be deployed at the unit level and employed tactically, increasing the need for coordination and the dissemination of information. Command and control systems must evolve to keep pace with this development.

A description of contemporary and proposed UAV systems is presented, and this thesis uses a scenario to illustrate current limitations and develop the requirements for UAV command and control.

DoD KEY TECHNOLOGY AREAS: Air Vehicles, Command, Control, and Communications, Sensors

KEYWORDS: UAV, Reconnaissance, Airborne Sensors, Imagery Dissemination

AN OPERATIONAL INTRANET FOR FIGHTER COMPOSITE SQUADRON THIRTEEN (VFC-13)

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This thesis describes the complete development process of an operational intranet for Fighter Composite Squadron Thirteen (VFC-13), the Naval Reserve's West Coast Adversary Squadron based at Naval Air Station (NAS) Fallon, NV.

The two major elements of research involved designing a simple Web site for the customer and developing a method of fully utilizing GroupWare capabilities to develop a system that would improve information access and dissemination, enhance communication, improve group collaboration, and enhance productivity.

A description of the underlying local area network architecture that supported the intranet is documented, as it provides the framework for hosting the Intranet. In addition, a description of Web site software development and GroupWare functionality is provided.

This thesis describes the prototype development process that was utilized for the intranet from the early stages of determining basic requirements through the completion of the final product. Through close communications with the customer during the prototyping process, the finished product was completed which satisfied the customer's requirements.

DoD KEY TECHNOLOGY AREA: Computing and Software

KEYWORDS: Intranet, Web Site, Web Page, GroupWare, Email, Prototype, Local Area Network, LAN, Naval Aviation, Squadron, VFC-13

AN INTEGRATED INTRANET AND DYNAMIC DATABASE APPLICATION FOR THE INTERNATIONAL PROGRAM OFFICE AT THE NAVAL POSTGRADUATE SCHOOL

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Intranet technologies like web-based databases, groupware and email represent the next major stage in the evolution of computing and it is greatly expected that they will increase the return on information technology investments. Almost every organization can benefit from an intranet or extranet. Some of the major benefits of an intranet can be counted as cost effectiveness, simplified system integration and growth, easy extension into WAN, enhanced security, minimized application development and deployment cost, minimized cost of deploying client – server solutions, minimized network management and support costs.

Since the International Programs Office (IPO) has several computers connected to a LAN and has an IP address, and one of its tasks is to maintain the International Students' records, they should have a good database system that can be accessed by all the users of the office. To solve the inefficiency and ineffectiveness that relates to database system that depends on International Students Assistant, it is recommended that IPO an intranet system with a dynamic database connectivity. Intranet may solve the communication problem to share information within the organization and may provide better services for the other users.

DoD KEY TECHNOLOGY AREA: Computing and Software

KEYWORDS: Intranet, Web-Based Application, Process, Information Systems Design, Internet

THE FUNDAMENTAL RE-THINKING AND REDESIGN OF THE MILITARY PAY DOCUMENT PROCESSING SYSTEM

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All organizations, both private and public, must improve, streamline, and automate their business practices to adjust to rigorous demands of a highly volatile marketplace, austere financial resources, and manpower reductions. This thesis analyzes the potential of business process re-engineering (BPR) to dramatically improve the Military Pay Document Process (MPDP) for the United States Army and the United States Coast Guard financial communities. Based on Nissen's methodology the MPDP is analyzed and three redesign alternatives are developed, which are capable of yielding order of magnitude improvements in cycle time and cost. This thesis includes process simulation and intelligent systems analysis of the Army and Coast Guard's baseline MPDP to generate and evaluate the three redesign alternatives. Simulation runs demonstrate that cycle time and cost can be reduced substantially by redesigning the MPDP. The redesign alternatives take a comprehensive look at transformation enablers and information technology (IT) capable of eliminating the Personnel Administrative Clerks (PAC) and the finance office functions as they pertain to pay transaction processing. The research concludes that the Army and Coast Guard's MPDP can be dramatically improved by eliminating middlemen functions (PAC and finance office) and shortening the value chain using IT along with other transformation enablers.

DoD KEY TECHNOLOGY AREAS: Modeling and Simulation, Other (Business Process Re-engineering)

KEYWORDS: Business Process Re-engineering (BPR), Military Pay Document Process