

### Title of Paper

## Static and Dynamic Analysis of an Internet Security System

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### Presenter

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### Instructional Level

Introductory     Intermediate     Advanced

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### Target Group

assurance managers and test project leaders

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### Keywords

- how to test security functions
  - how to create an XML test design
  - how to specify security test cases
  - how to document a security test
  - how to evaluate system security
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### Abstract

This presentation is an experience report on the testing of an e-government security system within the scope of a EU sponsored project – Access eGov – for the networking of local governments in Poland and Slovakia. The goal of the testing project was to evaluate the security system CSAP – Communication, Security, Authentication and Privacy, an adaptable security component for e-government systems developed at the University of Essen against the ISO-9126 standard for evaluating software products. The project was carried out under the auspices of the Wirtschaftsinformatik chair of Professor Günther Pernul at the University of Regensburg.

The project started in Sept. 2006 and was concluded in February 2007.

To begin with the tester analyzed the requirements document using the Text Analysis tool for parsing German texts and extracting test metrics and test cases from them. After that the tester proceeded to conceive a test plan according to the ANSI-IEEE standard 829 and to select the metrics with which the CSAP system could be evaluated. He then generated a test design based on the same standard in the form of an XML document structured by test execution step. The greatest effort went into specifying the test cases and documenting them in an Excel table. Parallel to this activity the Java source code of 73 classes with 2300 statements was statically analyzed with the source analysis tool JavAudit, which checks the code against the coding rules and measures the code size, complexity and quality. The metrics extracted from the Java code were then transposed on to the ISO 9126 metrics to evaluate the static properties of the software.

A test environment had to be set up to simulate the e-government components which would be using the access control component.

This was done by developing a series of Java test drivers, one for every security transaction type. The test drivers accesses the test case table to generate the necessary test data on the fly. In addition, the database of access rights was initialized. Prior to starting the test, the Java code was instrumented by the dynamic analyzer tool TestDocu. A probe was inserted into every method to record both the number and times of execution. The probes called a Java test monitor to record the

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method names and time of execution in a trace file. By analyzing the trace files the methods could be assigned to the 62 test cases run. By the end of the test a test coverage of 74% method coverage had been reached and 6 errors had been detected of which two were critical. The metrics captured through the dynamic analysis were then carried over into the ISO-9126 model to achieve a final evaluation of the security system. The result of the evaluation was that the static quality of the product was sufficient but the reliability was not ripe enough for productive use in an e-government environment.

#### Outline

1. Access E-Government project background
2. Role of the CSAP security component
3. Analyzing the security requirements
4. Planning the test with ANSI-IEEE 829
5. Designing the test with XML
6. Specifying the test cases with Excel tables
7. Static Analysis of the Java source code with JavAudit
8. Dynamic Analysis of the security functions with TestDocu
9. Evaluating the test results according to ISO-9126

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#### Biography

Harry M. Sneed (MPA), Lehrbeauftragter for Software Engineering at the Universities of Passau and Regensburg is responsible for quality assurance of the EU Access-Egov project. He established the first commercial software testing laboratory together with Dr. Ed Miller in Budapest in 1978. Since then he has participated in at least 14 test projects, published over 60 articles on testing and written 4 books on the subject.

His latest book – Der Systemtest – appeared in 2006.

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