MASTER OF SCIENCE
IN
SOFTWARE ENGINEERING

DEVELOPMENT OF AN INTERNET INTRUSION PREVENTION TOOL

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This thesis explores the current shortcomings in computer and Internet security, and how the lack of user education in basic security concepts is detrimental to computer and network security. The use of cryptography and potentially expensive technical means to secure systems will fail when one neglects security education of users. This thesis addresses a portion of the security education problem by designing and developing a tool to educate users on the two major successful methods for penetrating a computer system—weak passwords and social engineering. The tool can teach users how to pick good passwords and the steps to take to prevent social engineering attacks. The tool consists of a tutorial and ends with an exam to test user comprehension concerning picking good passwords and preventing social engineering attacks.

KEYWORDS: Computer Security, Social Engineering, Intrusion Prevention

DoD KEY TECHNOLOGY AREA: Computing and Software

COSTS AND BENEFITS OF SOFTWARE PROCESS IMPROVEMENT

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There are numerous problems in DoD software development projects. The ad hoc practices used in the military services and in industry have resulted in unpredictable costs and schedules and low-quality products. This thesis proposes that one solution to these problems is to integrate Software Process Improvement (SPI) activities based on a proven model into software development projects. Both a formal and an informal approach to SPI is discussed. The thesis also describes not only the problems encountered in most software development projects, but also the activities defined in these SPI approaches that are designed to solve these problems. A case study of a military project that has spent several years implementing SPI activities based on Software Engineering Institute's (SEI) Capability Maturity Model (CMM) is presented. The SPI activities were implemented in an effort to deliver a high quality product with high reliability while maintaining a high level of control of costs and schedule. This project has succeeded in its goals and the costs and benefits of the project's efforts are presented.

KEYWORDS: Software Process Improvement, SmartNet, Capability Maturity Model, Rapid Application Development

DoD KEY TECHNOLOGY AREA: Computing and Software

IMPLEMENTATION OF REQUIREMENTS TRACING IN THE PROTOTYPING ENVIRONMENT UTILIZING PROTOTYPING DESCRIPTION LANGUAGE (PSDL)

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The prototyping description language (PSDL), a key component of Computer-Aided Prototyping (CAPS), is a language designed for clarifying the requirements of complex real-time systems. Through the use of prototyping, the functional requirements for an embedded system can be rapidly validated to preclude inefficient usage of resources. This research has concentrated on the software engineering area of extending the PSDL data type and Ayacc source to support requirements tracing. Currently, CAPS doesn't use requirements tracing so the extensions just described are a significant step in that direction. This thesis includes an investigation into the potential use of an OODBMS which will interface with ADA95 and be utilized to store the list of requirement ids for each PSDL component.

Through the ADA95 program implementation and extension to the capabilities of the PSDL data type and Ayacc source, the programmer/designer has automated documentation support which will link the requirement ids to their respective component names. This research demonstrates there is no ADA95 OODBMS at the current time and therefore the requirement ids are stored in a file. There is an ADA95 OODBMS being developed at Lockheed Martin under the project name of FIRM. Also demonstrated is the connection of the unique list of requirement ids in the design phase with their respective PSDL components, so that the link between the design stages and analysis phase support for the modules is more completely established.

KEYWORDS: PSDL, ADA95, AYACC, OODBMS

DoD KEY TECHNOLOGY AREA: Other (Software Engineering)