NISTIR 5590

Proceedings Report of the International Invitation Workshop on Developmental Assurance

June 16 - 17, 1994
Turf Valley Country Club
Ellicott City, MD

P. Toth

U.S. DEPARTMENT OF COMMERCE
Technology Administration
National Institute of Standards
and Technology
Gaithersburg, MD 20899

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January 1995

U.S. DEPARTMENT OF COMMERCE
Ronald H. Brown, Secretary

TECHNOLOGY ADMINISTRATION
Mary L. Good, Under Secretary for Technology

NATIONAL INSTITUTE OF STANDARDS
AND TECHNOLOGY
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Executive Summary

Ninety eight participants from the US, EC, Canada, and Japan representing government agencies, both defense and civil, private corporations, evaluators, users, and vendors of trusted products met to discuss the concept of developmental assurance.

Very few representatives from the vendor community participated in the workshop. This is an area of concern. It was suggested that a second workshop be held with only vendors in attendance.

The majority of the participants felt that the concept of developmental assurance was valid. However, the participants suggested a cautiously optomistic approach to the implementation of a developmental assurance scheme.

The participants thought developmental assurance is a promising concept but it is as yet unproven. A great deal of study is needed to validate the concept.

The participants recommended that all future developmental assurance work take place on the international level. The results of any developmental assurance scheme should be exchangeable, repeatable and provide reciprocity. It was recommended that an international working group for developmental assurance be established.

The developmental assurance concept must first be proven at the lower levels of trust. Developmental assurance may provide a level of assurance that approaches the current C2/E2. If this is possible, developmental assurance may then be extended to the higher levels of trust.

Developmental assurance may not replace third party evaluations completely but may help to speed up the evaluation process. Developmental assurance in combination with third party evaluation may provide a useful level of assurance in a more reasonable period of time.

Introduction

The International Invitational Workshop on Developmental Assurance was held June 16-17, 1994 at the Turf Valley Hotel and Country Club in Ellicott City, Maryland. The Workshop was sponsored by the National Institute of Standards and Technology (NIST), the National Security Agency (NSA), the Canadian Communications Security Establishment (CSE), and the European Commission (EC). Ninety eight participants representing government agencies, private corporations, evaluators, purchasers and vendors of trusted products took part.

Formulation of the Developmental Assurance Concept

In November 1993, a meeting of senior execuitves from NIST, NSA, CSE, and the EC was held at NIST. The senior executives discussed various alternatives to the third party evaluation scheme. Third party evaluations tend to be expensive and resource consuming. The senior executives agreed that some assurrance may be gained from reliance on the development process. If a vendor was to follow and document a particular development method, a level of assurance may be gained. That is not to say that the governments would require that a vendor follow a particular development process but that the process followed by a vendor be documented and repeatable. The vendor would demonstrate the security enhancing features of the process used during development. Therefore, a level of assurance could be gained from the development process itself.

The senior executives agreed that developmental assurance may provide an adequate level of assurance for some users, particularily those in the commercial and civil sectors. It was also agreed that while developmental assurance may approach a level of assurance close to C2/E2 that a great deal of research needs to be done.

Call for Papers

In January 1994 a call for papers was issued requesting thought on developmental assurance. Seventy-seven papers were recieved and the authors were invited to participate in the Developmental Assurnace Workshop.

The papers received covered a wide variety of topics including:

Approaches to Developmental Assurance
Operationsal perspectives
Commercial Products
Tactical Systems
The Information Highway
Security Engineering Capability Maturity Model

Common Criteria
Relationship to Evaluation
Quality Assurance

Although the accepted papers are not published in these proceedings a list of the papers is in contained in Appendix A.

Format of the Workshop

The papers received were of an extremely diverse nature and reflected individual perspectives, environments and experiences. It was clear from the papers that there was a disparate understanding of the definition of developmental assurance. The workshop participants needed to clearly define their understanding of the developmental assurance concept. The workshop committe organized the workshop into areas for discussion. These areas included:

Metrics - How can developmental assurance be measured? How can we establish useful metrics that are meaningful to the security community in the civil, defense and private sectors?

Process - What process could be used to measure developmental assurance? Could SEI or the Security Engineering Capability Maturity Model be used? Are there other approaches which may be appropriate?

Tradeoffs - How does developmental assurance relate to other methods of gaining assurance such as evaluation?

Assurance based on "people" - Can some level of assurance be gained based on the people involved? Does developmental assurance mean "certifying" in some way the people that perform the devlopment OR does it mean "certifying" the development process itself OR some combination of the two. How does quality assurance play into developmental assurance? Does quality add to the security of a product or system in any meaningful way?

Low/High Assurance - Are the needs the same? At what current level of assurance (C2?, E2?) would developmental assurance be useful/meaningful? Is developmental assurance appropriate at the higher assurance levels? Could developmental assurance be a building block towards higher assurance level?

The attendees were randomly assigned to small working groups in which they discussed the above topics.

Conclusions & Recommendations

General Summary

In general, the majority of the workshop participants agreed that the concept of developmental assurance is valid and potentially valuable. Use of notions described in the developmental assurance concept could provide benefits to the overall evaluation process.

Developmental assurance must be further investigated at the international level. The Workshop participants were very concerned about individual countries moving ahead on this concept without harmonization. Several participants stated the need to work closely together as an international community.

Potential Benefits

The Workshop attendees noted several potential benefits from the use of a developmental assurance scheme. Evaluations of both products and systems would be possible under a developmental assurance scheme. Developmental assurance may result in major cost reductions for third party evaluations.

The workshop participants also believed that the use of developmental assurance may result in the acceleration of third party evaluations. If developmental assurance can help to provide the necessary documentation, this may in turn help to speed up the evaluation process conducted by a third party.

Developmental assurance may also be useful in cutting the cost and time required for the accreditation process. The outputs of developmental assurance may provide some very useful information to certifiers and accreditors.

By shifting some of the evaluation workload to organizations performing developmental assurance, evaluations may be completed in a more timely manner. Developmental assurance may also be very useful in causing improvements to re-evaluation, and maintenance of evaluation ratings.

It was suggested that the use of developmental assurance as a alternative to third party evaluations may reduce or eliminate misleading evaluation rating claims. Such claims as "designed to meet" and "C2-like" can be misleading and confusing the to consumer.

A scheme which encompasses developmental assurance will broaden the availability of security expertise and practice. Evaluation expertise will be spread to other organizations outside the government agencies. This may help to foster a wider community of computer security professionals

Developmental assurance may also result in greater availability of low assurance evaluated products, and a consequent increase in awareness and demand. If more organizations have the expertise to perform evaluations then the number of evaluated products will increase.

Levels of Assurance

Precise bounds of applicability and achievable levels of developmental assurance need further investigation. Developmental assurance should be introduced with lower level goals and, if successful, migrate upwards to the higher levels of trust.

Relationship to Third Party Evaluations

The combination of developmental assurance products, and developmental assurance with third party evaluation products should be feasible, but requires further study. The effect on and relationship with liabilities and insurance requires study.

Effect on competition may have benefits and disadvantages.

The developmental assurance scheme must fit naturally into current commercial activity and operations, and align with (and anticipate) industry trends. Although third party evaluation by Commercial Licensened Evaluation Facilities (CLEFs) was seen as providing improved throughput, it was not seen as responding to general commercial needs for products

It was generally agreed that there would be continuing requirement for third party evaluation. Developmental assurance would not replace third party evaluations but serve as a portion of the evaluation process. Use of Developmental assurance could potentially reduce the length of time required for a third party evaluation.

Proposed Model

The Workshop Participants envisioned a four tiered approach to operating a developmental assurance scheme.

First, an international body will set standards and oversee the operation of the national bodies.

Second, the national bodies will regulate the operation of licensing agents in their individual areas.

Third, the Europeans CLEFs could form the basis of a model for a licensing agent. The CLEFs under this model, would be authorized to approve, license and audit the Developmental assurance process of vendor and potentially system integrators.

Fourth, the vendors and integrators would develop and deliver products, components and systems that carry their evaluation marking or warranty. This might take the form of a multi-factor evaluation vector rather than a simple passed indicator.

Additionally a mechanism for appeals and interpretations would be developed. The appeal process could operate either under the national or international schemes. The process of interpretation of developmental assurance reqirements must take place at the international level in order to prevent conflicting interpretations.

Criteria Base

There was a great deal of discussion about the criteria to be used for developmental assurance. It was the common view that a criteria must be established, possibly through the Common Criteria.

There are many specific requirements for developmental assurance that may need to be handled in separate documentation.

Possible Methodologies and Approaches

The developmental assurance workshop did not result in the establishment of a single developmental assurance methodolgy or approach. Rather it explored a number of valid methodologies and approaches. It was suggested by the workshop participants that a combination of these approaches into a new framework may result in a useful methodology. This combination of valid approaches, perhaps with the development of some new methods, could provide an extremely effective developmental assurance framework.

The framework for developmental assurance must cover all stages and aspects of the design, implementation and delivery processes.

There is a considerable legacy of relevant tools and methodologies exist which should provide a solid basis for developmental assurance. These include:

- Capability Maturity Models
- ISO 9000-3
- Formal methods
- Informal methods (object oriented etc.).

Developmental assurance methods must support some form of metric to assess performance and quality improvement.

General Issues

The participants expressed concern about a number of general developmental assurance issues. The level of committment from the government agencies was unclear. The roles the government agencies were to take in the development of a developmental assurance scheme was also unclear.

The participants were also concerned about the inital costs of implementing a developmental assurance scheme. Costs of required resources from both the government agencies and the vendors were discussed. Some participants felt that a developmental assurance scheme would place a heavy burden on the vendors. There was also some discussions about the demonstrable trustworthiness of the vendors. Some particpants felt that it would not be acceptable to simply rely on the word of the vendor and that a third party review of vendor claims would always be required.

The level of detail required for both the scheme and the vendor documentation was discussed. A great deal of guidance documentation will be required.

Since there were very few vendors in attendance, the commitment to a developmental assurance scheme by the vendors was questioned. It was unclear whether or not the vendors would accept a developmental assurance scheme.

A lengthy discussion about legal liabilities and insurance coverage took place during the workshop.

Recommended Actions

The North American and European sponsors will reflect on the results of the workshop, and consider further action. It was suggested that an international working group be formed to further explore the developmental assurance concept.

A significant number of participants indicated that they would be able to provide further support for developing the ideas of the workshop.

The opinion of the vendors and system integrators not represented at the workshop should be actively sought by the sponsors, perhaps through an additional workshop. Success of a developmental assurance scheme will greatly depend on getting support from the major vendors and integrators.

Appendix A

Papers Received from the United States

Some Reflection on Development Assurance

Susan Rose Childers
Computer Sciences Corporation
Hanover, Maryland

Establishing a Unified Framework for Expressing Developmental Assurance Requirements in the Information Technology Security Evaluation Common Criteria

Ron S. Ross, Terry Mayfield, Stephen R. Welke, and John M. Boone
Institute for Defense Analyses
1801 N. Beauregard Street
Alexandria, VA 223311-1772

Specification for a Unified Standard: Integration of the Common Criteria with the ISO 9000-3 Standard

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Summary Paper -- Product Assurance: An Operational Perspective

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The New Alliance: Gaining on Security Assurance

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Position Paper for the International Workshop on Developmental Assurance

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Quality Management Systems Support Trusted Software

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Developmental Assurance for Commercial Products

Steven B. Lipner
Trusted Information Systems, Inc.
Glenwood, MD

Application of Trusted Technology in the Development of Tactical Systems

Diane M. Bishop
Computer Sciences Corporation
1301 Virginia Drive, Fourth Floor
Ft. Washington, PA 19034

The International Information Highway: Its Impact on Security and The Assurance Question

Developmental Assurance: Its Nature, Need, and Means

Guy King
Computer Sciences Corporation

Acceptance of the Security Engineering Capability Maturity Model

Captain Julie L. Connolly, USAF
INFOSEC Systems Engineering Office
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An International Red Team for Information Technology Security

Wilson F. Engel, III, Ph.D.
Research Director
INRI

Position Paper on Developmental Assurance

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Trade-Offs in Establishing a Software Process Security Standard

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Development Assurance versus Evaluation Assurance: What can really be gained?

Noelle McAuliffe
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An Organizational Approach to Developing Quality Assurance Methods for Gaining Security Assurance in t Electric Utility Industry

Art Maria
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Technical and Policy Position on Developmental Assurance

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Developmental Assurance and Software Quality Assurance, A Common Ground

Jennie Benson
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Position Paper on Developmental Assurance for Security Products

Ranwa Hadda and Deborah Downs
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Additional Considerations for Reducing the Dependency upon Evaluation Assurance through Development Assurance

Donald Schmidt
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Position Paper on the Use of Developmental Assurance to Replace Evaluation

Richard Allen, Anthony Datel
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Evaluating Systems Composed of Certified Elements

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DoD Information Technology Security Certification and Accreditation Process (DITSCAP)

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Process Assurance

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An Assurance Taxonomy

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Security Engineering Capability Maturity Model: A Method for Assessing Process Assurance

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Assurance is an N-Space (Where N is Hopefully Small)

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Linking Digital Signatures with Manual Signatures

Viktor E. Hampel, James P. Craft, and Robert D. Smith, Jr.
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Fax: 703.681.0165

Building Security and Quality into System Architectures

John Voltmer
The Solution Center
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Position on Using Quality Assurance Methods to Gain Security Assurance

Sue LeGrand, MS, CISSP
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Kemah, TX 77565

Electronic Labeling of Digital Products (Proposal for an International Protection Standard for Digital Products)

Victor E. Hampel
Consultant and Senior Technical Advisor to the
Office of the Secretary of Defense (AT&T/DATDC)
5109 Leesburg Pike, Suite 701
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Position Paper Concerning the Identification and Development of the Requisite Processes and Methods for Developmental Assurance

Robert A. Tannert
Galaxy Computer Services, Inc.
for the Department of Energy

Supply and Demand Security

Marshall D. Abrams, Jay J. Kahn, Lester J. Fraim, and James G. Williams
The MITRE Corporation

Contingency Plans -- Murphy was an Optimist

Jay J. Kahn, Marshall D. Abrams, Lester J. Fraim, and James G. Williams
The MITRE Corporation

How Do You Decide How Much Assurance is Enough?

Marshall D. Abrams, Jay J. Kahn, Lester J. Fraim, and James G. Williams
The MITRE Corporation

Developmental Assurance Benefits of the Capability Maturity Model

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The Need for 'Personal Assurance' of IT Security Specialists

Richard C. Koenig, Program Director
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The ISSA-Sponsored Committee to Develop and Promulgate Generally accepted System Security Principles (GSSP)

Will Ozier
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San Francisco, CA 94102
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Papers Received from Canada

Improving Security Through Vendor Participation -- A Position Paper

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Position Paper for International Invitational Workshop on Developmental Assurance

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Developmental Assurance and Risk Management

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The Role of ISO 9000 -- Quality Assurance in Providing Security Product Assurance

Terry Fletcher, B. Eng., M. Sc
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Developmental Assurance a Developmental Process

Kimberly Dwight Greenizan
INFOSEC Engineering
Computing Devices Canada
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Developmental Assurance in Product Evaluation

J. P. Hopkinson

Unification of Security Modeling Techniques

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Position Paper for International Invitational Workshop on Developmental Assurance

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The Use of Risk Assessment to Select an Appropriate Product Development Process

Tim Moses, Ph. D.
AEPOS Technologies Corporation
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Developmental Assurance Proposal

Andrew Robison
CSE, Canada

The Development of Functionality, Assurance, and Evaluation Complexity and Suggestions for Simplification

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Trust through Assurance (Assurance Through Experience)

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B1 Security Verification & Validation: 3 DAYS VERSUS 3 YEARS

Peter P.C.H. Kingston, B.Sc, ISP, CISSP
The Kingston Group & Associates Limited

Papers Received from Europe

IBAG Contribution to International Invitational Workshop on Development Assurance

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Potential Contribution of Conformance Testing Methods to Security Evaluation

Roy Cadwallader,
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International Invitational Workshop on Developmental Assurance -- Summary Paper

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No title
Subject: The BT System Security Evaluation and Certification Scheme

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Paper for Vendor Assurance Workshop: A Total Package on Information Security

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Developmental Assurance, the Need and a Possible Framework

Per Hoving,
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Security Evaluation in an OSI Context

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An Integrative Approach and a Proposal for a Metric

Dr. Heinrich Kersten
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Tuning Process Capability to Assure Required Security Levels

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Position Paper on Developmental Assurance

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To Build an Affordable Software Engineering Environment for the Development of Secure Systems

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Security Quality through Security Engineering Methodology

Michèle Zurfluh-Vallant, Jean-Marc Lermuzeaux
Alactel Alsthom Recherche

Response to Call for Papers -- International Invitational Workshop on Developmental Assurance

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Statement of Position on Self Certification in ITSEC

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ISO 9000 -- Quality Standard Based Network Services Security Architecture

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The Place of Developmental Assurance

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Summary Paper for International Workshop on Development Assurance

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Practical Experience With Evaluation Assurance of Commercial Security Products

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International Harmonization of Information Security Assessments

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Security Evaluation, Quality Assurance and Conformance

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Summary Paper for the Developmental Assurance Workshop

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International Invitational Workshop on Developmental Assurance - A Position Paper on Vendor Assurance

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Developmental Assurance, the Need and a Possible Framework

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