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# Guidelines for the Verification and Validation of Expert System Software and Conventional Software

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### **ABSTRACT**

This volume contains all of the technical references found in Volumes 1-7 concerning the development of guidelines for the verification and validation of expert systems, knowledge-based systems, other AI systems, object-oriented systems, and conventional systems.

AAAI-90, *Workshop Notes for the AAAI-90 on Knowledge Based Systems Verification, Validation and Testing*, The MIT Press, Cambridge, Massachusetts 02142, July 29, 1990.

Abdel-Hamid, T.K. and S.E. Madnick, *Lessons Learned from Modeling the Dynamics of Software Development*, Communications of the ACM, Vol. 32, No. 12, December 1989.

Ackerman, F.A., L.S. Buchwald, and F.H. Lewski, *Software Inspections: An Effective Software Verification Process*, IEEE Software, Vol. 6, No. 3, May 1989.

ACM SIGCHI, *CHI (Computer-Human Interaction) Conference Proceedings on Human Factors in Computing Systems*, sponsored by the ACM SIGCHI, Austin, Texas April 30-May 4, 1989 pp. 265-268.

Advisory Committee on Nuclear Safety, *ACNS-4, Recommended General Safety Requirements for Nuclear Power Plants*, Advisory Committee of the Atomic Energy Control Board of Canada - Secretariat, Ottawa, Canada K1P 5S9, June 1983.

Alagić, S., *Object-Oriented Database Programming*, Springer-Verlag, New York, New York, 1988.

Aldridge, J., *A Position Paper on Validation of Knowledge-based Systems*, Validation and Testing of Knowledge-Based Systems Workshop Proceedings, AAAI-88, The MIT Press, Cambridge, Massachusetts, August 1988.

Alford, M., *SREM At The Age of Eight: The Distributed Computing Design System*, Computer, 18 (4), pp. 36-46, 1985.

Alford, M., *A Requirements Engineering Methodology for Real-Time Processing Requirements*, IEEE Transactions on Software Engineering, SE-3(1), pp. 60-69, 1977.

American Nuclear Society Standards Committee and the Nuclear Power Engineering Committee of the Institute of Electrical and Electronic Engineers, Inc. Power Engineering Society, *American National Standard Applications Criteria for Programmable Digital Computer Systems in Safety Systems of Nuclear Power Generating Stations*, ANSI/IEEE-ANS-7.4.3.2, IEEE Service Center, Piscataway, New Jersey, 08554, 1982.

Andert, E.P., and C. Frasher, *Verifiable, Autonomous Satellite Control System*, IEEE Aerospace Applications Conference Digest, IEEE Service Center, Piscataway, New Jersey, 08554, February 1989.

Andrews, J.D., *Formal Methods in Computing: A Position Paper*, Position paper for FM-89, Workshop on Formal Methods, July 23-27, 1989, Halifax, Nova Scotia.

Andriole, S.J., and G.W. Hopple, *Defense Applications of Artificial Intelligence*, Chapter 6, pp. 111-138, Lexington Books, Lexington, Massachusetts, 1988.

ANSI/ANS-10.4-1987, *Guidelines for the Verification and Validation of Scientific and Engineering Computer Programs for the Nuclear Industry*, American Nuclear Society, 555 North Kensington Ave., La Grange Park, Illinois, 60525, May 13, 1987.

ANSI/IEEE ANS-7-4.3.2-1982, *Application Criteria for Programmable Digital Computer Systems of Nuclear Power Generating Stations*, American Nuclear Society, 555 North Kensington Ave., La Grange Park, Illinois, 60525, July 6, 1982.

ANSI/IEEE 1008-1987, *IEEE Standard for Software Unit Testing*, IEEE Standards Board, New York, New York, American Nuclear Society, 555 North Kensington Ave., La Grange Park, Illinois, 60525, 1986.

ANSI/ANS-3.5-1985, *American National Standard Nuclear Power Plant Simulators for Use in Operator Training*, American Nuclear Society, 555 North Kensington Ave., La Grange Park, Illinois, 60525, October 25, 1985.

ANSI/IEEE 1012-1986, *Software Verification and Validation Plans*, American Nuclear Society, 555 North Kensington Ave., La Grange Park, Illinois, 60525, November 14, 1986.

ANSI/IEEE 729-1983, *Glossary of Software Engineering Terminology*, American Nuclear Society, 555 North Kensington Ave., La Grange Park, Illinois, 60525, February 18, 1982.

ANSI/IEEE 830-1984, *IEEE Guide to Software Requirements Specifications*, IEEE Standards Board, New York, New York, American Nuclear Society, 555 North Kensington Ave., La Grange Park, Illinois, 60525, 1984.

ANSI/IEEE 1016-1987, *Recommended Practice for Software Design Description*, IEEE Standards Board, New York, New York, American Nuclear Society, 555 North Kensington Ave., La Grange Park, Illinois, 60525, 1987.

ANSI/IEEE 828-1983, *Software Configuration Management Plans*, American Nuclear Society, 555 North Kensington Ave., La Grange Park, Illinois, 60525, June 24, 1983.

ANSI/IEEE 1042-1987, *Guide to Software Configuration Management*, American Nuclear Society, 555 North Kensington Ave., La Grange Park, Illinois, 60525, September 12, 1988.

ANSI/IEEE 829-1983, *Software Documentation*, American Nuclear Society, 555 North Kensington Ave., La Grange Park, Illinois, 60525, February 18, 1983.

Antoniou, G., and V. Sperschneider, *On the Verification of Modular Logical Knowledge Bases*, Universitat Osnabruck, Germany.

Archinoff, G.H., R.J. Hohendorf, A. Wassyng, B. Quigley, and M.R. Borsch, *Verification of the Shutdown System Software at the Darlington Nuclear Generating Station*, Presented at The International Conference on Control & Instrumentation in Nuclear Installations, 8-10 May 1990, Glasgow, United Kingdom.

Archinoff, G.H., and R.A. Brown, *Licensing Safety Critical Software*, Canadian Nuclear Society Bulletin, Vol. 11, No. 2, Summer 1990.

Armed Forces Communications and Electronics Association, *Command & Control (C2) Systems Acquisition Study: Final Report*, September 1, 1982, Department of Defense, Alexandria, Virginia.

Arthur, J.D., R.E. Nance, E.V. Dorsey, and J. Henry, *Software Quality Measurement: Validation of a Foundational Approach*, Final Report, Year One, Systems Research Center and The Department of Computer Science, Virginia Tech, Blacksburg, Virginia, May 1, 1991.

Ascent Logic Corporation, *Requirements Driven Design*, RDD-100, Ascent Logic Technology, 180 Rose Orchard Way, San Jose, California, 95134, 1991.

ASME NQA-2a-1990 Part 2.7, *Quality Assurance Requirements of Computer Software for Nuclear Facility Application*, The National Institute of Standards and Technology Computer Systems Laboratory, Gaithersburg, Maryland 20899, 1990.

Asmis, G.J.K., H.O. Tezel, and J.D. Kendall, *The Canadian Process for Regulatory Approval of Safety Critical Software in Nuclear Power Reactors*, Presented at the International Conference on Control & Instrumentation in Nuclear Installations, 8-10 May 1990, Glasgow, United Kingdom.

Atkinson, Sr., J.H., *Test and Evaluation of Command, Control, Communications and Intelligence Systems*, ITEA Journal, Vol. 11, No. 1, pp. 40-44.

Atomic Energy Control Board, *Software Engineering: Current and Future Activities*, Atomic Energy Control Board, P.O. Box 1046, Ottawa, Ontario, K1P 5S9, Canada, 1990.

Atomic Energy Control Board, *Software Safety*, Atomic Energy Control Board, P.O. Box 1046, Ottawa, Ontario, K1P 5S9, Canada, November 1990.

Atomic Energy Control Board, *CANDU Computers, Controllers, and Software Events*, Atomic Energy Control Board, P.O. Box 1046, Ottawa, Ontario, K1P 5S9, Canada, 1990.

Atomic Energy Control Board, *Computer Based Systems in CANDU POWER REACTORS*, Atomic Energy Control Board, P.O. Box 1046, Ottawa, Ontario, K1P 5S9, Canada, 1990.

Atomic Energy Control Board, *Proposed Regulatory Guide: Requirements for the Safety Analysis of Candu Nuclear Power Plants*, Atomic Energy Control Board, P.O. Box 1046, Ottawa, Ontario, K1P 5S9, Canada, June, 1980.

Ayel, M., and L. Vignollet, *Automatic Building of Test-Samples for Validating Knowledge Based Systems*, Verification, Validation and Testing of Knowledge-Based Systems Workshop Proceedings, IJCAI-89, Morgan Kaufmann Publishers, Inc. Palo Alto, California 94303, August 1989.

Bachant, J., *Validating and Testing XCON*, Validation and Testing of Knowledge-Based Systems Workshop Proceedings, AAAI-88, The MIT Press, Cambridge, Massachusetts 02142, August 1988.

Bahill, A.T., M. Jafar, and R.F. Moller, *Tools for Extracting Knowledge and Validating Expert Systems*, Proceedings of the 1987 IEEE International Conference on Systems, Man and Cybernetics, IEEE Service Center, Piscataway, New Jersey 08854, October 1987.

Bahill, A.T., *Verifying and Validating Personal Computer-Based Expert Systems*, Prentice-Hall, Englewood Cliffs, New Jersey, 1991.

Baltimore Gas and Electric Company, *A-85-11A, Tropical Report - RETRAN Computer Code Reactor System Transit Analysis Model Qualification*, Baltimore Gas and Electric Company, January 31, 1986.

Barker, V.E., and D.E. O'Connor, *Expert Systems for Configuration at Digital: XCON and Beyond*, Communications of the ACM, Vol. 32, No. 3, March 1989.

Barnes, M., P. Bishop, B. Bjarland, G. Dahll, D. Esp., J. Lahti, H. Valisuo, and P. Humphreys, *Software Testing and Evaluation Methods (The STEM Project)*, Technical Report, OECD Halden Reactor Project, HWR-210, The Institutt for Energiteknikk, Halden, Norway, May 1987.

Barnes, M., P. Bishop, B. Bjarland, G. Dahll, D. Hufton, and H. Valisuo, *Software Testing and Evaluation Methods Final Report on the STEM Project*, Technical Report: OECD Halden Reactor Project, HPR-334, The Institutt for Energiteknikk, Halden, Norway, May 1988.

Barnes, M., P. Bishop, M. Brewer, P. Bradley, G. Dahll, F. Ross, and T. Sivertsen, *Safety Assessment of Programs (The SAP Project)*, Technical Report: OECD Halden Reactor Project, HWR-269, Institutt for Energiteknikk, Halden, Norway, January 1990.

Barnes, M., P. Bishop, B. Bjarland, G. Dahll, D. Esp, P. Humphreys, J. Lahti, S. Yoshimura, A. Ball, O. Hatlevold, *PODS -- The Project on Diverse Software*, Halden Reactor Project Report, HPR-323, 1985.

Barrett, B.W., *A Software Quality Specification Methodology for Knowledge-Based Systems*, Knowledge Based cation, Validation and Testing, Workshop Proceedings, AAAI-90, The MIT Press, Cambridge, Massachusetts 02142, July 1990.

Barrett, B.W., *A Hypothetical Application of the Statistical Modeling and Estimation of Reliability Functions for Software (SMERFS) to Knowledge-Based Systems (KBSs)*, Expert Systems with Applications, Special Issue: Verification and Validation of Knowledge-Based Systems, Vol. 1, No. 3, pp. 281-289, 1990.

Barrett, B.W., *Software Reliability Models: Can They be Applied to Expert Systems?* Verification, Validation and Testing of Knowledge-Based Systems, Workshop Proceedings, IJCAI-89, Morgan Kaufmann Publishers, Inc., Palo Alto, California 94303, August 1989.

Bartlett, E.B., and R.E. Uhrig, *Nuclear Power Plant Status Diagnostics Using an Artificial Neural Network*, Nuclear Technology, Vol. 97, March 1992.

Bartschat, S.J., *Test Strategies for Expert System Applications*, Presented at the IBM Testing Interdivisional Technical Liaison (ITL) Meeting, August 1990.

Basili, V., and D. Weiss, *Evaluation of a Software Requirements Document by Analysis of Change Data*, Presented at the Fifth International Conference on Software Engineering, Computer Society Press of IEEE, Washington, D.C., IEEE Service Center, Piscataway, New Jersey 08854.

Batarekh, A., A.D. Preece, A. Bennett, and P. Grogono, *Specifying an Expert System*, Expert Systems with Applications, 2(3), 1991.

Baum, L.S., D.B. Shema, J.H. Boose, and J.M. Bradshaw, *Acquiring and Verifying Control Knowledge for a Blackboard System*, Verification, Validation and Testing of Knowledge-Based Systems Workshop Proceedings, IJCAI-89, Morgan Kaufmann Publishers, Inc., Palo Alto, California 94303, August 1989.

Becker, L.A., P.G. Green, and J. Bhatnager, *Evidence Flow Graph Methods for Validation and Verification of Expert Systems*, Worcester Polytechnic Institute, Worcester, Massachusetts, Contract NAG1-809, July 1989.

Becker, L., J. Duckworth, P.E. Green, B. Michalson, D. Gosselin, K. Nainani, and A. Pease, *Translating Expert System Rules into ADA Code with Validation and Verification, Final Report*, Worcester Polytechnic Institute, Worcester, Massachusetts 01609, August 1990.

Becker, L.A., P.E. Green, R.J. Duckworth, J. Bhatnager, and A. Pease, *Evidence Flow Graphs for VV&T*, Verification, Validation and Testing of Knowledge-Based Systems, Workshop Proceedings, IJCAI-89, Morgan Kaufmann Publishers, Inc., Palo Alto, California 94303, August 1989.

Becker, L., J. Duckworth, P. E. Green, and A. Khanna, *Translating Expert System Rules into ADA Code with Validation and Verification [KRAM 2-1], Final Report*, Worcester Polytechnic Institute, Worcester, Massachusetts, 01609, March 1991.

Beizer, B., *Software Testing Techniques*, Van Nostrand Reinhold, New York, New York, 1990.

Bellman, K.L., and D.O. Walter, *Analyzing and Correcting Knowledge-based Systems Requires Explicit Models*, Validation and Testing of Knowledge-Based Systems Workshop Proceedings, The MIT Press, Cambridge, Massachusetts 02142, AAAI-88, August 1988.



Bellman, K.L., *Testing, Verifying and Validating Autonomous Systems: Big Plans for Expert Systems and Big Challenges for Us*, Knowledge Based Systems Verification, Validation and Testing Workshop Proceedings, AAAI-90, The MIT Press, Cambridge, Massachusetts 02142, July 1990.

Bellman, K.L., *Testing and Evaluating Knowledge-Based Systems: There's a Lot We Can Do Now*, AAAI, The MIT Press, Cambridge, Massachusetts 02142, January 1989.

Bellman, K.L., *The Modeling Issues Inherent in Testing and Evaluating Knowledge-Based Systems*, Expert Systems with Applications, Special Issue: Verification and Validation of Knowledge-Based Systems, Vol. 1, No. 3, pp. 199-215, 1990.

Beltracchi, L., *Expert Systems and Nuclear Safety*, Proceedings of the American Nuclear Society 1990 Winter Meeting, The American Nuclear Society, La Grange Park, Illinois, November 11, 1990.

Beltracchi, L., *Overview of Computer Standards and Tools in the European Nuclear Industry*, Presentation at the JTEC Workshop on Assessment of European Nuclear Controls and Instrumentation, National Science Foundation, Washington, D.C., January 31, 1991.

Beltracchi, L., *A Framework for a Direct Perception/Direct Manipulation Nuclear Power Plant Console*, U.S. Nuclear Regulatory Commission, The NRC Public Document Room, 2120 L Street, N.W., Lower Level, Washington, D.C. 20555, Draft, 1990.

Benbasat, I., and J.S. Dhaliwal, *A Framework for the Validation of Knowledge Acquisition*. Knowledge Acquisition, Vol. 1, No. 2, pp. 215-233, June 1989.

Berg, O., T.J. Bjorlo, O. Evjen, N.T. Fordestrommen, and K. Haugset, *ISACS - An Integrated Surveillance and Control System Concept for the Advanced Control Room*, Technical Report: OECD Halden Reactor Project, HWR-219, Institutt for Energiteknikk, Halden, Norway, May 1988.

Berg, O., J.S. Larsen, T. Westgaard, C. Holmstrom, H. Andersson, S. Jakobsson, R. Heinonen, and T. Kukko, *A Preliminary Specification for A Multifunctional Decision Support System in Emergency Management Applying Expert System Techniques*, Technical Report: OECD Halden Reactor Project, HWR-205, Institutt for Energiteknikk, Halden, Norway, May 1987.

Bernard, J.A., A.F. Henry, D.D. Lanning, and J.E. Meyer, *Closed-Loop Digital Control of Nuclear Reactors Characterized by Spatial Dynamics*, Report No. MITNRL-041, Nuclear Reactor Laboratory, Massachusetts Institute of Technology, The MIT Press, Cambridge, Massachusetts 02142, March 1991.

Bernard, J.A., and T. Washio, *Expert System Applications Within the Nuclear Industry*, American Nuclear Society, La Grange Park, Illinois 60525, 1989.

Berns, G.M., *Assessing Software Maintainability*, Communications of the ACM, Vol. 27, No. 1, pp. 14-23, January 1984.

Bhatnagar, R., D.W. Miller, B.K. Hajek, and J.E. Stasenko, *An Integrated Operator Advisor System for Plant Monitoring, Procedure Management, and Diagnosis*, Nuclear Technology, Vol. 89, March 1990.

Bidoit, M., B. Biebow, M.C. Gaudel, C. Gresse, and G.D. Guiho, *Exception Handling: Formal Specification and Systematic Program Construction*, IEEE Transactions on Software Engineering, Vol. SE11, No. 3, IEEE Service Center, Piscataway, New Jersey 08854, March 1985.

Bishop, P., et al, *PODS -- A Project on Diverse Software*, IEEE Transactions on Software Engineering, Vol. SE-12 (9), ISBN 0098-5589, 1986.

Bishop, P., et al, *STEM -- A Project on Software Test and Evaluation Methods*, Paper presented at SARS '87 and published in *Achieving Safety and Reliability with Computer Systems*, B. Daniels (Ed.), ISBN 1-85166-1670, Elsevier Applied Science, New York, New York, 1987.

Bishop, P.G., (Ed.), *Dependability of Critical Computer Systems 3, Techniques Directory*, Guidelines produced by The European Workshop on Industrial Computer Systems Technical Committee 7 (EWICS TC7). Elsevier Applied Science, New York, New York, 1990.

Blanchard, B.S., and W.J. Fabrycky, *Systems Engineering and Analysis*, Prentice-Hall, Englewood Cliffs, New Jersey, 1990.

Bochsler, D.C., and M.A. Goodwin, *Software Engineering Approach to Expert System Design and Verification*, Second Conference on Artificial Intelligence for Space Applications, pp 47-60, NASA, Johnson Space Center, Houston, Texas, August 1988.

Boehm, B.W., *Software Engineering Economics*, Prentice-Hall, Inc., Englewood Cliffs, New Jersey, 1981.

Boehm, B.W., *Software Engineering*, IEEE Transactions on Computers, Vol. 25, No. 12, pp. 1126-1241, 1976.

Boehm, B.W., *Software Risk Management*, Academic Press, New York, New York, 1990.

Boehm, B.W., *A Spiral Model of Software Development and Enhancement*, IEEE Computer, pp. 61-72, May 1988.

Boehm, B.W., *Verifying and Validating Software Requirements and Design Specifications*, IEEE Software, Vol 1, No. 1, pp. 75-88, January 1984.

Bond, D., D. Lane, and P. Shikli, *Knowledge Management in Expert Systems*, Technical Report, SAIC COMSYSTEMS Division, San Diego, California 92121, May 1988.

Bonissone, P.P., and N.C. Wood, *Plausible Reasoning in Dynamic Classification Problems*, Validation and Testing of Knowledge-Based Systems Workshop Proceedings, AAAI-88, The MIT Press, Cambridge, Massachusetts 02142, August 1988.

Booch, G., *Object Oriented Design: With Applications*, The Benjamin/Cummings Publishing Company, Inc., Redwood City, CA, 1991.

Booher, H. (Ed.), *MANPRINT: An Approach to Systems Integration* Van Nostrand Reinhold, New York, New York, 1990.

Boose, J.H., *Personal Construct Theory and The Transfer of Human Expertise*, AAAI-84, Proceedings of the National Conference on Artificial Intelligence, Vol. 1, The MIT Press, Cambridge, Massachusetts 02142, pp. 27-33, August 1984.

Booth, G., *Object Oriented Design, With Applications*, Benjamin/Cummings Publishing Co., Redwood City, California, 1991.

Borgida, A., S. Greenspan, and J. Mylopoulos, *Knowledge Representation as the Basis for Requirements Specifications*, Computer, 18(4), pp. 82-91, 1985.

Botten, N., A. Kusiak, and T. Raz, *Knowledge Bases: Integration, Verification, and Partitioning*, European Journal of Operational Research, Number 42, pp 111-128, 1989.

Boyer, R., and J.S. Moore, *Proof Checking the RSA Public Key Encryption Algorithm*, Readings in Artificial Intelligence and Software Engineering, (Ed. Charles Rich, and Richard C. Waters), pp. 87-96, 1986, Morgan Kaufmann Publishers, Los Altos, California.

Browning, J.A., *An Empirical Study of Fault Detection by Static Units-Consistency Analysis*, Thesis, The Naval Postgraduate School, Monterey, California, September 1991.

Bruyn, W., R. Jensoon, D. Keskar, and P. Ward, *ESML: An Extended Systems Modeling Language*, ACCM Software Engineering Notes, 13(1), pp. 58-67, 1988.

Bryan, W.L., and S.G. Siegal, *Software Product Assurance: Techniques for Reducing Software Risk*, Elsevier, New York, New York, 1988.

Bryant, J.L., and N.P. Wilburn, *Handbook of Software Quality Assurance Techniques Applicable to the Nuclear Industry*, NUREG/CR-4640, PNL-5784, Prepared for U.S. Nuclear Regulatory Commission, Washington, D.C. 20555, August 1987.

BSI Standards, *Guide to the Assessment of Reliability of Systems Containing Software*, Document No. 89/97714, BSI Standards, 2 Park Street, London W1A 2BS, London, 1989.

BSI, *Standards Guide to Assessments of Reliability of Systems Containing Software: Draft for Development*, Document 89/97714, BSI Standards, 2 Park Street, London W1A 2BS, September 12, 1989.

Burke, R.A., and R.W. McNenny, *VV&T Advantages Provided by the ID3 Algorithm*, Technical Report. Available from NASA, Johnson Space Center, Houston, Texas.

Burris, L.B., C. Chang, J.B. Combs, R. McBeth, R. Stachowitz, and T. Stock, *The Expert Systems Validation Associate: An Overview*, Technical Report, The Lockheed Artificial Intelligence Center, Palo Alto, California 94303.

Bussac, J.P., P. Jover, and M. Conflant, *The Introduction of Computer Systems into Nuclear Power Plant Instrumentation and Control: The French Safety Approach*, Presented at International Symposium on Nuclear Power Plant Instrumentation and Control, Tokyo, Japan, May 18-22, 1992.

Cain, D., E. Choi, M. Divakarani, V. Longo, T. Wilson, and B. Braithwaite, *EPRI GEMS: Expert Systems for Technology Transfer*, Technical Report, The Electrical Power Research Institute, Palo Alto, California 94303, 1991.

Callahan, P.H., *Expert Systems for AT&T Switched Network Maintenance*, AT&T Technical Journal, Vol. 67, Issue 1, pp. 93-103, AT&T Technical Journal, Short Hills, New Jersey 07078, January 1988.

Card, D.N., *Defect-Causal analysis Drives Down Error Rates*, IEEE Software, Computer Science Corporation, Calverton, Maryland, July 1993.

Carre, B., et al., *SPADE -- the Southampton Program Analysis and Development Environment*, Published in Software Engineering Environment, I. Sommerville (Ed.), IEEE Computing, Series 7, 1986.

Castore, G., *A Formal Approach to Validation and Verification for Knowledge-Based Control Systems*, Proceedings of First Annual Workshop on Space Operations Automation (SOAR '87), NASA, Johnson Space Center, Houston, Texas, pp. 197-202, August 1987.

Castore, G., S. Kalpin, and B. Schrag, *Knowledge-Based Control Systems*, Technical Report, Honeywell Inc., Minneapolis, Minnesota, May 1987.

Chaffee, A.E., Chief of Events Assessment Branch, Division of Operating Reactor Support, USNRC, *Listing of Augmented Inspection Teams Dispatched Since 1985*, June 8, 1993.

Chang, W.C., and M.Y. Tarn, *A Study on the Verification of Nuclear Power Plant Emergency Operating Procedure Tracking System*, Masters of Science thesis, January 1991. Available upon request from the Institute of Management Science, National Chiao Tung University, Hsinchii, Taiwan, Republic of China.

Chang, W.C., and J.F. Cheng, *The Utility Experience of Implementing the Emergency Operating Procedure Tracking System*, Proceedings of Applications for the Electric Power Industry Conference, Electric Power Research Institute, Palo Alto, California 94303, June 1990.

Chang, C.L., J.B. Combs, and R.A. Stachowitz, *A Report on the Expert Systems Validation Associate (EVA)*, Expert Systems with Applications, Special Issue: Verification and Validation of Knowledge-Based Systems, Vol. 1, No. 3, pp. 217-230, 1990.

Chang, C.L., and R.A. Stachowitz, *Testing Expert Systems*, Second Annual Workshop on Space Operations Automation and Robotics (SOAR '88), NASA, Johnson Space Center, Houston, Texas, pp. 131-135, July 1988.

Chang, C.L., R.A. Stachowitz, and J.B. Combs, *Testing Integrated Knowledge-based Systems*, IEEE International Workshop on Tools for Artificial Intelligence: Architectures, Languages and Algorithms, IEEE Service Center, Piscataway, New Jersey 08854, pp. 12-18, October 1989.

Chang, C.L., R.A. Stachowitz, and J.B. Combs, *Validation of Nonmonotonic Knowledge-Based Systems*, Knowledge Based Systems Verification, Validation and Testing Workshop Proceedings, AAAI-90, The MIT Press, Cambridge, Massachusetts 02142, July 1990.

Chapanis, A., *Man-Machine Engineering* Brooks/Cole Publishing Company, Monterey, California, 1965.

Charette, R.N., *IV&V and Risk Management*, Presentation Made to the ANSI/IEEE Standard 1012 Working Group at the National Institute of Standards and Technology, The American Nuclear Society, 555 North Kensington Avenue, La Grange Park, Illinois 60525, November 12, 1992.

Chee, C., *Comments on Space Station Freedom Program SSEP Software Life-Cycle Management Standards for Flight and Ground Software*, Private Correspondence to Dr. Michael Freeman, June 1990.

Chen, R., *The Integration of the Air Force Content Data Model and MIL-STD-1833-2B*, David Taylor Research Center Report No. DTRCC-90/034, Carderock Division, Naval Surface Warfare Center, Code 3323, Bethesda, Maryland 20084-5000, 1990.

Chen, Z., and Ching Y. Suen, *Application of Metric Measures: From Conventional Software to Expert Systems*, Concordia University, Montreal, Canada.

Cheng, J.F., R. Chiang, C.C. Yao, A.J. Spurgin, D.D. Orbis, B.K.H. Sun, D. Cain, and C. Christensen, *Evaluation of an Emergency Operating Procedure Tracking Expert System by Control Room Operators*, Proceedings of Applications for the Electric Power Industry Conference, Electric Power Research Institute, Palo Alto, California 94303, June 1990.

Chisholm, G.H., B.T. Smith, and A.S. Wojcik, *A Paradigm for Analyzing Independence in System Behavior Using Formal Methods*, Position Paper for FM-89, Workshop on Formal Methods, July 23-27 1989, Halifax, Nova Scotia, Argonne National Laboratory, Argonne, Illinois 60439.

Chisholm, G.H., B.T. Smith, and A.S. Wojcik, *Formal Specifications for Safety Grade Systems*, Proceedings of the American Power Conference, Chicago, Illinois, April 28-May 1, 1991, pp 606-612.

Chisholm, G.H., J. Kljaich, B.T. Smith, and A. S. Wojcik, *An Approach to the Verification of a Fault-Tolerant, Computer-Based Reactor Safety System: A Case Study Using Automated Reasoning, Vol. 1*, Electric Power Research Institute, NP-4924, Vol. 1, Research Project 2686-1, Interim Report, January 1987.

Chisholm, G.H., J. Kljaich, B.T. Smith, and A.S. Wojcik, *An Approach to the Verification of a Fault-Tolerant, Computer-Based Reactor Safety System: A Case Study Using Automated Reasoning, Vol. 2: Appendixes*, Electric Power Research Institute, NP-4924, Vol. 2, Research Project 2686-1, Interim Report, Electric Power Research Institute, Palo Alto, California 94303, January 1987.

Chisholm, G.H., B.T. Smith, and A.S. Wojcik, *Formal System Specifications - A Case Study of Three Diverse Representations*, ANL-90/43, The Mathematics and Computer Science Division and The Reactor Analysis Division, Argonne National Laboratory, Argonne, Illinois 60439, December 1990.

Chou, Q.B., H.S. Kernius, L. Crossley, M. Benjamin, and M. Kapadia, *Integrated Distributed Control Computer System for Nuclear Power Plant Control*, Ontario Hydro and CAE Electronics Limited.

Chu, Bei-Tseng Bill, *Fault Diagnosis with Continuous System Models*, IEEE Transactions on Systems, Man, and Cybernetics, Vol. 23, No.1, January/February 1993.

Coad, P. and E. Yourdon, *Object-Oriented Design*, Yourdon Press, Englewood Cliffs, NJ, 1991.

Cobb, R.H., and H.D. Mills, *Applying Cleanroom Engineering to the Development and Certification of Correct Software for Shutdown Systems in Nuclear Power Plants*, Testimony prepared for ARCS Meeting, Digital Systems Safety for Nuclear Power Plants, USNRC Advisory Committee on Reactor Safeguards, Computers in Nuclear Plants Subcommittee, February 9, 1993.

Code of Federal Regulations, Title 10, Part 50.73, *Licensee Event Report System*, January 1, 1992.

Cohen, P.R., and A.E. Howe, *The Invisible Hand: How Evaluation Guides AI Research*, Validation and Testing of Knowledge-Based Systems Workshop Proceedings, AAAI-88, The MIT Press, Cambridge, Massachusetts 02142, August 1988.

Cohen, P.R., *A Survey of the Eighth National Conference on Artificial Intelligence: Pulling Together or Pulling Apart?*, Survey of 150 papers from the Proceedings of the National Conference on Artificial Intelligence (AAAI-90), Department of Computer and Information Science, University of Massachusetts, Amherst, Massachusetts, December 1990.

Cohen, P.R., D.M. Hart, and J.K. Devadoss, *Models and Experiments to Probe the Factors that Affect Plan Completion Times for Multiple Fires in Phoenix*, Experimental Knowledge Systems Laboratory, Department of Computer and Information Science, University of Massachusetts, submitted to IJCAI-91, Commission Electrotechnique Internationale Norme De La Cei, *Software for Computers in the Safety Systems of Nuclear Power Stations*, International Electrotechnical Commission IEC Standard Publication 880, First Edition, Bureau Central de la Commission Electrotechnique Internationale, 3 rue de Varemoe, Geneve, Suisse, 1986.

Computer Sciences Corporation, *Expert System Development Methodology Reference Manual, Technical Report, Revision 1*, Computer Sciences Corporation, Chantilly, Virginia, August 1989.

Computer Sciences Corporation, *Expert System Development Methodology User Guide. Technical Report, Revision 1*, Computer Sciences Corporation, Chantilly, Virginia, August 1989.

Computer Sciences Corporation, *Expert System Development Methodology Framework for Evaluation of ESDM, Preliminary Report, Working Materials*, Computer Sciences Corporation, Chantilly, Virginia, March 1989.

Computer Sciences Corporation, *Expert System Development Methodology Standard, Technical Report, Revision 1*, Computer Sciences Corporation, Chantilly, Virginia, August 1989.

Conrath, D.W., and R.S. Sharma, *Evaluating Expert Systems using A Multiple-Criteria, Multiple-Stakeholder Approach*, University of Waterloo, Ontario, Canada, 1991.

Constantine, M.M., and J.W. Ulvila, *Testing Knowledge-Based Systems: The State of the Practice and Suggestions for Improvement*, Expert Systems with Applications, Special Issue: Verification and Validation of Knowledge-Based Systems, Vol. 1, No. 3. pp. 237-248, 1990.

Constantine, M.M., and J.W. Ulvila, *Knowledge-Based Systems in the Army: The State of the Practice and Lessons Learned, with Implications for Testing*, Verification, Validation and Testing of Knowledge-Based Systems Workshop Proceedings, IJCAI-89, Morgan Kaufmann Publishers, Inc., Palo Alto, California 94303, August 1989.

Cook, T.M., *KBS Validation and Verification: Issues for the NASA's Space Station Program*, Presented at NASA Ames Research Center, May 14-15, 1987, NASA Ames Research Center, Moffett Field, California 94035.

Cox, B.J., *Object Oriented Programming: An Evolutionary Approach*, Addison-Wesley Publishing Co., Reading, MA, 1987.

Cragun, B.J., and H.J. Steudel, *A Decision-table-based Processor for Checking Completeness and Consistency in Rule-based Expert Systems*, International Journal of Man-Machine Studies, Vol. 26, No. 5, pp. 633-648, May 1987.

Craw, Susan, *Refinement Assists Quality Assurance*, School of Computer and Mathematical Sciences, The Robert Gordon University, Aberdeen, Scotland.

Cristian, F., *Understanding Fault-Tolerant Distributed Systems*, Communications of the ACM, Vol. 34, No. 2, pp. 56-78, February 1991.

Crow, J., and J. Rushby, *Model-Based Reconfiguration: Integrating Diagnosis and Recovery*, SRI International, Contract No. NAS1-18969, Task 2, SRI Project 8200-120, Final Report, SRI International, Menlo Park, California 94025, February 1991.

Crow, J., and J. Rushby, *Model-Based Reconfiguration: Toward an Integration with Diagnosis*, Presented at the AAAI-91 Conference, Anaheim, California, July 14-19, SRI International, Menlo Park, California 94025, 1991.

Cuddigan, J.E., J. Norris, S.A. Ryan, and S. Evans, *Validating the Knowledge in a Computer-based Consultant for Nursing Care*, Proceedings of the Eleventh Annual Symposium on Computer Applications in Medical Care, pp. 74-78, SCAMC, Inc., Washington, DC 20004, November 1987.

Culbert, C., G. Riley, and R.T. Savely, *Expert System Development Methodology Which Supports Verification and Validation*, Proceedings of the ISA/88 International Conference and Exhibit, pp. 1443-1447, NASA Johnson Space Center, Houston, Texas, October 1988.

Culbert, C., and R.T. Savely, *Expert System Verification and Validation*, Validation and Testing of Knowledge-Based Systems Workshop Proceedings, AAAI-88, The MIT Press, Cambridge, Massachusetts 02142, August 1988.

- Culbert, C., and R.T. Savely, *CRSV and AAMP: Ongoing work at National Aeronautical and Space Agency/Johnson Space Center in KBS Verification and Validation*, Submittal to Verification, Validation and Testing of Knowledge-Based Systems Workshop, NASA Johnson Space Center, Houston, Texas, IJCAI-89, August 1989.
- Culbert, C., G. Riley, and R.T. Savely, *Approaches to the Verification of Rule-Based Expert Systems*, SOAR '87 First Annual Workshop on Space Operations Automation and Robotics, SCAMC, Inc., Washington, DC, August 1987.
- Culbert, C., G. Riley, and R.T. Savely, *An Expert System Development Methodology Which Supports Verification and Validation*, 4th IEEE Conference on Artificial Intelligence Applications, IEEE Service Center, Piscataway, New Jersey 08854, September 1987.
- Culbert, C., G. Riley, and R.T. Savely, *Verification Issues for Rule-Based Expert Systems*, Third Conference on Artificial Intelligence for Space Applications, Part 1, NASA Johnson Space Center, Houston, Texas, November 1987.
- Culbert, C., G. Riley, and R.T. Savely, *Expert System Development Methodology That Supports Verification and Validation*, ISA Transactions Vol 28, No. 1, pp. 15-18, 1989.
- Cullyer, W.J., *Expert Systems and Certification*, IEEE Colloquium on "Expert Systems Liability," Digest No. 115, London, United Kingdom, October 23, 1989, March 1-3, 1989.
- Dahl, M., K. Williamson, *Experiences of Using Verification Tools for Maintenance of Rule-Based Systems*, Copyright 1993, The Boeing Company, Seattle, Washington.
- Dahll, G., G. Gloe, M. Kersken, U. Mainka, J. Martz, O. Nordland, and E. Suliga, *Tools for the Standardised Software Safety Assessment (The SOSAT Project), Technical Report: OECD Halden Reactor Project, HWR-211*, Institutt for Energiteknikk, Halden, Norway, May 1987.
- Dahll, G., and J.E. Sjoberg, *Software Safety Tools - The SOSAT 2 Project, Technical Report: OECD Halden Reactor Project, HWR-268*, Institutt for Energiteknikk, Halden, Norway, January 1990.
- Dahll, G., M. Barnes, and P. Bishop, *Software Diversity - A Way to Enhance Safety? Abstract*, OECD Halden Reactor Project, Norway, Institutt for Energiteknikk, Halden, Norway,.
- Dahll, G., and J.E. Sjoberg, *SOSAT - A Set of Tools for Software Safety Assessment*, Paper submitted for the Second European Conference on Software Quality Assurance, May 30-June 1, 1990, Gustav Dahl, OECD Halden Reactor Project, Institutt for Energiteknikk, Halden, Norway.
- Daughtery, H.T., and S.H. Levinson, *Standardizing Expert System Verification and Validation*, B&W Nuclear Service Company, Paper presented at AI91: Frontiers in Innovative Computing for the Nuclear Industry, Jackson, Wyoming, September 18, 1991, B&W Nuclear Service Company, P.O. Box 10935, Lynchburg, Virginia 24506-0935.
- Daughtrey, T., *Software Verification and Validation: An Introduction*, Text for Course 1799, Software Verification and Validation at the School of Engineering and Applied Science at George Washington University, B&W Nuclear Service Company, P.O. Box 10935, Lynchburg, Virginia 24506-0935, 1992.
- Davis, C.A., and T.R. Renckly, *The Validation of Intelligent Training Systems*, Combined Proceedings: Third and Fourth Conferences on Applications of Artificial Intelligence on CD-ROM in Education and Training, pp. 41-49, October 1988.
- Davis, R., B. Buchanan, and E.H. Shortliffe, *Production Rules as a Representation for a Knowledge-Base Consultation Program*, Artificial Intelligence, pp. 15-45, August 8, 1977.

- Davis, A.M., *Software Requirements: Analysis and Specification*, Prentice-Hall, Inc., New York, New York, 1990.
- Davis, R., *Interactive Transfer of Expertise: Acquisition of New Inference Rules. Readings in Artificial Intelligence*, B.L. Webber and N.J. Nilsson (Eds.), Tioga Publishing Company, Palo Alto, California, pp. 410-428, 1981.
- de Almeida, Alberto Teixeira Bigotte, *An Empirical Study of the Fault-Predictive Ability of Software Control Structure Metrics*, Thesis, Naval Postgraduate School, Monterey, California, June 1990.
- Decision Science Consortium, Inc., *Testing and Evaluating C3I Systems That Employ AI, Vol 1: Handbook for Testing Expert Systems*, Final Report, Contract No. DAEA18-88-C-0028, Decision Science Consortium, McLean, VA 22102, January 1991.
- Department of Defense, *Human Engineering Guidelines for Management Information Systems. MIL-HDBK-761A (Draft)*, Aberdeen Proving Ground, Aberdeen, Maryland, U.S. Army Human Engineering Laboratory, Department of Defense, Washington, D.C. 20362, October 1987.
- Department of Defense, *Military Standard 2168, Defense System Software Quality Program*, Department of Defense, Washington, D.C. 20362, April 29, 1988.
- Department of Defense, *Software Master Plan, Volume 1: Plan of Action, Preliminary Draft*, Department of Defense, Washington, D.C. 20362, February 9, 1990.
- Department of Defense, *Military Standard 2167, Defense System Software Development*, Department of Defense, Washington, D.C. 20362, June 4, 1985.
- Department of Defense (USAF), *Technical Reviews and Audits for Systems, Equipments, and Computer Software, Military Standard 1521B (USAF)*, Department of Defense, Washington, D.C. 20362, June 4, 1985.
- Department of Defense, *Military Standard 2167A, Defense System Software Development*, Department of Defense, Washington, D.C. 20362, February 29, 1988.
- Desimone, R., and J. Rininger, *Expert System Validation and Verification*, SRI International, Contract DAAB07-86-D-A035, SRI Project 3002, Final Report, SRI International, Menlo Park, California 94025, August 1990.
- Deutsch, M., *Software Verification and Validation: Realistic Project Approaches*, Prentice-Hall, Inc., Englewood Cliffs, New Jersey, 1982.
- Dicker, M.P., *Fuzzy Logic Approach to Test and Evaluation Planning*, ITEA Journal, Vol. 11, No. 1, pp. 48-52.
- Downs, T., *An Approach to the Modeling of Software Testing With Some Applications*, IEEE Transaction on Software Engineering, SE-11(4), April 1985.
- Doyle, J., *Methodological Simplicity in Expert System Construction: The Case of Judgements and Reasoned Assumptions*, The Artificial Intelligence Magazine, 4(2), pp. 39-43, 1983.
- Doyle, R.J., *Constructing and Refining Causal Explanations from an Inconsistent Domain Theory*, Proceedings of the AAAI-86 Fifth National Conference on Artificial Intelligence, Philadelphia, Pennsylvania, August 11-15, 1986, Vol. 1, Science, pp. 538-544, The MIT Press, Cambridge, Massachusetts 02142.
- Dubois, E., J. Hagelstein, E. Lahou, F. Ponsaert, and A. Rifaut, *A Knowledge Representation Language for Requirements Engineering*, Proceedings of the IEEE, Vol. 74, No. 10, pp. 1431-1444, October 1986.



Duhamel, A., R. Beuscart, J. Demongeot, Y. Mouton, and the SES Group, *SES (Septicemia Expert System): Knowledge Validation From Data Analysis*, Proceedings of the Annual International Conference of the IEEE Engineering in Medicine and Biology Society, IEEE Service Center, Piscataway, New Jersey 08854, November 1988.

Duke, E.L., *Application of Flight Systems Methodologies to the Validation of Knowledge-Based Systems*, 2nd Annual Workshop on Space Operations Automation and Robotics (SOAR 1988), NASA Johnson Space Center, Houston, Texas, pp. 107-121.

Duncan, I.M.M., and D.J. Robson, *Ordered Mutation Testing*, Software Engineering Notes, Vol. 15, No. 2., pp. 29, April 1990.

Dunn, R., *Software Defect Removal*, McGraw-Hill, New York, New York, 1984.

Dutton, J.E., *Commonsense Approach to Process Modeling*, IEEE Software, July 1993.

Eason, K.D., *Dialogue Design Implications of Task Allocation Between Man and Computer*, Ergonomics, 3(9), pp. 881-891, 1990.

Edwards, R.M., D.W. Ruhl, E.H. Klevans, and G.E. Robinson, *Development and Testing of a Diagnostic System for Intelligent Distributed Control at EBR-II*, Presented at Fast Reactor Safety Meeting, Snowbird, Utah, The Pennsylvania State University, University Park, Pennsylvania 16802, August 1990.

Eggert, P., *Toward Special-Purpose Program Verification*, Proceedings of the ACM SIGSOFT: International Workshop on Formal Methods in Software Development, Vol. 15, No. 4, pp. 25-29, ACM Order Department, Baltimore, Maryland, 21264, September 1990.

Ehrig, H., and B. Mahr, *Fundamentals of Algebraic Specification*, Springer Verlag, Englewood, New Jersey, 1985.

Eike, D.R., S.A. Fleger, and E.R. Phillips, *User Interface Guidelines for Expert Troubleshooting Systems*, Science Applications International Corporation, 1710 Goodridge Drive, McLean, Virginia 22102, 1986.

Electric Power Research Institute, *Reactor Emergency Action Level Monitor, Vol. 2: REALM User's Reference Guide*, EPRI NP-5719, Vol. 2, The Electric Power Research Institute, Palo Alto, California 94303, September 1988.

Electric Power Research Institute, *Proceedings: 1987 Conference on Expert System Applications in Power Plants*, Proceedings EPRI 2923-1, The Electric Power Research Institute, Palo Alto, California 94303, December 1988.

Electric Power Research Institute, *Reactor Emergency Action Level Monitor, Vol. 1: REALM Technical Report*, EPRI NP-5719, Vol. 1, The Electric Power Research Institute, Palo Alto, California 94303, September 1988.

Electric Power Research Institute, *Verification and Validation of Expert Systems for Nuclear Power Plant Applications, Final Report*, NP-5978, The Electric Power Research Institute, Palo Alto, California 94303, August 1988.

Electric Power Research Institute, *Conference on Expert Systems Applications for the Electric Power Industry Conference*, Orlando, Florida, June 5-8, The Electric Power Research Institute, Palo Alto, California 94303, 1989.

Electric Power Research Institute, *The EPRI Knowledge Acquisition Workshop Handbook*, EPRI NP-6240, Final Report, The Electric Power Research Institute, Palo Alto, California 94303, February, 1989.

Electric Power Research Institute, *Electric Power Research Institute Artificial Intelligence/Expert Systems Research and Development*, B. Sun (Ed.), The Electric Power Research Institute, Palo Alto, California 94303, October 1987.

Electric Power Research Institute *Emergency Operating Procedures Tracking System. Interim Report NP-5250M*, Vol. 1, The Electric Power Research Institute, Palo Alto, California 94303, June 1987.

Electric Power Research Institute, *Survey and Assessment of Conventional Software Verification and Validation Techniques. Final Report*, TR-102106, Research Project 3093-01, The Electric Power Research Institute, Palo Alto, California 94303, February 1993.

Electric Power Research Institute, *Emergency Operating Procedures Tracking System. Interim Report NP-5250SP*, The Electric Power Research Institute, Palo Alto, California 94303, June 1987.

Electric Power Research Institute, *Approaches to the Verification and Validation of Expert Systems for Nuclear Power Plants, NP-5236, Final Report*, The Electric Power Research Institute, Palo Alto, California 94303, July 1987.

Electric Power Research Institute, *The BWR Emergency Operating Procedures Tracking System (EOPTS), Evaluation by Control-Room Operating Crews. Final Report NP-68-46*, The Electric Power Research Institute, Palo Alto, California 94303, May 1990.

Electric Power Research Institute, *Reactor Emergency Action Level Monitor Expert-System Prototype: Independent Review*, EPRI NP-5719, Vol. 3, The Electric Power Research Institute, Palo Alto, California 94303, April 1988.

Enand, R., G.S. Kahn, and R.A. Mills, *A Methodology For Validating Large Knowledge Bases*, International Journal of Man-Machine Studies, Vol. 33, 1990, pp. 361-371.

Enright, T., *EOPTS Functional Design Requirements Document: Rev. A. TVA/EPRI/SAIC*, The Electric Power Research Institute, Palo Alto, California 94303, March 7, 1992.

Enright, T.R., *An EOP Tracking System for Nuclear Plant Training Simulators*, Science Applications International Corporation, Atlanta, Georgia.

EPRI NP-1850-CCM VOLUME 4, *Quality Assurance Requirements of Computer Software for Nuclear Facility Application*, Electric Power Research Institute, Palo Alto, California, 1990.

EPRI NP-2511-CCM VOLUME 4, *RETRAN-02 - A Program for Transient Thermal-Hydraulic Analysis of Complex Fluid Flow Systems - Volume 4 Applications*, Electric Power Research Institute, Palo Alto, California, January 1983.

EPRI NP-5524, *Testing and Installation of a BWR Digital Feedwater Control System*, Atomic Energy of Canada, Limited, Electric Power Research Institute, Palo Alto, California, December 1987.

EPRI NP-5978, *Verification and Validation of Expert Systems for Nuclear Power Plant Applications*, Electric Power Research Institute, Palo Alto, California, August 1988.

Eshelman, L., and J. McDermott, *MOLE: A Knowledge Acquisition Tool That Uses Its Head*, Proceedings of the AAAI-86 Fifth National Conference on Artificial Intelligence. Philadelphia, Pennsylvania, August 11-15, 1986, Vol. 2, Engineering, The MIT Press, Cambridge, Massachusetts 02142, pp. 950-955.

Fagan, M.E., *Advances in Software Inspection*, IEEE Transactions on Software Engineering, SE-12(7), pp. 744-751, July 1986.

Far, B.H., M. Nakamichi, *Qualitative Fault in Systems with Nonintermittent Concurrent Faults: A Subjective Approach*, IEEE Transactions on Systems, Man, and Cybernetics. Vol. 23, No. 1, January/February 1993.

Ferrara, K.C., S.J. Keene, and C. Lance, *Software Reliability from a System Perspective*. 1989 *Proceedings Annual Reliability and Maintainability Symposium; an Institute of Electrical and Electronic Engineers Conference*, IEEE Service Center, Piscataway, New Jersey 08854, pp. 332-339.

Fetzer, J.H., *Program Verification: The Very Idea*, Communications of the ACM, Vol. 31, No. 9, September 1988.

Fieschi, M., *Towards Validation of Expert Systems as Medical Decision Aids*, International Journal of Bio-Medical Computing, Vol. 26, No. 1-2, pp. 93-108, July 1990.

Finelli, G.B., *NASA Software Failure Characterization Experiments*, Reliability Engineering and System Safety, Vol. 32, pp. 155-159, 1991, Elsevier Science Publishers Ltd, United Kingdom.

Finin, T.W., *Interactive Classification: A Technique for Acquiring and Maintaining Knowledge Bases*, Proceedings of the Institute of Electrical and Electronic Engineers, Inc., Vol. 74, No. 10, pp. 1414-1421, IEEE Service Center, Piscataway, New Jersey 08854, October 1986.

Finlay, P.N., G.J. Forsey, and J.M. Wilson, *The Validation of Expert Systems-Contrasts With Traditional Methods*, Journal of the Operational Research Society, Vol. 39, No. 10, pp. 933-938, October 1988.

Fischer, H.D., K. Hellmerichs, and A. Parry, *Digital Instrumentation and Control for Future Nuclear Power Plants Within the French-German Cooperation*, Paper prepared for SIEMENS AG/KWU, Erlangen, Germany, Nuclear Power International (NPI), Paris La Defense, France, and FRAMATOME (FRA), Paris La Defense, France.

Florac, W.A., *Software Quality Measurement: A Framework for Counting Problems and Defects*, Technical Report, CMU/SEI-92-TR-22, ESC-TR-92-022, Software Engineering Institute, Carnegie Mellon University, Pittsburgh, Pennsylvania, September 1992.

Frankl, P.G. and E.J. Weyuker, *A Formal Analysis of the Fault-detecting Ability of Testing Methods*, IEEE Transactions on Software Engineering, Vol. 19, No. 3, March 1993.

Franklin, M.K., and A. Gabriellian, *A Transformational Method for Verifying Safety Properties in Real-Time Systems*, Proceedings, Real-Time Systems Symposium, Santa Monica, California, December 5-7, pp. 112-123, Thompson-CSF Inc., Pacific Rim Operations, Palo Alto, California, 1989.

Franklin, W.R., R. Bansal, E. Gilbert, and A. Prakash, *Sensitivity Analysis and Version Control of Expert Systems*, Technical Report, The MIT Press, Cambridge, Massachusetts 02142, February 1989.

Franklin, W.R., R. Bansal, and E. Gilbert, *Sensitivity Analysis of Expert Systems. Validation and Testing of Knowledge-Based Systems Workshop*, Proceedings, AAAI-88, The MIT Press, Cambridge, Massachusetts 02142, August 1988.

Franklin, W.R., R. Bansal, E. Gilbert, and G. Schroff, *Debugging and Tracing Expert Systems*, Proceedings of the Twenty First Annual Hawaii International Conference on System Sciences, Vol. 3, Kona, Hawaii, pp. 159-167, IEEE Service Center, Piscataway, New Jersey 08854, January 1988.

Friedman, J., L.A. Miller, and A. Peterson, *Concept Paper: An IV&V Approach to Validate Requirements for Expert Systems*, Technical Report, Science Applications International Corporation, COMSYSTEMS Division, San Diego, California, May 2, 1988.

Froome, P., and B. Monahan, *The Role of Mathematically Formal Methods in the Development and Assessment of Safety-Critical Systems*, Butterworth & Co. Ltd., London, United Kingdom, 1988.

Gabrielian, A., and M.K. Franklin, *Multi-Level Specification of Real-Time Systems*, Communications of the ACM, Vol. 34, No. 5, pp. 51-60, May 1991.

Gabrielian, A., and M.K. Franklin, *Multi-Level Specification and Verification of Real-Time Software*, 12th International Conference on Software Engineering, Nice, France, March 1990.

Galambos, J.A., R.P. Abelson, and J.R. Black (Eds.), *Knowledge Structures*, Lawrence Erlbaum Associates, Hillsdale, New Jersey, 1986.

Gamble, R.F., R. Gruia-Catalin, and W.E. Ball, *Formal Verification of Pure Production System Programs*, Technical Report, Department of Computer Science, Washington University, St. Louis, Missouri.

Gamble, R.F., *A Perspective on Formal Verification*, Department of Mathematical and Computer Sciences, The University of Tulsa, Tulsa, Oklahoma.

Gaschnig, J., P. Klahr, H. Pople, E. Shortliffe, and A. Terry, *Evaluation of Expert Systems: Issues and Case Studies. Building Expert Systems*, F. Hayes-Roth, D.A. Waterman, and D.B. Lenat (Eds), Don Mills, Addison-Wesley, Ontario, Canada, Chapter 8, pp. 241-280, 1983.

Gearhart, L.M., *Managing the Development and Deployment of Expert Systems*, Proceedings of the IEEE 1989 National Aerospace and Electronics Conference, NAECON, IEEE Service Center, Piscataway, New Jersey 08854, May 1989.

Geissman, J.R., and R.D. Schultz, *Verification & Validation of Expert Systems*, AI Expert, pp. 26-33, February 1988.

Geissman, J.R., *Verification and Validation for Expert Systems: A Practical Methodology*, Proceedings from the 4th Annual Presentation of The Artificial Intelligence and Advanced Computer Technology Conference & Exhibition, Abacus Programming Corporation, Van Nuys, California, May 1988.

Gelprin, D., and D. Hetzel, *The Growth of Software Testing*, Communications of the ACM, Vol. 31, No. 6, pp. 687-695, June 1988.

Ghezzi, C., D. Mandrioli, S. Morasea, and M. Pezze, *A General Way to Put Tim in Petri Nets (as in Kramer)*, ACM Order Department, P.O. Box 64145, Baltimore, Maryland 21264, pp. 60-67.

Giadrosich, D.L., *Modeling and Simulation in Operational Test and Evaluation: A Dinosaur's Viewpoint*, ITEA Journal, Vol. 11 No. 1, pp. 45-52, 1990.

Gibson, M.L., and R.G. Vedder, *Tools and Techniques for Use in Decision Support Systems*, Journal of Information Systems Management, Spring 1989.

Gilmore, W.E., Human Engineering guidelines for the Evaluation and Assessment of Video Display Units, NUREG/CR-4227, U.S. Nuclear Regulatory Commission, July 1985.

Gilmore, W.E., D.I. Gertman, and H.S. Blackman, *The User-Computer Interface in Process Control*, Academic Press, Boston, Massachusetts, 1989.

Gilstrap, L., *Evaluation of a Proposed Expert System Development Methodology: Two Case Studies*, Telematics and Informatics, Vol. 7, No. 3/4, pp. 467-477, The MIT Press, Cambridge, Massachusetts 02142, 1990.

Gilstrap, L., *Expert System Development Methodology Case Study: Intelligent Tutoring System*, Prepared for the National Aeronautics and Space Administration, Goddard Space Flight Center, Greenbelt, Maryland, November 1990.

Gilstrap, L., *Management of Expert Systems Development*, Knowledge Based Systems Verification, Validation and Testing Workshop Proceedings, AAAI-90, The MIT Press, Cambridge, Massachusetts 02142, August 1990.

Gilstrap, L., *Validation and Verification of Expert Systems*, 1991 Goddard Conference on Space Applications of Artificial Intelligence, May 14-15, pp. 241-248, 1991.

Ginsberg, A., *A Metalinguistic Approach to the Construction of Knowledge Base Refinement Systems*, Proceedings AAAI-86 Fifth National Conference on Artificial Intelligence, Vol. 1, pp. 436-441, The MIT Press, Cambridge, Massachusetts 02142, August 1986.

Ginsberg, A., *Theory Reduction, Theory Revision, and Retranslation*, Proceedings Eighth National Conference on Artificial Intelligence - AAAI-90, Vol. 2, pp. 777-782, The MIT Press, Cambridge, Massachusetts 02142, July 1990.

Ginsberg, A., *Theory Revision via Prior Operationalization. Proceedings AAAI-88 The Seventh National Conference on Artificial Intelligence*, Vol. 2, pp. 585-589, The MIT Press, Cambridge, Massachusetts 02142, August 1988.

Ginsberg, A., S. Weiss, and P. Politakis, *Seek2: A Generalized Approach to Automatic Knowledge Base Refinement*, IJCAI-85, Proceedings of the Ninth International Joint Conference on Artificial Intelligence, Vol. 1, pp. 367-374, Morgan Kaufmann Publishers, Inc., Palo Alto, California 94303, August 1985.

Ginsberg, A., *Knowledge-Base Reduction: A New Approach to Checking Knowledge Bases for Inconsistency & Redundancy*, Proceedings AAAI-88 The Seventh National Conference on Artificial Intelligence, Vol. 2, pp. 585-589, The MIT Press, Cambridge, Massachusetts 02142, August 1988.

Glass, B.J., W.K. Erickson, and K.J. Swanson, *TEXSYS: A Large Scale Demonstration of Model-Based Real-Time Control of a Space Station Subsystem*, Information Sciences Division, NASA-Ames Research Center, Moffett Field, California.

Gloe, G., and R. Westhaeuser, *Assessment of Computer Based Control Systems -- Current Practice and Trends in Germany*, Department of Nuclear Technology and Radiation Protection, Freie und Hansestadt Hamburg, Germany.

Good, D.I., *Is "Formal Methods" the Right Problem?*, Position paper presented for FM-89, Workshop on Formal Methods, July 23-27, 1989, Halifax, Nova Scotia.

Good, D., *Mechanical Proofs About Computer Programs*, Readings in Artificial Intelligence and Software Engineering, ed., C. Rich, and R.C. Waters, Morgan Kaufmann Publishers: Los Altos, California, pp. 65-84, 1986.

Goodenough, J., and S. Gerhart, *Toward a Theory of Test Data Selection*, IEEE Transactions on Software Engineering, Vol. SE-1, No. 2, 1975.

Goodwin, M.A., and L.R. Fussell, *Use of Electronic Knowledge Repositories in VV&T of Knowledge-Based Systems*, Submittal to AAAI-88 Workshop on Validation and Testing of Knowledge-Based Systems, Rockwell Space Operations Company, Houston, Texas 77058.

Goodwin, M.A., and C.C. Robertson, *Expert System Verification Concerns in an Operations Environment*, First Annual Workshop on Space Operations Automation and Robotics (SOAR '87), Houston, Texas, NASA Johnson Space Center, Houston, Texas, August 1987.

Goodwin, M.A., and C.C. Robertson, *A Systemic View of Validating and Testing Knowledge-Based Systems*, Validation and Testing Knowledge-Based Systems Workshop Proceedings, AAAI-88, NASA Johnson Space Center, Houston, Texas, August 1988.

Gordin, D., D. Foxvog, J.R. Rowland, P. Surko, and G.T. Vesonder, *OKIES: A Troubleshooter in the Factory*, AT&T Bell Laboratories, Warren, New Jersey 07060.

Gordon, M., *HOL: A Machine Oriented Formulation of Higher Order Logic*, Technical Report No. 68, University of Cambridge, United Kingdom, 1985.

Gornito, H.C. and G.T. Hutto, *Meeting Test Challenges Through Experimental Design*, Sverdrup Technology, Inc., TEAS Group, Eglin Air Force Base, Florida.

Gould, J.D., and C. Lewis, *Designing for Usability: Key Principles and What Designers Think*, Communications of the ACM, Volume 28, pp. 300-311, 1985.

Gowens, Dr. J.W., *Expert System Evaluation Methodology (ASQBG-A-89-034)*, AIRMICS, Atlanta, Georgia, July 1989.

Graham, I., *Object Oriented Methods*, Addison-Wesley Publishing Co., Wokingham, England, 1991.

Green, C.J.R., *Evolutionary Approach to Verification and Validation of Expert Systems*, Proceedings - 1987 Fall Joint Computer Conference, Exploring Technology: Today and Tomorrow, pp. 760, IEEE Service Center, Piscataway, New Jersey 08854, October 1987.

Griesmer, J.H., *Validating and Testing the FAME Expert System*, Knowledge Based Systems Verification, Validation and Testing Workshop Proceedings, AAAI-90, The MIT Press, Cambridge, Massachusetts 02142, July 1990.

Green, C.J.R., *On the Use of Requirements in Development of Knowledge-Based Systems*, Validation and Testing Knowledge-Based Systems Workshop Proceedings, AAAI-88, The MIT Press, Cambridge, Massachusetts 02142, August 1988.

Green, C.J.R., and M.M. Keyes, *Verification and Validation of Expert Systems*, WESTEX-87: Proceedings-Western Conference on Expert Systems, Anaheim, California, IEEE Service Center, Piscataway, New Jersey 08854, June 1987.

Grogono, P., A. Batarekh, A. Preece, R. Shinghal, and C. Suen, *Expert System Evaluation Techniques: A Selected Bibliography*, Expert Systems, 1991.

Groundwater, E.H., L.A. Miller, and S.M. Mirsky, *Guidelines for Verification and Validation of Expert Systems, Task 2: Survey and Document Expert System V&V Methodologies*. Draft, Science Applications International Corporation, 1710 Goodridge Drive, McLean, Virginia 22102, September 6, 1991.

Groundwater, E.H., *Verification and Validation Plan for the Water Chemistry Expert Monitoring System (WCEMS)*, Technical Report, Science Applications International Corporation, 1710 Goodridge Drive, McLean, Virginia 22102, August 1989.

*Guideline for Life Cycle Validation, Verification, and Testing of Computer Software, Federal Information Processing Standards Publication 101*, National Technical Information Service, U.S. Department of Commerce, Springfield, Virginia 22161, June 6, 1983.

Gupta, U.G., and J. Biegel, *RIICaG: A Rule-Based Intelligent Test Case Generator*, Knowledge Based Systems Verification, Validation and Testing Workshop Proceedings, AAAI-90, The MIT Press, Cambridge, Massachusetts 02142, July 1990.

Hajek, B.K., C.R. Hardy, D.W. Miller, and R. Bhatnagar, *A V&V Program for a Real Time Operator Advisor Expert System*, Proceedings of Applications for the Electric Power Industry Conference, The Electric Power Research Institute, Palo Alto California 94303, June 1990.

Hall, L., M. Friedman, and A. Kandel, *On the Validation and Testing of Fuzzy Expert Systems*, IEEE Transactions on Systems, Man and Cybernetics, Vol. 18, No. 6, pp. 1023-1027, November/December 1988.

Hall, D.L., and D.T. Heinze, *The Use of Simulation Techniques for Expert System Test and Evaluation*, ISA Transactions, Vol. 28, No. 1, pp. 19-22, 1989.

Halstead, M., *Elements of Software Science*, Elsevier North-Holland, New York, New York, 1977.

Hamilton, D., K. Kelly, and C. Culbert, *KBS V&V - State-of-the-Practice and Implications for V&V Standards*, IBM, Houston, Texas, 1991.

Hamlet, R., *Introduction to Special Section on Software Testing*, Communication of the ACM, Vol. 31, No 6, pp. 662-667, June 1988.

Hamlet, R., *Partition Testing Does Not Inspire Confidence*, IEEE Transactions on Software Engineering, Vol. 16, No. 12, December 1990.

Hamlet, R., *Theory of Software Testing and Software Reliability*, Department of Computer Science, Center for Software Quality Research, Portland State University, Portland, Oregon.

Hanna, F. K., N. Daeche, and M. Longley, *Veritas<sup>+</sup>: A Specification Language Based on Type Theory*, Position paper from FM-89, Workshop on Formal Methods, July 23-27, 1989, Halifax, Nova Scotia.

Harel, D., *Statecharts: A Visual Formalism For Complex Systems*, Science of Computer Programming 8, North-Holland Elsevier, New York, New York, pp. 231-274, 1987.

Harel, D., H. Lachover, A. Naamad, A. Pnueli, M. Politi, R. Sherman, and A. Shtul-Trauring, *Statement: A Working Environment for the Development of Complex Reactive Systems*, Proceedings of the 10th International Conference on Software Engineering, Singapore, IEEE Computer Society Press, 1730 Massachusetts Ave., N.W., Washington, D.C. 20036-1903, pp. 396-406, April 1988.

Harel, D. and S. Rolph, *Modeling and Analyzing Complex Reactive Systems: The Statement Approach*, Logix, Inc., Burlington, Massachusetts, 1989.

Harrison, P., J.M. Owens, and D.K. McBride, *Validation of Expert Systems that Implement Simulations*, Presented at the Military Operations Research Society, Mini-Symposium on Simulation Validation, October 1990.

Harrison, P.R., P.A. Ratcliffe, D.S. Kimes, and D. Fairhead, *An Integrated Prototyping and Validation Model for Knowledge-Based System Design*, Knowledge Based Systems Verification, Validation and Testing of Workshop Proceedings, AAAI-90, The MIT Press, Cambridge, Massachusetts 02142, July 1990.

Harrison, P.R., P.A. Ratcliffe, *Towards Standards for the Validation of Expert Systems. Expert Systems With Applications*, Vol. 2, pp. 251-258, 1991.

Harrison, P.R., P.A. Ratcliffe, CDR J.M. Owens, USN, and CDR S.D. Harris, USN, *The Validation of Embedded Knowledge-Based Systems*, Proceedings of the Twenty-second Annual Modeling and Simulation Conference, May 1991.

- Harrison, P.R., *Testing and Evaluation of Knowledge-based Systems*, in *Structuring Expert Systems: Domain, Design, and Development*, J. Liebowitz and D.A. DeSalvo (Eds.), Yourdin Press, 1989, Chapter 11, pp. 303-329.
- Hartway, B., J. Young, and D. Thomas, *Simulation Characterization*, Proceedings of Third International Conference on Software for Strategic Systems, 27-28 February 1990, Huntsville, Alabama, pp. 64-85.
- Hasling, D.W., *Abstract Explanations of Strategy in a Diagnostic Consultation System*, Proceedings of the National Conference on Artificial Intelligence, AAAI-83, The MIT Press, Cambridge, Massachusetts 02142, 1983.
- Hassberger, J.A., and J.C. Lee, *A Simulation-Based Expert System for Nuclear Power Plant Diagnostics*, Nuclear Science and Engineering, Volume 102, pp. 153-171, 1989.
- Hatley, D. and I. Pirbhai, *Strategies for Real-Time System Specification*, Dorset House, New York, New York, 1987.
- Haugset, K., *The Integrated Surveillance and Control System (ISACS)*, Technical Report: OECD Halden Reactor Project, HWR-212, Institutt for Energiteknikk, Halden, Norway, May 1987.
- Hayakawa, H., K. Monta, T. Sato, and M. Tani, *Concepts of Integrated Information and Control Systems for Future Nuclear Plants*, IAEA International Conference on Man-Machine Interface in the Nuclear Industry, Tokyo, The International Atomic Energy Agency, Wagramerstrasse 5, P.O. Box 100, A-1400, Vienna, Austria, February 1988.
- Hayes, J.H., *Risk Reduction Through Requirements Tracing*, Proceedings of the Software Quality Conference, May 15-18, Science Applications International Corporation, 1710 Goodridge Drive, McLean, Virginia 22102, 1990.
- Hayes, J.E., E.H. Groundwater, L.A. Miller, S. Kreyer, and S.M. Mirsky, *Guidelines for Verification and Validation for Expert Systems, Task 3, Test Applicability and Limitations of Conventional Verification Methods*, Technical Report, Science Applications International Corporation, 1710 Goodridge Drive, McLean, Virginia 22102, December 1992.
- Hayes-Roth, F., D.A. Waterman, and D.B. Lenat, *Building Expert Systems*, Addison-Wesley Publishing Co., Inc., Reading, Massachusetts, Chapter 8, pp. 241-280, 1983.
- Hayes-Roth, F., J.E. Davidson, L.D. Erman, and J.S. Lark, *Frameworks for Developing Intelligent Systems*, IEEE Expert, June 1991.
- Hecht, H. and K.S. Tso, *Quality Metrics for High Integrity Software*, Document H009, Harris Corporation, Information Systems Division For Investigations sponsored by Nuclear Regulatory Commission and Electric Power Research Institute, SoHar Incorporated, Beverly Hills, California, March 1993.
- Heller, M., *AI in Practice, Once it Works, Does it Still Qualify as AI?* BYTE Magazine, January 1991.
- Heninger, K., et al., *Specifying Software Requirements for Complex Systems: New Techniques and Their Application*, IEEE Transactions on Software Engineering, 1980.
- Hicks, D.B., J. Harauz, and R.J. Hohendorf, *Software Quality Assessment Process*, Ontario Hydro, Toronto, Canada.
- Hill, W.B., and R.J. Hohendorf, *Achieving Fault Tolerance in Computer-Based Systems Used in Generating Station Applications*, Ontario Hydro, Toronto, Canada.
- Hill, J.V., *Software Development Methods in Practice*, Elsevier Applied Science, New York, New York, 1991.
- Hoare, C. and J. Shephardson (Eds.), *Mathematical Logic and Programming Languages*, Prentice-Hall International, New York, New York, 1985.



Hoare, C., *Communicating Sequential Processes*, Prentice-Hall International, New York, New York, 1986.

Hofmeister, A.M., *Formative Evaluation in the Development and Validation of Expert Systems in Education*, Computer Intelligence, Vol. 2, No. 2, pp. 65-67, May 1986.

Howden, W.E., *Functional Program Testing*, IEEE Transactions on Software Engineering. SE-6(2), pp. 162-169, March 1980.

Howe, A.E., and P.R. Cohen, *Failure Recovery: A Model and Experiments*, Experimental Knowledge Systems Laboratory, Department of Computer Science, University of Massachusetts. Accepted for AAAI-91, The MIT Press, Cambridge, Massachusetts 02142.

Hu, Q., R.T. Plant, and D.B. Hertz, *Developing Rigorous Software Production and Cost Models*, Department of Computer Information Systems, University of Miami, Coral Gables, Florida.

Hu, S.D., *Expert Systems for Software Engineers and Managers*, Chapman and Hall, New York, New York, 1987.

Huffman (Hayes), J.E., *Partially Automated In-Line Documentation (PAID): Design and Implementation of a Software Maintenance Tool*, Proceedings of the 1988 IEEE Conference on Software Maintenance, The Institute of Electrical and Electronics Engineers, Inc., 345 East 47th Street, New York, New York, October 1988.

Hughes, G., *Design and Validation of Advanced Operator Support Systems for a Role in Plant Safety*, Research Report, Central Electricity Generating Board, Berkeley, United Kingdom, June 1989.

Humphrey, W.S., *Managing the Software Process*, Addison-Wesley Publishing Company, Reading, Massachusetts, 1990.

ICF Information Technology, Inc., *Testing and Evaluating C3I Systems That Employ AI, Vol 3: A Guide to Developing Small Expert Systems*, ICF Information Technology, Inc., San Jose, CA, February, 1991.

IEC 880, *Software for Computers in the Safety Systems of Nuclear Power Stations*, Bureau Central de la Commission Electrotechnique Internationale, 3 rue de Varemoe, Geneve, Suisse, 1986.

IEC 964, *Design for Control Rooms of Nuclear Power Plants*, Bureau Central de la Commission Electrotechnique Internationale, 3 rue de Varemoe, Geneve Suisse, 1989.

Ince, D.C., *The Automatic Generation of Test Data*, Computer Journal, 30(1), pp. 63-69, February 1987.

Institution of Electrical Engineers, *Computing and Control Division Colloquium Organized by Professional Group C4 (Artificial Intelligence) on "Testing Expert Systems,"* Savoy Place, London, Institution for Electrical Engineers, London, United Kingdom, December 3, 1987.

Institution of Electrical and Electronics Engineers, Inc., *Standard for Software Life-Cycle Processes*, draft, P1074/D1.0, The Institute of Electrical and Electronics Engineers, Inc., 345 East 47th Street, New York, New York 10017, March 1, 1988.

International Atomic Energy Agency, *Demonstration and Review of Expert System Prototypes Used in Nuclear Industry*, Tel Aviv, Israel, October 11-15, 1993, The International Atomic Energy Agency, Wagramerstrasse 5, P.O. Box 100, A-1400, Vienna, Austria.

International Business Machines (IBM), *Expert System Verification and Validation Survey RICIS Contract #069 Delivery 4 - Final Report*, IBM, Houston, Texas 77058, September 14, 1990.

International Business Machines (IBM), *Expert System Verification and Validation Study RICIS Contract #069, Phase 2 - Requirements Identification, Delivery 2 - Current Requirements Applicability*, IBM, Houston, Texas 77058, January 13, 1990.

International Electrotechnical Commission Draft International Standard, *The Classification of Instrumentation and Control Systems Important to Safety for Nuclear Power Plants*, Project Number 45A.20.1, submitted March 13, 1992. Available from National Institute of Standards and Technology, Gaithersburg, MD.

International Atomic Energy Agency, *Safety Implications of Computerized Process Control in Nuclear Power Plants*, Report of a Technical Committee Meeting, "Safety Implications of Computerized Process Control in Nuclear Power Plants." Vienna, November 13-17 1989, The International Atomic Energy Agency, Wagramerstrasse 5, P.O. Box 100, A-1400, Vienna, Austria.

ISO Draft International Standard, *Information Processing Systems -- Open Systems Inter-Connection -- Lotos -- A Formal Description Technique Based on the Temporal Ordering of Observational Behavior*, ISO/TC 97/SC 21, ISO DIS 8807, The National Institute of Standards and Technology Computer Systems Laboratory, Gaithersburg, Maryland 20899, July 20, 1987.

Jackson, P., and P. Lafrere, *On the Application of Rule-Based Techniques to the Design of Advice-Giving Systems*, International Journal of Man-Machine Studies, 20(1), pp. 63-68, 1984.

Jagodzinski, A.P., *A Theoretical Basis for the Representation of On-Line Computer Systems to Naive Users*, International Journal of Man-Machine Studies, Volume 18, pp. 215-252, 1983.

Janusz, P.E., *Readiness Growth Model: A Quantitative Analysis of Software Risk*, Presented at the U.S. Army Armament Research, Development & Engineering Center, Picatinny Arsenal, New Jersey, August 1992.

Japanese Technology Evaluation Center, Patricia N. Rogers, (Ed.), *JTEC Program Summary*, September 1991.

Jensen, H., and K. Vairavan, *An Experimental Study of Software Metrics for Real-Time Software*, IEEE Transactions on Software Engineering, Vol. SE-11(2), pp. 231-234, 1985.

Jensen, R., and C. Tonies, *Software Engineering*, Prentice-Hall Inc., Englewood Cliffs, New Jersey, 1979.

Johnson, S.C., *Validation of Highly Reliable, Real-Time Knowledge-Based Systems*, Second Annual Workshop on Space Operations Automation and Robotics (SOAR 1988), pp. 123-129, NASA Johnson Space Center, Houston, Texas, November 1988.

Jones, C., *Systematic Software Development Using VDM*, Prentice-Hall International, New York, New York, 1986.

Jones, T.C., *Programming Productivity*, McGraw-Hill, New York, New York, 1986.

Juang, J.Y., J.M. Lin, and E. Freeman, *Characterizing Real-Time Capabilities of a Logic Program via Deductive Analysis*, Validation and Testing Knowledge-Based Systems Workshop Proceedings, AAAI-88, The MIT Press, Cambridge, Massachusetts 02142, August 1988.

Kahn, G., S. Nowlan, and J. McDermott, *MORE: An Intelligent Knowledge Acquisition Tool*, IJCAI '85, Proceedings of the Ninth International Joint Conference on Artificial Intelligence, Los Angeles, California, pp. 581-584, Morgan Kaufmann Publishers, Inc., Palo Alto, California 94303, August 1985.

Kaisler, S.H., *Expert System Metrics*, Proceedings of the 1986 IEEE International Conference on Systems, Man, and Cybernetics, Vol. 1, pp. 114-120, IEEE Service Center, Piscataway, New Jersey 08854, October 1986.

Kaneko, T. and T. Nakajo., *Determination Method to Identify Effective Software Testing Areas: Detection of Software Defects Related to External Specification Changes*, Systems and Computers in Japan, Vol. 21, No. 8, 1990.

Kang, Y., and A.T. Bahill, *A Tool for Detecting Expert-System Errors*, AI Expert, pp. 46-51, February 1990.

Karat, C.M., R. Campbell, and T. Fiegel, *Comparison of Empirical Testing and Walkthrough Methods in User Interface Evaluation*, CHI '92, ACM, May 3-7, 1992.

Kearsley, G., *Validation of an Expert System: The CBT Analyst*, Journal of Computer-Based Instruction. Vol. 15, No. 2, pp. 61-64, Spring 1988.

Kidd, A.L., and M.B. Cooper, *Man-Machine Interface Issues in the Construction and Use of an Expert System*, International Journal of Man-Machine Studies, Volume 22, pp. 91-102, 1985.

Kim, W. and F.H. Lochovsky (Eds.), *Object-Oriented Concepts, Databases, and Application*, ACM Press, New York, New York, 1989.

Kimmel, H., *Software Test and Evaluation Manual*, DoD 5000.3-M-3, Under Secretary of Defense for Acquisition, November 1987.

King, J.C., *Symbolic Execution and Program Testing*, Communications of the ACM, 19(7), pp. 385-394, July 1976.

Kiper, J.D., *Structural Testing of Rule-based Expert Systems*, Verification, Validation and Testing of Knowledge-Based Systems Workshop Proceedings, IJCAI-89, Morgan Kaufmann Publishers, Inc., Palo Alto, California 94303, August 1989.

Kirk, D., and J. Naser., *A Verification and Validation Methodology for Systems in Nuclear Power Applications*, Proceedings of Applications for the Electric Power Industry Conference, Electric Power Research Institute, Palo Alto, California, June 1990.

Kitamura, M.M. Takahashi, T. Washio, and K. Sugiyama, *Synthesis of Heuristic Knowledgebase for Supporting Development of Goal-Oriented Reactor Noise Analysis Programs*, Progress in Nuclear Energy, Vol. 21, Pergamon Press, United Kingdom, pp. 213-221.

Klein, G.A., *AIQ: A Test for the Performance of Expert Systems*, AOG/AAAI 87 Joint Conference, Dayton, Ohio, The MIT Press, Cambridge, Massachusetts 02142, October 1987.

Klein, G.A., R. Caldwood, and D. MacGregor, *Critical Decision Method for Eliciting Knowledge*, IEEE Transactions on Systems, Man and Cybernetics, V19, No. 3, pp. 462-472, May/June 1989.

Klein, G.A., and J.A. King, *A Test for the Performance of Knowledge-Base Systems: AIQ*, Validation and Testing Knowledge-Based Systems Workshop Proceedings, AAAI-88, The MIT Press, Cambridge, Massachusetts 02142, August 1988.

Klinker, G., C. Boyd, S. Genetet, and J. McDermott, *A KNACK for Knowledge Acquisition*, AAAI 1987, Proceedings of the Sixth National Conference on Artificial Intelligence, Vol. 2, Seattle, Washington, July 13-17, pp. 488-493, The MIT Press, Cambridge, Massachusetts 02142, July 1987.

Knowledge CASE Tool, 1650 Tyson Blvd., Suite 800, McLean, Virginia 22102 (703) 506-0800.

Kobialka, H.U., *Configuration Editing, Generation & Test within Working Contexts*, Sigsoft Software Engineering Notes, Vol 15, No. 6, pp. 173-182, December 1990.

- Koch, C.G., *User Interface Design for Maintenance/Troubleshooting Expert System*, Proceedings of the Human Factors Society, 29th Annual Meeting, pp. 367-371, ACM Order Department, P.O. Box 64145, Baltimore, Maryland 21264, 1985.
- Kramer, J., J. Magee, and M. Sloman, *Configuration Support for System Description, Construction and Evolution*, Proceedings of the Fifth International Workshop on Software Specification and Design, 19-20 May 1989, Pittsburgh, Pennsylvania, ACM SIGSOFT Engineering Notes, Vol. 14 No.3, pp. 28-33, IEEE Computer Society, Order Department, 10662 Los Vaqueros Circle, Los Alamitos, California 90720-2578, 1983.
- Krishnamurthy, C., S. Padalkar, J. Sztipanovits, and B.R. Purvis, *Methodology for Testing and Validating Knowledge Bases*, Third Conference on Artificial Intelligence for Space Applications, Part 1. pp. 21-32, NASA Johnson Space Center, Houston, Texas, November 1987.
- Kusiak, A., *Identification of Anomalies in Rule Bases*, Working Paper No. 89-12, June 1989, The University of Iowa, Department of Industrial and Management Engineering, Ames, Iowa.
- Laird, J., *Recovery from Incorrect Knowledge in SOAR*, Proceedings from the AAAI-88 Seventh National Conference on Artificial Intelligence, Vol. 2, St. Paul, Minnesota, August 21-26, pp. 618-623, The MIT Press, Cambridge, Massachusetts 02142, 1988.
- Laita, L.M., et. al., *A Theoretical Approach to Verification of Knowledge Based Systems*, Knowledge Based Systems Verification, Validation and Testing Workshop Proceedings, AAAI-90, The MIT Press, Cambridge, Massachusetts 02142, August 1990.
- Laita, L.M., L. de Ledesma, A. Perez, A. de Antonio., *A Tentative New Logical Approach for Dealing with KBS's Verification Problems*, Facultad De Informatica, Universidad Politecnica de Madrid, Madrid, Spain.
- Lal-Gabe, A., *Hazards Analysis and Its Application to Build Confidence in Software Test Results*, IEEE, 1990.
- Landauer, C., *Principles of RuleBase Correctness*, Verification, Validation and Testing of Knowledge-Based Systems Workshop Proceedings, IJCAI-89, Morgan Kaufmann Publishers, Inc., Palo Alto, California 94303, August 19, 1989.
- Landauer, C., *Correctness Principles for Rule-Based Expert Systems*, Expert Systems with Applications, Special Issue: Verification and Validation of Knowledge-Based Systems, Vol. 1, No. 3, pp. 291-316, 1990.
- Landauer, C., *Empirical Methods in Expert System Validation*, Knowledge Based Systems Verification, Validation and Testing Workshop Proceedings, AAAI-90, The MIT Press, Cambridge, Massachusetts 02142, July 1990.
- Lane, N.E., *Global Issues in Evaluation of Expert Systems*, IEEE Expert, pp. 121-125, August 1986.
- Lapassat, A.M., *Real Time Systems Software Validation and Verification*, Commissariat a L'Energie Atomique, France, Cen/Saclay - Irdi/D\_leti/Dein/sir, 91191 Gif sur Yvette Cedex, France.
- Laprie, J.C., and B. Littlewood, *Probabilistic Assessment of Safety-Critical Software: Why and How?*, Communications of the ACM, Vol. 35, No. 2, February 1992.
- Larson, H.L., R. R. Yager, *The Use of Fuzzy Relational Thesauri for Classificatory Problem Solving in Information Retrieval and Expert Systems*, IEEE Transactions on Systems, Man and Cybernetics, Vol. 23, No. 1, January/February 1993.

Laue, S.A., *Technical Specifications Advisor Pilot Project for Brunswick Steam Electric Plant - Unit 1 Carolina Power and Light Company*, Conference on Expert Systems Applications for the Electric Power Industry, Orlando, Florida, June 5-8, 1989.

Laurent, J.P., and M. Ayel, *Off-Line Coherence Checking for Knowledge Based Systems*, Verification, Validation and Testing of Knowledge-Based Systems Workshop Proceedings, IJCAAI-89, Morgan Kaufmann Publishers, Inc., Palo Alto, California 94303, August 1989.

Lazarus, R.B., *A Novel Approach to Failure Diagnosis in Large-Scale Dynamic Systems*, Intelligent Systems Review, Vol. 2, No. 2, pp. 4-13, Winter 1989.

Laznovsky, A., *Automated Testing Mechanisms*, Worcester Polytechnic Institute, Worcester, Massachusetts, June 24, 1991.

Lee, A.K., *Guideline for Categorization of Software in Ontario Hydro's Nuclear Facilities With Respect to Nuclear Safety*, Prepared by the Nuclear Safety Department of Ontario Hydro/AECL Software Engineering and Standards (OASES) Committee, Ontario Hydro, Toronto, Canada.

Lehner, P.E., *Toward an Empirical Approach to Evaluating the Knowledge Base of an Expert System*, Validation and Testing Knowledge-Based Systems Workshop Proceedings, AAAI-88, The MIT Press, Cambridge, Massachusetts 02142, August 1988.

Lehner, P.E., and D.A. Zirk, *Cognitive Factors in User/Expert-System Interaction*, Human Factors, 29(1), pp. 97-109, 1987.

Leveson, N.G., *Software Safety in Embedded Computer Systems*, Communications of the ACM. Vol. 34, No. 2, pp 34-46, February 1991.

Leveson, N.G., and J.L. Stolzy, *Safety Analysis Using Petri Nets*, IEEE Transactions on Software Engineering, SE-13(3), 1987.

Leveson, N.G., and P.R. Harvey, *Analyzing Software Safety*, IEEE Transactions on Software Engineering, SE-9(5), pp. 569-579, September 1983.

Lewis, R.O., *Software Verification and Validation*, In Software Quality Management, Petrocelli Books, New York, New York, pp. 240, 1987.

Li, X., *The Rule-Based Paradigm Considered Harmful - A Critical View of An Industry Practitioner*, Knowledge Based Systems Verification, Validation and Testing Workshop Proceedings, AAAI-90, The MIT Press, Cambridge, Massachusetts 02142, July 1990.

Linden, T.A., *A Meta-Level Software Development Model that Supports V&V for AI Software*, Verification, Validation and Testing of Knowledge-Based Systems Workshop Proceedings, IJCAI-89, August 1989.

Linden, T.A., *A Meta-Level Software Development Model That Supports V&V for AI Software*, Expert Systems with Applications, Special Issue: Verification and Validation of Knowledge-Based Systems, Vol. 1, No. 3, pp. 271-279, Morgan Kaufmann Publishers, Inc., Palo Alto, California 94303.

Linden, T.A., *Alternative Approaches to V&V for AI Systems*, Validation and Testing Knowledge-Based Systems Workshop Proceedings, AAAI-88, The MIT Press, Cambridge, Massachusetts 02142, August 1988.

Littlewood, B., and L. Strigini, *The Risks of Software*, Scientific American, November 1992.

- Liverpool Data Research Associates Ltd., *LDRA Software Tested, FORTRAN*, User Documentation, Liverpool, United Kingdom, 1985.
- Llinas, J., S. Rizzi, and M. McCown, *The Test and Evaluation Process for Knowledge-Based Systems*, Technical Report of Science Applications International Corporation, San Diego, California, June 1987.
- Loganathanaraj, R., *Static Analysis of Consistency and Redundancy of a Rule Based Expert System*, The Second International Conference on Industrial & Engineering Applications of Artificial Intelligence & Expert Systems IEA/AIE-89, The University of Southern Louisiana, Lafayette, Louisiana 70504, June 1989.
- Loganathanaraj, R., *Towards a Better Design Methodology of Expert Systems for Verification and Validation*, Knowledge Based Systems Verification, Validation and Testing Workshop Proceedings, AAAI-90, The MIT Press, Cambridge, Massachusetts 02142, July 1990.
- Loiseau, S., *A Diagnosis Approach to Formulate Validation of Knowledge Based Systems*, Laboratoires de Recherche en Informatique, Universite Paris XI, Orsay, France.
- Lopez, B., P. Meseguer, and E. Plaza., *Knowledge Based Systems Validation: A State of the Art*, AI Communications Vol. 3, No. 2, pp. 58-72, June 1990.
- Lupton, L.R., J.J. Lipsett, R.A. Olmstead, and E.C. Davey, *A Foundation for Allocating Control Functions to Humans and Machines in Future Candu Nuclear Power Plants*, Presented at IAEA/NEA International Symposium on Balancing Automation and Human Action in Nuclear Power Plants, Munich, Federal Republic of Germany, July 9-13, 1990, Atomic Energy of Canada Limited - Research Company, Chalk River, Ontario, Canada K0J 1J0
- Majumdar, C., D. Majumdar, and J.I. Sackett, Eds., *Artificial Intelligence and Other Innovative Computer Applications in the Nuclear Industry*, Plenum Press, New York, New York, 1988.
- Mallion, Brigadier General R., and G.E. Bradley, *Joint Interoperability Test Center: Fort Hauchuca, Arizona*, ITEA Journal, Vol. 11, No. 1, pp. 20-24, 1990.
- Marcus, S., *SALT: A Knowledge Acquisition Tool that Checks and Helps Test a Knowledge Base*, Validation and Testing Knowledge-Based Systems Workshop Proceedings, AAAI-88. The MIT Press, Cambridge, Massachusetts 02142, August 1988.
- Mars, N.J. I., and P.L. Miller, *Tools for Knowledge Acquisition and Verification in Medicine*, Proceedings - the Tenth Annual Symposium on Computer Applications in Medical Care, Washington, D.C., October 25-26, IEEE Service Center, Piscataway, New Jersey 08854, pp. 36-42, 1986.
- Martin, J. and J.J. Odell., *Object-Oriented Analysis & Design*, Prentice Hall, Englewood Cliffs, NJ, 1992.
- Mata, P. and P.G. Sedano, *Analysis of Cofrentes Abnormal Plant Transients with Retran-02 and Retran-03*, Nuclear Technology, Vol. 100, November 1992.
- May, R.S., *EPRI Guide for Verification and Validation of Critical Function Software*, Draft, Prepared for EPRI Computer Products Group, S. Levy Inc., Electric Power Research Institute, Palo Alto, California, June 6, 1991.
- McCabe, T., *A Complexity Measure*, IEEE Transactions on Software Engineering, Vol. SE-2(4), pp. 308-320, 1976.
- McGarry, F., *The Software Life-Cycle -- Models and Management of Software Development*, Presentation to the U.S. Nuclear Regulatory Commission's Advisory Committee on Reactor Safeguards, Subcommittee meeting on Software Development and Design Concepts, Bethesda, Maryland, August 20-21, 1992.

McGuire, J.G., and R. Stiles, *Detecting Interference in Knowledge Base Systems*, Intelligent Systems Review, Vol. II, No. 314, IEEE Service Center, Piscataway, New Jersey 08854, 1991.

McGuire, J.G., *Uncovering Redundancy and Rule-Inconsistency in Knowledge Bases via Deduction*, Presented at the Fifth Annual Conference on Computer Assurances: Systems Integrity, Software Safety, and Process Security, IEEE COMPASS-90, June 1990.

Mehrotra, M., and C. Wild, *Multi-Viewpoint Clustering Analysis*, Phase-I SBIR Grant, NASA Johnson Space Center, Houston, Texas.

Mehrotra, M., *Rule Groupings: A Software Engineering Approach Towards Verification of Expert Systems*, NASA Contractor Report 4372, contract NAS1-18585, NASA Johnson Space Center, Houston, Texas, May 1991.

Mehrotra, M., and S.C. Johnson, *Importance of Rule Groupings in Verification of Expert Systems*, Knowledge Based Systems Verification, Validation and Testing Workshop Proceedings, AAAI-90, The MIT Press, Cambridge, Massachusetts 02142, July 1990.

Meyer, B., *Object-Oriented Software Construction*, Prentice Hall, Englewood Cliffs, NJ, 1988.

Michalski, R.S., and J.B. Larson, *Incremental Generation of VLI Hypotheses: The Underlying Methodology and the Description of Program AQ11*, Reports of the Intelligent Systems Group ISG 83-5, Department of Computer Science, University of Illinois at Urbana-Champaign, Urbana-Champaign, Illinois, January 1983.

MIL-STD-1629A, Notice 2, *Military Standard, Procedures for Performing a Failure Mode Effects and Criticality Analysis*, Department of Defense, Washington, D.C. 20362, November 28, 1984.

Miller, L.A., *Verification and Validation of Expert Systems*, Invited paper presented at the U.S. Army Test and Evaluation Command Conference on AI, Sierra Vista, Arizona, Science Applications International Corporation, 1710 Goodridge Drive, McLean, Virginia 22102, January 15, 1992.

Miller, L.A., E. Groundwater, and S. Mirsky, *Guidelines for Verification and Validation of Expert Systems. Task 1: Review of Conventional Methods*, Draft, Science Applications International Corporation, 1710 Goodridge Drive, McLean, Virginia 22102, April 19, 1991.

Miller, L.A., *Expert System Verification and Validation for Nuclear Power Industry Applications*, Presentation of American Nuclear-Society Winter Meeting, November 1990.

Miller, L.A., *A Realistic Industrial-Strength Life-Cycle Model for Knowledge-Based System Development and Testing*, Knowledge Based Systems Verification and Validation Workshop Proceedings, AAAI-90, The MIT Press, Cambridge, Massachusetts 02142, July 1990.

Miller, L.A., J. Hayes, and S. M. Mirsky, *Task 7: Guidelines for the Verification and Validation of Artificial Intelligence Software Systems*, Report prepared for United States Nuclear Regulator Commission and the Electric Power Research Institute, May 1993.

Miller, L.A., J. Hayes, and S. M. Mirsky, *Guidelines of the Verification and Validation of Artificial Intelligence Software Systems. Draft Task 4*, Science Applications International Corporation, Prepared for U.S. Nuclear Regulatory Commission and The Electric Power Research Institute, March 26, 1993.

Miller, L.A., J.E. Hayes, and S.M. Mirsky, *Guidelines for Verification and Validation of Expert Systems. Task 6: Knowledge Base Certification*, Science Applications International Corporation for U.S. Nuclear Regulatory Commission and Electric Power Research Institute, February 1993.

Miller, L.A., *Making Sure Expert Systems Do What They Are Supposed to Do*, Presentation to American Power Conference, Sponsored by EPRI, Science Applications International Corporation, 1710 Goodridge Drive, McLean, Virginia 22102, April 23-25, 1990.

Miller, L.A., *Behavioral Studies of the Programming Process*, IBM Research Report, Rc7367, International Business Machines (IBM), Yorktown Heights, New York, 1978.

Miller, L.A., *Naive Programmer Problems with Specification of Transfer-of-control*, National Computer Conference Proceedings, Anaheim, California, Science Applications International Corporation, 1710 Goodridge Drive, McLean, Virginia 22102, pp. 657-663, 1975.

Miller, L.A., *Programming By Non-Programmers*, International Journal of Man Machine Studies, 6, pp. 237-260, 1974.

Miller, L.A., *Dynamic Testing of Knowledge Bases Using the Heuristic Testing Approach*. *Expert Systems with Applications: An International Journal*, Special Issue: Verification and Validation of Knowledge-Based Systems, Vol. 1, No. 3, pp. 249-269, 1990.

Miller, L.A., *Testing and Evaluation of Expert Systems*, Paper distributed at the Fourth IEEE Conference on AI Applications, San Diego, California, The Computer Society of the IEEE, P.O. Box 80452, Worldway Postal Center, Los Angeles, California 90080, March 18, 1988.

Miller, L.A., *New Challenges for the Validation and Verification of Knowledge-Based Systems*, American Association for Artificial Intelligence Panel Presentation: Issues in Validation of Knowledge-Based Systems, Reno, Nevada, Science Applications International Corporation, 1710 Goodridge Drive, McLean, Virginia 22102, January 1989.

Miller, E., *Better Software Testing*, Proceedings of Third International Conference on Software for Strategic Systems, February 27-28, pp. 1-7, Huntsville, Alabama, 1990.

Miller, L.A., *A Comprehensive Approach to the Verification and Validation of Knowledge-Based Systems*, Submission to IJCAI Workshop on Verification, Validation and Testing of Knowledge-Based Systems, Morgan Kaufmann Publishers, Inc., Palo Alto, California 94303, August 1989.

Miller, L.A., *Verification and Validation of Knowledge-based Systems with Emphasis on Life-Cycle*, Technical Report, Science Applications International Corporation, 1710 Goodridge Drive, McLean, Virginia 22102, August 1989.

Miller, L.A., *Tutorial on Validation and Verification of Knowledge-Based Systems*, Proceedings of the Conference on Expert Systems Applications for the Electric Power Industry, Science Applications International Corporation, 1710 Goodridge Drive, McLean, Virginia 22102, June 1989.

Miller, L.A., *Guidelines for the Verification and Validation of Artificial Intelligence Software Systems*, Presented at George Washington University, Science Applications International Corporation, 1710 Goodridge Drive, McLean, Virginia 22102, April 21, 1993.

Mills, H., V. Basili, J. Gannon, and R. Hamlet, *Principles of Computer Programming: A Mathematical Approach*, William C. Brown, New York, New York, 1987.

Milner, R., *A Calculus of Communicating Systems*, Laboratory for the Foundations of Computer Science, Edinburgh University Report No. ECCS-LFCS-86-7, University of Edinburgh, Scotland, 1986.



Mirsky, S.M., J.E. Hayes, and L.A. Miller, *Guidelines for Verification and Validation of Expert Systems, Task 8: Validation Scenarios, Draft*, Science Applications International Corporation for U.S. Nuclear Regulatory Commission and Electric Power Research Institute, June 1993.

Modjeski, R.B., and A.C. Ward, *Testing the Limits: The Application of Artificial Intelligence to Test and Evaluation*, ITEA Journal, Vol. 11, No. 3, pp. 29-33, 1990.

Moninger, W.R., T.R. Stewart, and P. McIntosh, *Validation of Knowledge-based Systems for Probabilistic Forecasting*, Validation and Testing Knowledge-Based Systems Workshop Proceedings, AAAI-88, The MIT Press, Cambridge, Massachusetts 02142, August 1988.

Montalban, M., and I. Jebel, *Outils d'Aide a la Validation de Bases de Connaissances. Specification de la Representation du Controle et des Interfaces Graphiques Adaptees (Tools for Validating Knowledge Bases, Specification of Inspection Graphing and Adapted Graphic Interfaces)*, Centre National de la Recherche Scientifique, Paris, France, July 1, 1989.

Montalban, M., *Decision Tables*, Science Research Associates, Inc., Chicago, Illinois, 1974.

Moradian, A., P.L. Wilhelm, and S.S. Palusamy, *Artificial Intelligence Applications to Electric Power Plant On-Line Diagnostics*, Pacific Rim International Conference on Artificial Intelligence, Westinghouse Electric Corporation, Orlando, Florida 32817, 1990.

Moradian, A., E.D. Thompson, M.A. Jenkins, G.H. Tomlinson, and T. Trepagnier, *On-Line AI Diagnostics for Utility Generating Stations*, Society for Electric Power Research and Implementation (SEPRI), Westinghouse Electric Corporation, Orlando, Florida, 32817.

Moradian, A., R.F. Gray, and P.L. Wilhelm, *Generator Artificial Intelligence Diagnostics On-Line Experience*, Proceedings of the 4th Incipient Failure Detection Conference, Electric Power Research Institute, Palo Alto, California.

Morell, L.J., *Use of Metaknowledge in the Verification of Knowledge-Based Systems (Final Report)*, College of William and Mary, Williamsburg, Virginia, Grant GT 47-003-029, NASA Contractor Report 181821, April 1989.

Morell, L.J., *Theoretical Insights into Fault-based Testing*, Internal Research Paper, College of William and Mary, Williamsburg, Virginia.

Moriconi, R., *A Designer/Verifier's Assistant*, Readings in Artificial Intelligence and Software Engineering, (Ed.), C. Rich, and R.C. Waters, Morgan Kaufmann Publishers, Los Altos, California, pp. 335-350, 1986.

Morison, W.G., M.T. McPhedran, and E.F. Fenton, *Utilization of Computers in the Control of Ontario Hydro Nuclear Plants*, Presented at ANS Topical Meeting on Computer Applications for Nuclear Power Plant Operations and Control.

Morrel, L.J., *Theory of Fault-Based Testing*, IEEE Transactions on Software Engineering, Vol. 16, No. 8, August 1990.

Motoda, H., *The Current Status of Expert System Development and Related Technologies in Japan*, IEEE Expert, pp. 3-11, August 1990.

Murter, J.S., *Integrating a Neural Network and Expert Diagnosis into Data Validation*, U.S. Army Combat Systems Test Activity, Aberdeen Proving Ground, Aberdeen, Maryland.

Myers, R.M., *Verification of Expert Systems: A Preliminary Analysis*, Proceedings of ROBEXS '87 Third Annual Workshop on Robotics and Expert Systems, ISA (Robotics & Expert Systems V.3), Research Triangle Park, North Carolina, pp. 231-239, June 1987.

Myers, G.J., *The Art of Software Testing*, Wiley, New York, New York, 1979.

Naser, J.A. (Ed.), *Expert System Applications for the Electric Power Industry*, Hemisphere Publishing Corporation, New York, New York, 1991.

Naser, J., S. Bhatt, B. Su, and R. May, *Digital Software Verification and Validation Methodologies and Tools*, Proceedings of the American Power Conference, April/May 1991, pp. 602-605, Electric Power Research Institute, Palo Alto, California.

Naser, J.A., *Nuclear Power Plant Expert System Verification & Validation*, Validation and Testing Knowledge-Based Systems Workshop Proceedings, AAAI-88, The MIT Press, Cambridge, Massachusetts 02142, August 1988.

National Aeronautical and Space Administration, *Space Station Freedom Program Human-Computer Interface Guidelines*, NASA USE 1000, Version 2.1, NASA, Reston, Virginia, 1989.

Nazareth, D.L., *Discussion of Empirical Methods in Expert System Validation*, Knowledge Based Systems Verification and Validation Workshop Proceedings, AAAI-90, The MIT Press, Cambridge, Massachusetts 02142, July 1990.

Nazareth, D.L., *Issues in the Verification of Knowledge in Rule-Based Systems*, International Journal of Man-Machine Studies, Vol. 30 No. 3, pp. 255-271, March 1989.

Nazareth, D.L., *Verification of Rule-Based Knowledge Using Directed Graphics*, University of Wisconsin-Milwaukee, School of Business Administration, Milwaukee, Wisconsin, May 1990.

NBS 500-93, *Software Validation, Verification, and Testing Technique and Tool Reference Guide*, The National Institute of Standards and Technology Computer Systems Laboratory, Gaithersburg, Maryland 20899, September 1982.

NBS-500-75, *Validation, Verification, and Testing of Computer Software*, The National Institute of Standards and Technology Computer Systems Laboratory, Gaithersburg, Maryland 20899, February 1981.

NBS-500-98, *Planning for Software Validation, Verification and Testing*, The National Institute of Standards and Technology Computer Systems Laboratory, Gaithersburg, Maryland 20899, November 1982.

Neches, R., W.R. Swartout, and J. Moore, *Enhanced Maintenance and Explanation of Expert Systems through Explicit Models of their Development*, IEEE Transactions of Software Engineering, Vol. SE-11 No. 11, pp. 1337-1351, November 1985.

Neches, R., W.R. Swartout, and J. Moore, *Explainable (and Maintainable) Expert Systems*, IJAC-85, Proceedings of the Ninth International Joint Conference on Artificial Intelligence, Vol. 1, Morgan Kaufmann Publishers, Inc., Palo Alto, California 94303, pp. 382-389, August 1985.

Nelson, W.R., and H.S. Blackman, *Response Tree Evaluation: Experimental Assessment of an Expert System for Nuclear Reactor Operators*, NUREG/CR-4272, U.S. Nuclear Regulatory Commission, September 1985.

Nelson, R., *Expert System to be Tested for Plant Control and Heat Rate Optimization. Controls and Automation Update*, p. 3, Electric Power Research Institute, Palo Alto, California, October 1989.

Neumann, P.G., *Whither Formal Methods?*, Position paper for FM-89, Workshop on Formal Methods, July 23-27, Halifax, Nova Scotia, 1989.

Neumann, P.G., *Illustrative Risks to the Public in the Use of Computer Systems and Related Technology*, Position Paper for FM-89, Workshop on Formal Methods, July 23-27, 1989, Halifax, Nova Scotia.

Ng, P., and R. Yeh (Eds.), *Modern Software Engineering: Foundations and Current Perspectives*, Van Nostrand Reinhold, New York, New York, 1990.

Nguyen, T.A., W.A. Perkins, T.J. Laffery, and D. Pecora, *Knowledge Base Verification*, AI Magazine, Vol. 8, No. 2, pp. 69-75.

Nguyen, T.A., *Verifying Consistency of Production Systems*, Proceedings of the Third Conference on Artificial Intelligence Applications, Washington, D.C., IEEE Service Center, Piscataway, New Jersey 08854, February 1987.

Nguyen, T.A., W.A. Perkins, T.J. Laffey, and D. Pecora, *Checking an Expert Systems Knowledge Base For Consistency and Completeness*, IJAC-85, Proceedings of the Ninth International Joint Conference on Artificial Intelligence, Vol. 1, pp. 375-378, Morgan Kaufmann Publishers, Inc., Palo Alto, California 94303, August 1985.

Nicoud, S., *Requirements for a Database System to Support Development of Large-Scale, Expert Systems*, Validation and Testing Knowledge-Based Systems Workshop Proceedings, AAAI-88, The MIT Press, Cambridge, Massachusetts 02142, August 1988.

Nicoud, J., and P. Fah, *Common Assembly Language for Micro-Processors, CAM3*, Draft 3.3, EFPL, Lausanne, Switzerland, 1983.

Nijssen, G.M. and I.A. Halpin, *Conceptual Schema and Relational Database Design*, prentice Hall, Englewood Cliffs, New Jersey, 1989.

Norman, D.A., and S.W. Draper (Eds.), *User-Centered System Design: New Perspectives on Human-Computer Interaction*, Lawrence Erlbaum Associates, Hillsdale, New Jersey, 1986.

Norris, W., *Electronic Combat Operational Effectiveness Testing*, ITEA Journal, Vol. 11 No. 1, pp. 53-58, 1990.

NSAC-39, *Verification and Validation for Safety Parameter Display Systems*, Nuclear Safety Analysis Center, Atlanta, Georgia, December 1981.

NSAC-40, *Accident Sequences for Design, Validation, and Training-Safety Parameter Display System*, Science Applications International Corporation for Nuclear Safety Analysis Center, Nuclear Safety Analysis Center, Atlanta, Georgia, April 1982.

NSPSAD-8102NP, *Reload Safety Evaluation Methods for Application to PI Unites*, Northern States Power Company, December 1981.

NTH-G-6, *Topical Report - RETRAN Code Transient Analysis Model Qualification*, Florida Power & Light Company, July 1985.

Nuclear Engineering International, *Sizewell B Reactor Protection Reliability: Nuclear Electric Presents Its Case*, Nuclear Engineering International, March 1993.

NUREG/CR-4640, PNL-5784, *Handbook of Software Quality Assurance Techniques Applicable to the Nuclear Industry*, August 1987.

NUREG/CR-4674, Vol. 15 and 16, *Precursors to Potential Severe Core Damage Accidents: 1991 A Status Report*, September 1992.

NUREG/CR-4454, *RELAP5/MOD2 Code Assessment at the Idaho National Engineering Laboratory*, March 1986.

NUREG/CR-4428, *Overview of TRAC-BD1/MOD1 Assessment Studies*, EG&G Idaho, November 1985.

NUREG/CR-6018, EPRI TR-102106, Miller, L.A., E. Groundwater, and S.M. Mirsky, *Survey and Assessment of Conventional Software Verification and Validation Methods*, April 1993.

NUREG/CR-5977, *A Performance Indicator of the Effectiveness of Human-Machine Interfaces for Nuclear Power Plants*, Moray, N., B.J. Jones, J. Rasmussen, J.D. Lee, K.J. Vicente, R. Brock, and T. Djemil, January 1993.

NUREG/CR-5930, *High Integrity Software Standards and Guidelines*, Wallace, D.R., L.M. Ippolito, and D.R. Kuhn, September 1992.

NUREG/CR-4227, *Human Engineering Guidelines for the Evaluation and Assessment of Video Display Units*, W. Gilmore, July 1985.

NUREG/CR-4195, *Overview of TRAC-PD2 Assessment Calculations*, EG&G Idaho, November 1985.

NUREG/CR-4196, *Overview of TRAC-BD1 (Version 12) Assessment Studies*, EG&G Idaho, April 1985.

NUREG/CR-4359, *Independent Assessment of TRAC-PF1 (Version 7.0), RELAP5/MOD1 (Cycle 14), and TRAC-BD1 (Version 12) Codes Using Separate-Effects Experiments*, Brookhaven National Laboratory, August 1985.

NUREG-0653, *Report on Nuclear Industry Quality Assurance Procedures for Safety Analysis Computer Code Development and Use*, August 1980.

NUREG-0800, *USNRC Standard Review Plan, Chapter 15*, revised July 1981.

NUREG-1272, *Annual Report*, USNRC Office for Analysis and Evaluation of Operational Data 1991, Vol. 6, No. 1, July 1992.

NUSCO 140-1, *NUSCo Thermal Hydraulic Model Qualification Volume I (RETRAN)*, Northeast Utilities Service Company, August 1, 1984.

O'Keefe, R.M., and S. Lee, *An Integrative Model of Expert System Verification and Validation*, Expert Systems with Applications, Special Issue: Verification and Validation of Knowledge-Based Systems, Vol. 1, No. 3. pp. 231-236, 1990.

O'Keefe, R.M., and D.E. O'Leary, *The Verification and Validation of Expert Systems*, Technical Report, Technical Report of Rensselaer Polytechnic Institute, Pittsburgh, Pennsylvania, 1991.

O'Keefe, R.M., *Issues in the Verification and Validation of Knowledge-Based Systems*, Technical Report No. 37-92-334, Technical Report of Rensselaer Polytechnic Institute, Pittsburgh, Pennsylvania, September 1992.

O'Keefe, R.M., O. Balci, and E.P. Smith, *Validating Expert System Performance*, IEEE Expert, pp. 81-90, Winter 1987.

O'Keefe, R.M., *The Effect of Knowledge Representation Schemes on Maintainability of Knowledge-Based Systems*, Technical Report No. 37-92-327, Technical Report of Rensselaer Polytechnic Institute, Pittsburgh, Pennsylvania, August 1992.

O'Keefe, R.M., *A Systems View of Validating Expert Knowledge Systems*, Validation and Testing Knowledge-Based Systems Workshop Proceedings, AAAI-88, The MIT Press, Cambridge, Massachusetts 02142, August 1988.

O'Leary, D.E., and R. O'Keefe, *Verifying and Validating Expert Systems, Tutorial Program*, Eleventh International Joint Conference on Artificial Intelligence, University of Southern California, Los Angeles, California, August 1989.

O'Leary, T.J., M. Goul, K.E. Moffitt, and E.E. Radwon, *Validating Expert Systems*, IEEE Expert Vol 5, No 3, pp. 51-58, June 1990.

O'Leary, D.E., and N.A. Kanderin, *Validating the Weights in Rule-Based Expert Systems: a Statistical Approach*, International Journal of Expert Systems Research and Applications, Vol. 1, No. 3, pp. 253-279, 1988.

O'Leary, D.E., *Determining the Existence of Difference in Expert Judgement*, Knowledge Based Systems Verification, Validation and Testing Workshop Proceedings, AAAI-90, The MIT Press, Cambridge, Massachusetts 02142, July 1990.

O'Leary, D.E., *Methods of Validating Expert Systems*, Interfaces, Vol. 18, No. 6., pp. 72-79, Nov-Dec 1988.

O'Leary, D.E., *Extended Abstract - A Computer Intensive Statistics Approach to Validating Expert Systems*, Verification, Validation and Testing of Knowledge-Based Systems Workshop Proceedings, IJCAI-89, Morgan Kaufmann Publishers, Inc., Palo Alto, California 94303, August 1989.

O'Leary, D.E., *Verification of Frame-based Knowledge Base*, Knowledge Based Systems Verification, Validation and Testing Workshop Proceedings, AAAI-90, The MIT Press, Cambridge, Massachusetts 02142, July 1990.

O'Neil, M., and A. Glowinski, *Evaluating and Validating Very Large Knowledge-Based Systems*, Medical Informatics, Vol 15, No 3, pp. 237-251, July/September 1990.

Oakes, L., *Transition from Analog to Digital Technologies*, Presentation at the JTEC Workshop on Assessment of European Nuclear Controls and Instrumentation, NSF, Washington, DC, The National Science Foundation, Washington, D.C. 20031, January 31, 1991.

Odubiyi, J.B., *Probability Based Dependency-Directed Backtracking: An Approach for Developing a Quality Metric for a Knowledge-Based System*, Knowledge Based Systems Verification, Validation and Testing Workshop Proceedings, AAAI-90, The MIT Press, Cambridge, Massachusetts 02142, July 1990.

Odubiyi, J.B., *Probability Based Dependency-Directed Backtracking: An Approach for Developing a Quality Metric for a Knowledge-Based System*, PhD. Thesis, Kennedy-Western University, April 1990. WHERE IS KW Univ?

Olason, H., and L.F. Pau, *Visual Logic Programming*, Journal of Visual Languages and Computing, 2, 1991.

Oliver, A.E.M., *Techniques for Expert System Testing and Validation*, Third International Expert Systems Conference, pp. 271-276, Learned Inf., Oxford, United Kingdom, June 1987.

Omar, A., and F. Mohammed, *A Survey of Software Functional Testing Methods*, ACM SIGSOFT Software Engineering Notes, Vol. 16, No. 2, pp. 75-82, 1991.

Osborne, Dr. R.L., *Online, Artificial Intelligence-Based Turbine Generator Diagnostics*, AI Magazine Vol. 7 No. 4, pp. 97-103, Fall 1986.

Ostrand, T.J., and M.J. Balcea, *The Category-Partition Method for Specifying and Generating Functional Tests*, Communications of the ACM, Vol 31, No. 6, pp. 676-686, June 1988.

Oxman, S.W., *Reporting Chemical Spills: An Expert Solution*, AI Expert, pp. 50-51, May 1991.

Oyeleye, O., *Qualitative Modeling of Continuous Chemical Processes and Applications to Fault Diagnosis*, Ph.D Dissertation, Massachusetts Institute of Technology, February 1990.

Park, Y.T., and D.C. Wilkins, *Establishing the Coherence of an Explanation to Improve Refinement of an Incomplete Knowledge Base*, AAAI-90, Proceedings Eighth National Conference on Artificial Intelligence, Vol. 1, pp. 511-516, The MIT Press, Cambridge, Massachusetts 02142, July 1990.

Parnas, D.L., G.J.K. Asmis, and J.D. Kendall, *Reviewable Development of Safety Critical Software*, Presented at the International Conference on Control & Instrumentation in Nuclear Installations, Glasgow, Telecommunication Research Institute of Ontario, Queen's University, Kingston, Ontario, Canada K7L 3N7, May 1990.

Parnas, D.L., A.J. van Schouwen, and S.P. Kwan, *Evaluation Standards for Safety Critical Software*, Technical Report 88-220, ISSN-0836-0227, Department of Computing & Information Science, Queen's University, Kingston, Ontario, Canada K7L 3N7, 1988.

Parnas, D.L., A.J. van Schouwen, and S.P. Kwan, *Evaluation of Safety-Critical Software*, J. Rushby (Ed.), Communications of the ACM, Vol 33, No. 6, pp. 636-648, June 1990.

Parnas, D.L., D.G. Smith, and T. Pearce, *Making Formal Software Documentation More Practical: A Progress Report*, Technical Report #88-236, ISSN 0836-0227, November 1988, Department of Computing and Information Science, Queen's University, Kingston, Ontario, Canada K7L 3N7.

Parnas, D.L., A.J. van Schouwen, and P. Kwan, *Evaluation of the Shutdown Software for Darlington, Final Report, Volume 1, (AECB Regulatory Support Project 2.127.2)*, Queen's University, Kingston, Ontario, Canada, Telecommunication Research Institute of Ontario, Queen's University, Kingston, Ontario, Canada K7L 3N7.

Parnas, D., and W. Bartussek, *Using Traces to Write Abstract Specifications For Software Modules*, Lecture notes in Computer Science (65), Information System Methodology Proceedings IOS, Springer Verlag, New York, New York, 1978.

Parnas, D.L., and P.C. Clements, *A Rational Design Process: How and Why to Fake It*, IEEE Transactions on Software Engineering, Vol. SE-12, No. 2, pp. 251-257, February 1986.

Parnas, D.L., *Progress Report, AECB Contract 2.117.1 Software Standards*, Computing & Information Science, Telecommunication Research Institute of Ontario, Queen's University, Kingston, Ontario, Canada K7L 3N7, March 30, 1989.

Parsaye, K., *Acquiring & Verifying Knowledge Automatically*, AI Expert, Vol. 3, No. 5, pp. 48-63, May 1988.

PATHFINDER, Advanced Computing Technology, Inc. *Realm: Validation and Verification Plan, Revision 3*, PATHFINDER, Advanced Computing Technology, Inc., Jacksonville, Florida 32216, April 1991.

Pau, L.F., *Prototyping, Validation and Maintenance of Knowledge Based Systems Software*, Third Annual Expert Systems in Government Conference - Proceedings, IEEE Service Center, Piscataway, New Jersey 08854, pp. 248-253, October 1987.

Pazzani, M.J., *A Set Covering Approach to Testing Rule-Based Expert Systems*, Knowledge Based Systems Verification, Validation and Testing Workshop Proceedings, AAAI-90, The MIT Press, Cambridge, Massachusetts 02142, July 1990.

Pazzani, M.J., and C.A. Brunk, *Detecting and Correcting Errors in Rule-Based Expert Systems: An Integration of Empirical and Explanation-based Learning*, Technical Report 90-38, Proceedings of the 5th AAAI Knowledge

Acquisition for Knowledge-Based Systems Workshop, The MIT Press, Cambridge, Massachusetts 02142, November 1990.

Pearce, D.A., *The Introduction of Fault Diagnosis Systems from Qualitative Models*, AAAI-88, Vol. 2, the Turing Institute, Glasgow, Scotland, The MIT Press, Cambridge, Massachusetts 02142, .

Perry, W.E., *Effective Methods of EDP Quality Assurance, 2nd Edition*, QED Information Sciences Incorporated, 1987.

Peters, L., *Timing Extensions to Structured Analysis for Real-Time Sysyets*, pp. 83-90, IEEE Computer Society, Order Department, 10662 Los Vaqueros Circle, Los Alamitos, California 90720-2578.

Peterson, G.E., *Object-Oriented Computing. Volume 2: Implementations* of the IEEE, Washington, DC, 1987.

Peterson, G.E., *Object-Oriented Computing. Volume 1: Concepts*. Computer Society Press of the IEEE, Washington, DC, 1987.

Peterson, I., *Finding Fault: The Formidable Task of Eradicating Software Bugs*, Science News, Vol. 139, No. 7, pp. 104-106, February 1991.

Pipard, E., *Detection Des Contradictions Dans Les Bases De Connaissances*, Universite Paris sud, pp. 997-1010, Universite Paris sun, U.A. 410 C.N.R.S., Bat. 490, 91405 Orsay, France.

Place, P.R.H., W.G. Wood, and M. Tudball, *Survey of Formal Specification Techniques for Reactive Systems*, Technical Report, CMU/SEI-90-TR-5, ESD-TR-90-206, Carnegie-Mellon University, Software Engineering Institute, Carnegie-Mellon University, Pittsburgh, Pennsylvania.

Plant, R.T., and D. Gold, *Increasing Expert System Reliability Through the Use of a Formal Specification*, Knowledge Based Systems Verification, Validation and Testing Workshop Proceedings, AAAI-90, July 1990, The MIT Press, Cambridge, Massachusetts 02142.

Poore, J.J., and H.D. Mills, *An Overview of the Cleanroom Software Development Process*, Position paper for FM-89, Workshop on Formal Methods, July 23-27, 1989, Halifax, Nova Scotia.

Porter, J.F., L.C. Kingsland III, D.A.B. Lindberg, I. Shah, J.M. Bengé, S.E. Hazelwood, D.R. Kay, M. Homma, M. Akizuki, M. Takano, and G.C. Sharp, *The AI/RHEUM knowledge-based Computer consultant System in Rheumatology: Performance in the Diagnosis of 59 Connective Tissue Disease Patients from Japan*, Arthritis and Rheumatism, Vol 31, No. 2, pp. 219-226, February 1988.

Preece, A.D., *A New Approach to Detecting Missing Knowledge in Expert System Rule Bases*, Submitted to the International Journal of Man-Machine Studies, Concordia University, Montreal, Canada H3G 1M8, November 1990.

Preece, A.D., *The COVER User Manual*, Center for Pattern Recognition and Machine Intelligence (CENPARMI), Concordia University, Montreal, Canada. COVER version 4.1, release 1, Concordia University, Montreal, Canada H3G 1M8, May 1991.

Preece, A.D., *The Role of Specifications in Expert System Evaluation*, Knowledge Based Systems Verification, Validation and Testing Workshop Proceedings, AAAI-90, The MIT Press, Cambridge, Massachusetts 02142, July 1990.

Preece, A.D., F. Shinghal, and A. Batarek, *Verifying Expert Systems: a Logical Framework and a Practical Tool*, Invited paper to appear in the Journal Expert Systems with Applications, Special Issue for the First World Congress on Expert Systems, Department of Computer Science, Concordia University, Montreal, Canada H3G 1M8, Summer 1992.

Preece, A.D., C. Grossner, P.G. Chander, and T. Radhakrishnan, *Structural Validation of Expert Systems: Experience Using a Formal Model*, AAAI-93, Workshop on Validation and Verification of Knowledge-Based Systems, Computer Science Department, Concordia University, Montreal, Quebec, Canada, The MIT Press, Cambridge, Massachusetts 02142, July 1993.

Preece, A.D., and R. Shinghal, *Practical Approach to Knowledge Base Verification*, Ed. M. Trivedi, Proceedings of Applications of Artificial Intelligence IX, pp. 608-619, Concordia University, Montreal, Canada H3G 1M8, April 1991.

Preece, A.D., *Towards a Methodology for Evaluating Expert Systems*, Expert Systems, Vol. 7, No. 4, pp. 215-223, November 1990.

Prerau, D.S., *Developing and Managing Expert Systems: Proven Techniques for Business and Industry*, Addison-Wesley Publishing Company, New York, New York, 1990.

Pritsker, A.A.B., *Introduction to Simulation and SLAMII*, John Wiley and Sons, New York, New York, 1986.

*Proceedings of the ACM SIGSOFT'89 Third Symposium on Software Testing, Analysis, and Verification*, R. A. Kemmerer. (Ed.), Vol. 14, No. 8, ACM Order Department, P.O. Box 64145, Baltimore, Maryland 21264, December 1989.

*Proceedings of the International Workshop on Artificial Intelligence for Industrial Applications*, Institute of Electrical and Electronic Engineers, Inc., Hitachi City, Japan, IEEE, Order Dept., Piscataway, New Jersey 08854, May 1988.

Quinlan, J.R., *Induction of Decision Trees*, Machine Learning 1, Kluwer Academic Publishers, Boston, Manufactured in The Netherlands, pp. 81-106, 1986.

Radwan, A.E., M. Goul, T.J. O'Leary, and K.E. Moffitt, *Verification Approach for Knowledge-Based Systems*, Transportation Research, Part A: General Vol 23A, No. 4, pp. 287-300, July 1989.

Rajamoney, S., and G. DeJong, *The Classification, Detection and Handling of Imperfect Theory Problems*, IJCAI'87, Proceedings of the Tenth International Joint Conference on Artificial Intelligence, Vol. 1, Milan, pp. 205-207, Morgan Kaufmann Publishers, Inc., Palo Alto, California 94303, August 1987.

Ramadege, P.J., and W.M. Worham, *Supervisory Control of a Class of Discrete Event Processes*, Society for Industrial and Applied Mathematics, Vol. 25, No. 1, pp. 206, January 1987.

Ramadege, P.J., and W.M. Worham, *Modular Feedback Logic for Discrete Event Systems*, Society for Industrial and Applied Mathematics, Vol. 25, No. 5, pp. 1202, September 1987.

Rannem, S., and E. Hung, *On Factors Contributing to Quality of Nuclear Control Computer Software*, Ontario Hydro, Toronto, Canada.

Rapps, S., and E.J. Weyuker, *Selecting Software Test Data Using Data Flow Information*, IEEE Transactions on Software Engineering, SE-11(4), pp. 367-375, April 1, 1985.

Rapps, S., and E.J. Weyuker, *Data Flow Analysis Techniques for Test Data Selection*, Sixth International Conference on Software Engineering, Tokyo, pp. 159-166, September 13-16, 1982.



Rasmussen, J., and K.J. Vicente, *Cognitive Control of Human Activities and Errors: Implications for Ecological Interface Design*, Presented at The Fourth International Conference on Event Perception and Action, Trieste, Italy, August 24-28, 1987, Riso National Laboratory, Roskilde, Denmark, 1987.

Rattray, C. (Ed.), *Specification and Verification of Concurrent Systems*, Springer-Verlag, New York, New York, 1990.

Real-Time Intelligent Systems Corporation (The), *User's Manual: Activation Framework Operating System Environment AFC Version 2.5*, The Real-Time Intelligent Systems Corporation, Worcester, Massachusetts 01606, 1991.

Real-Time Intelligent Systems Corporation (The), *Reference Manual: Activation Framework Operating System Environment AFC Version 2.5*, The Real-Time Intelligent Systems Corporation, Worcester, Massachusetts 01606, 1991.

Redmill, F.J., Ed., *Dependability of Critical Computer Systems Volume 1*, Guidelines produced by The European Workshop on Industrial Computer Systems Technical Committee 7 (EWICS TC7), Elsevier Applied Science, New York, New York, 1988.

Redmill, F.J. (Ed.), *Dependability of Critical Computer Systems. Volume 2: Guidelines produced by the European Workshop on Industrial Computer Systems Technical Committee 7*, Elsevier Applied Science, New York, New York, 1989.

Regulation Guide 1.52 (Task IC 127-5) *Criteria for Programmable Digital Computer System Software in Safety-Related System of Nuclear Power Plants*, U.S. Nuclear Regulatory Commission, November 1985.

Reibam, A.L., and M. Veeraraghavan, *Reliability Modeling: An Overview for System Designers*, Computer, pp. 49-57, April 1991.

Reuland, W.B., *I&C Requirements and Standards Database (ICRS)*, Electric Power Research Institute, Generic Safety Analysis Program, Nuclear Safety Analysis Center, Palo Alto, California, Electric Power Research Institute, Palo Alto, California.

Ribar, G., F. Arcoleo, and D. Hollo, *LOAN PROBE: Testing a Big Expert System*, AI Expert, pp. 43-49, May 1991.

Richardson, K., and C. Wong, *Knowledge Based System Verification and Validation as Related to Automation of Space Station Subsystems: Rationale for a Knowledge Based System Lifecycle*, NASA, Marshall Space Flight Center, Third Conference on Artificial Intelligence for Space Applications, Part 2, pp. 25-30, National Technical Information Service, U.S. Department of Commerce, Springfield, Virginia 22161, June 1988.

Richter, G. and B. Maffeo, *Toward a Rigorous Interpretation of ESML-Extended Systems Modeling Language*, IEEE Transactions on Software Engineering, Vol. 19, No. 2, February 1993.

Ricks, W.R., and K.H. Abbott. *Evaluation of Knowledge-based Systems*, Validation and Testing Knowledge-Based Systems Workshop Proceedings, AAAI-88, The MIT Press, Cambridge, Massachusetts 02142, August 1988.

Rippon, S., *Three Computerized Control Rooms*, Nuclear News, pp. 60-63, October 1990.

Roe, R., and J. Rowland, *Some Theory Concerning Certification of Mathematical Subroutines by Black Box Testing*, IEEE Transactions Software Engineering, Vol. SE-13, No. 6, 1987.

Roetzheim, W.H., *Developing Software to Government Standards*, Prentice Hall, Inc., Englewood Cliffs, New Jersey, 1991.

Rolls-Royce and Associates Limited, *Review of Darlington Reactor Shut-Down System Software for AECCB, Canada*, Document No. RRA/10082, Rolls Royce and Associates Limited, Derby DE2 8BJ, Canada, 1989.

Roman, G-C., R.F. Gamble, and W. E. Ball, *Formal Derivation of Rule-Based Programs*, IEEE Transactions on Software Engineering, Vol. 19, No. 3, March 1993.

Roscoe, G.S., *9370 Expert System Configurator Knowledge Base Verification*, Fourth International Expert Systems Conference, London, United Kingdom, pp. 159-167, Learned Info. Center, Oxford, United Kingdom, June 1988.

Ross, D., *Structured Analysis (SA): A Language for Communicating Ideas*, IEEE Transactions on Software Engineering, SE-3(1), pp. 16-33 (SADT), 1977.

Rossomando, P.J., *Critique of the Paper: Importance of Rule Groupings in Verification of Expert Systems*, Proceedings Eighth National Conference on AI, AAAI-90, July 1990.

Rossomando, P.J., *A Knowledge Based Environment for the Verification and Validation of Knowledge Based Systems*, Verification, Validation and Testing of Knowledge-Based Systems Workshop Proceedings, IJCAI-89, Morgan Kaufmann Publishers, Inc., Palo Alto, California 94303, August 1989.

Rothschild, M.A., H.A. Swett, P.R. Fisher, G.G. Weltin, and P.L. Miller, *Exploring Subjective vs. Objective Issues in the Validation of Computer-based Critiquing Advice*, Computer Methods and Programs in Biomedicine, Vol. 31, No. 1., pp. 11-18, January 1990.

Rousset, M.C., *On the Consistency of Knowledge Bases: The COVADIS System*, Computational Intelligence, Special Issue, September 1988.

Rousset, M.C., *On the Coherence and Validity of Rule Bases in Expert Systems: COVADIS System*. Genie Logiciel & Systemes Experts, No. 10, pp. 76-80, January 1988.

Rushby, J., M.E. Stickel, and R.J. Waldinger, *Engineering for Artificial Intelligence Software*, SRI International, Contract No. R009406, SRI Project 7447, Final Report, SRI International, Menlo Park, California 94025, September 1990.

Rushby, J., and J. Crow., *Evaluation of an Expert System for Fault Detection, Isolation, and Recovery in the Manned Maneuvering Unit*, NASA Contractor Report 187466, Contract NAS1-18226, SRI International, Menlo Park, California 94025, December 1990.

Rushby, J., *Formal Specification and Verification of a Fault-Masking and Transient-Recovery Model for Digital Flight-Control Systems*, SRI International, SRI-CSL-91-03, CSL Technical Report, SRI International, Menlo Park, California 94025, June 1991.

Rushby, J., F. von Henke, and S. Owre, *An Introduction to Formal Specification and Verification Using EHDm*, SRI International, SRI-CSL-91-02, CSL Technical Report, SRI International, Menlo Park, California 94025, February 1991.

Rushby, J., and R.A. Whitehurst, *Formal Verification of AI (Artificial Intelligence) Software SRI International Final Report*, SRI International, Menlo Park, California 94025, February 1989.

Rushby, J., *Validation and Testing of Knowledge-Based Systems: How Bad Can it get?*, Validation and Testing Knowledge-Based Systems Workshop Proceedings, AAAI-88, The MIT Press, Cambridge, Massachusetts 02142, August 1988.

- Rushby, J., *Towards Dependable Knowledge-Based Systems*, Abstract for panel session: V&V of KBS's, Aerospace Sciences meeting, AIAA, Reno, Nevada, SRI International, Menlo Park, California 94025, January 1989.
- Rushby, J., *Verification and Validation of AI-Based Systems for Aerospace Applications*, Computer Science Laboratory, SRI International, Menlo Park, California 94025.
- Rushby, J., *Issues and Techniques in Formal Methods*, Computer Science Laboratory, SRI International, Menlo Park, California 94025.
- Rushby, J., *Quality Measures and Assurance for AI Software*, NASA Contractor Report 4187, SRI International, Menlo Park, California 94025, October 1988.
- Rushby, J., *An Introduction to Formal Specification and Verification Using EHDM*, SRI International, CSL Technical Report SRI-CSL-91-02, February 1991.
- Sanders, P., *Improving Test and Evaluation Effectiveness: Defense Science Board 1989 Summer Study*, ITEA Journal, Vol. 11, No. 2, pp. 28-33, 1990.
- Sary, C., L. Gilstrap, and L.G. Hull, *Expert System Development Methodology (ESDM)*, Presented at the 5th Conference on AI for Space Applications, Huntsville, Alabama, May 1990.
- Schnell, D.A., *Usability Testing of Screen Design: Beyond Standards, Principles, and Guidelines*, Proceedings of the Human Factors Society, 30th Annual Meeting, pp. 1212-1215, The Human Factors Society, Box 1369, Santa Monica, California 90406, 1986.
- Schulmeyer, G.G. and J.I. McManus, *Handbook of Software Quality Assurance*, Van Nostrand Reinhold, New York, New York, 1992.
- Schulmeyer, G., *Zero Defect Software*, McGraw-Hill Inc., New York, New York, 1990.
- Schultz, Dr. R.D., and J.R. Geissman, *Bridging the Gap Between Static and Dynamic Verification*, Submission to AAAI-88 Workshop on Validation and Testing of Knowledge-Based Systems, The MIT Press, Cambridge, Massachusetts 02142, August 1988.
- Schumaker, R., and L.C. Davis, *Expert Systems at the Navy Center for Applied Research in Artificial Intelligence (NCARAI)*, Expert Systems With Applications, Vol. 1, No. 1, pp. 71-77, 1990.
- Science Applications International Corporation, *SAIC Systems Engineering Presentation*, King of Prussia, Pennsylvania, April 6, 1990.
- Science Applications International Corporation, *Guidelines for Verification and Validation of Expert Systems, Task 1: Review of Conventional Methods*, draft, April 1991, Prepared for Nuclear Regulatory Commission and Electric Power Research Institute.
- Science Applications International Corporation, *Methodology for Software and System Reliability Prediction Final Report, Vol. 1, Findings*, Science Applications International Corporation, San Diego, California, May 1987.
- Science Applications International Corporation, *Software Reliability Prediction and Estimation Guidebook. Vol. 2*, Science Applications International Corporation, San Diego, California, May 1987.

Science Applications International Corporation, *Prairie Island Nuclear Generating Plant, Red Wing, Minnesota: Verification and Validation (V&V) Plan, Units 1 and 2*, Technical Report, Science Applications International Corporation, Huntsville, Alabama, February 1986.

Seale, M.R., *Summary Presentation of Relevant Work in Knowledge Base System (KBS) Management*, Intelligent Training Technology, Validation and Testing of Knowledge-Based Systems Workshop Proceedings, AAAI-88, The MIT Press, Cambridge, Massachusetts 02142, August 1988.

Seamster, T.L., S.A. Fleger, and D.R. Eike, *The Prototype Process and User Interface Design*, Science Applications International Corporation, 1710 Goodridge Drive, McLean, Virginia 22102, 1987.

Sebo, D., D. Marksberry, and M. Modarres, *RSAS: A Reactor Safety Assessment System. Proceedings of the Seventh Power Plan Dynamics, Control, and Testing Symposium*, IEEE, Knoxville, Tennessee, IEEE Service Center, Piscataway, New Jersey 08854, May 1989.

Selby, R.W., *Empirically Based Analysis of Failures in Software Systems*, IEEE Transactions on Reliability, Vol. 39, No. 4, October 1990.

Sennett, C.T., *Formal Methods in the Production of Secure Software*, Position paper for FM-89, Workshop on Formal Methods, July 23-27, Halifax, Nova Scotia, 1989.

Shankar, N., S. Owre, and J.M. Rushby, *A Tutorial on Specification and Verification Using PVS (Beta Release)*, PVS, SRI International, Menlo Park, California 94025, March 31, 1993.

Shankar, N., *Mechanical Verification of a Schematic Protocol for Byzantine Fault-Tolerant Clock Synchronization*, SRI International, SRI-CSL-91-04, CSL Technical Report, June 1991.

Shlaer, S., and S.J. Mellor, *Object-Oriented Systems Analysis: Modeling the World in Data*, Yourdon Press, Englewood Cliffs, NJ, 1988.

Shumskas, A.F., *A Layered Software Test and Evaluation Strategy for a Layered Defense System*, ITEA Journal, Vol. 11, No. 3, pp. 49-62, 1990.

Sivertsen, T., *Methods and Tools for Formal Software Development*, Technical Report: OECD Halden Reactor Project, HWR-320, Institutt for Energiteknikk, Halden, Norway, March 1992.

Sivertsen, T., and H. Valisuo, *Algebraic Specification and Theorem Proving Used in Formal Verification of Discrete-Event Control Systems*, Technical Report: OECD Halden Reactor Project, HWR-260, Institutt for Energiteknikk, Halden, Norway, December 1989.

Sizemore, N.L., *Test Techniques for Knowledge-Based Systems*, ITEA Journal, Vol. 11, No. 2, 1990.

Sizemore, N.L., *Knowledge Base Graph Recovery Using Sparse Matrix Techniques*, ARC, Professional Services Group, Inc., Sierra Vista, Arizona.

Sizemore, N.L., *Test Techniques for Knowledge Based Systems: A Survey*, Verification, Validation and Testing of Knowledge-Based Systems Workshop Proceedings, IJCAI-89, Morgan Kaufmann Publishers, Inc., Palo Alto, California 94303, August 1989.

Skingle, B., *Exams for the Expert System*, Computer Systems Europe, pp. 61-64, March 1989.

Smith, D.N. *Concepts of Object-Oriented Programming*, McGraw-Hill Inc., New York, New York, 1991.

Smith, S.L., and J.N. Mosier, *Guidelines for Designing User Interface Software*, ESD-TR-86-278, Electronic Systems Division, Air Force Systems Command, Hanscom Air Force Base, Massachusetts, United States Air Force, 1986.

Smith, R.G., H.A. Winston, T.M. Mitchell, and B.G. Buchanan, *Representation and Use of Explicit Justifications for Knowledge Base Refinement*, IJAC-85, Proceedings of the Ninth International Joint Conference on Artificial Intelligence, Vol. 1, Morgan Kaufmann Publishers, Inc., Palo Alto, California 94303, pp. 671-680, August 1985.

SNUPPS (Standardized Nuclear Power Plant System), *Steam Generator Single-Tube Rupture Analysis for SNUPPS Plants Callaway and Wolf Creek*, December 1985.

Software Engineering Publications, *NIST Publication List 96*, U.S. Department of Commerce, Technology Administration, National Institute of Standards and Technology, Computer Systems Laboratory, National Institute of Standards and Technology, Gaithersburg, Maryland, April 1993.

Software A&E, *SNAP: Strategic Networked Applications Platform, Technical Brief*, Reston, Virginia, 1992.

Soloway, E., J. Bachant, and K. Jensen, *Assessing the Maintainability of XCON-in-RIME: Coping with the Problems of a VERY Large Rule-Base*, Proceedings of the Sixth National Conference on Artificial Intelligence, Vol. 2, AAAI-'87, The MIT Press, Cambridge, Massachusetts 02142, pp. 824-829, July 1987.

Spivey, J., *The Z Notation -- A Reference Manual*, Prentice-Hall International, New York, New York 1986.

St. Clair, D.C., W.E. Bond, and C.L. Sabharwal, *Measuring Concept Strength in Classification Trees*, pp. 168-179, McDonnell Douglas Research Laboratories, McDonnell Douglas Corporation, St. Louis, Missouri, October 1990.

St. Clair, D.C., W.E. Bond, and B.B. Flachsbar, *Using Output to Evaluate and Refine Rules in Rule-Based Expert Systems*, pp. 9-13, McDonnell Douglas Research Laboratories, McDonnell Douglas Corporation, St. Louis, Missouri, November 1987.

Stachowitz, R.A., and J.B. Combs, *Validation of Expert Systems*, Proceedings of the Hawaii International Conference on Systems Sciences, Kona, Hawaii, Lockheed Corporation, Palo Alto, California 94304, January 1987.

Stachowitz, R.A., C.L. Chang, T.S. Stock, and J.B. Combs, *Building Validation Tools for Knowledge-Based Systems*, First Annual Workshop on Space Operations Automation and Robotics (SOAR '87), NASA Johnson Space Center, Houston, Texas, August 1987.

Stachowitz, R.A., C.L. Chang, and J.B. Combs, *Research on Validation of Knowledge-Based Systems*, Validation and Testing Knowledge-Based Systems Workshop Proceedings, AAAI-88, The MIT Press, Cambridge, Massachusetts 02142, August 1988.

Standard P-7-4-3.2-1993, *Standard Criteria For Digital Computers in Safety Systems of Nuclear Power Generating Stations*, IEEE Power Engineering Society, 1993.

*Standard for Software Life-Cycle Process*, Life-Cycle Processes Working Group of the Software Engineering Standards Subcommittee, Institute for Electric and Electronic Engineers, Inc., Washington, D.C., March 1988.

Straker, E.A., and N.C. Thomas, *Verification and Validation as an Integral Part of the Development of Digital Systems for Nuclear Applications*, Nuclear Safety, Vol. 24, No. 3, pp. 338-351, May/June 1983.

*Structuring Expert Systems: Domain, Design, and Development*, Ed. J. Liebowitz and D.A. DeSalvo, Chapter 11, Prentice-Hall Inc., Englewood Cliffs, New Jersey, 1989.

Sudduth, A., *Diagnostic Reasoning Using Qualitative Causal Models*, Paper presented at the Electric Power Research Institute Conference and Expert System Applications for the Electric Power Industry, Boston, Electric Power Research Institute, Palo Alto, California, September 9-11, 1991.

Suen, C.Y., P.D. Grogono, R. Shinghal, and F. Coallier, *Verifying, Validating, and Measuring the Performance of Expert Systems*, Expert Systems with Applications, Vol. 1, No. 2, pp. 93-102, 1990.

*Sun Microsystems Reference Manual*, pp. 169-180, Revision A of March 27, 1990, pp. 169-180, Sun Microsystems, Inc., 2650 Park Tower Drive, Merrifield, Virginia 22116.

Surko, P.T., J.M. Achroff, and J.R. Wright, *Autotest 2: An Expert System for Special Services*, AT&T Bell Laboratories, Warren, New Jersey.

Suwa, M., A.C. Scott, and E.H. Shortliffe, *An Approach to Verifying Completeness and Consistency in a Rule-Based Expert System*, The AI Magazine, Vol. 3, No. 4, pp. 16-21, Fall 1982.

Swartout, W.R., *XPLAIN: A System for Creating and Explaining Expert Consulting Programs*, Artificial Intelligence, 21(3), pp. 285-325, 1983.

Sweet, R., and A.L. Lopez, *Testing, the Modular C<sup>2</sup> Evaluation Structure and the Acquisition Process*, SIGNAL: The International Journal of C<sup>3</sup>I, pp. 75-79, August 1987.

Szatkowski, Dr. G.P., *Advanced Launch System (ALS) Space Transportation Expert System Study (Stress). Final Report No. GDSS-DSES-89-001*, Technical Report of General Dynamics/Space Systems Division, San Diego, California.

Szatkowski, Dr. G.P., *Approaches to Verification/Validation of Imbedded Decision Support Systems Applied to Launch Vehicle Operations*, Technical Report of General Dynamics/Space Systems Division, San Diego, California.

Szygenda, S., D. Yatim, and J. Girardeau, *Fault Modeling for Digital Systems: A State of the Art Review*, Proceedings of Third International Conference on Software for Strategic Systems held February 27-28, 1990, Huntsville, Alabama, pp. 144-153, Addison-Wesley Publishing Company, Order Department, Jacob Way, Reading, Massachusetts 01867.

Tai, K.C., *What To Do Beyond Testing*, ACM Sigsoft Software Engineering Notes, Vol. 14, No. 2, pp. 58-61, April 1989.

Tao, Y., H. Zhijun, and Y. Ruizhao, *Performance Evaluation of the Inference Structure in Expert System*, IJCAI87, Proceedings of the Tenth International Joint Conference on Artificial Intelligence, Vol. 2, pp. 945-950, Morgan Kaufmann Publishers, Inc., Palo Alto, California 94303, August 1987.

Teichroew, D. and E. Hershey, III, *PSL/PSA: A Computer-Aided Technique for Structure Documentation and Analysis of Information-Processing Systems*, IEEE Transactions on Software Engineering, SE(3)-1, pp. 41-48 ((PSL/PSA)), 1987.

Tello, E.R., *Object-Oriented Programming for Artificial Intelligence: A Guide to Tools and System Design*, Addison-Wesley Publishing Co., Reading, MA, 1989.

Terano, T., H. Kongoji, K. Kaji, and K. Yamamoto, *Development of a Guideline for Expert System Evaluation - A Report on a Three-year Project*, Submitted to the AAAI-91 Workshop on VV&T of KBS's held in Anaheim, California, July 1991, The MIT Press, Cambridge, Massachusetts 02142, .

Terano, T., H. Kongoji, K. Kaji, and K. Yamamoto, *Developing a Guideline for Expert Evaluation -- A Midterm Report*, The University of Tsukuba, Tokyo, Japan, August 1990.

Terano, T., and S. Kobayashi, *Problem Analyses, Tool Evaluation, and Verification and Validation, Study: Three Steps for Knowledge-Based Systems Development Methodology*, Verification, Validation and Testing of Knowledge-Based Systems Workshop Proceedings, IJCAI-89, Morgan Kaufmann Publishers, Inc., Palo Alto, California 94303, August 1989.

Thevenod-Fosse, P., H. Waeselynck, and Y. Crouzet, *An Experimental Study on Software Structural Testing: Deterministic Versus Random Input Generation*, IEEE, 1991.

Thistle, J.G., and W.M. Wonham, *Control Problems in a Temporal Logic Framework*, International Journal of Control, Vol. 44, No. 4, pp. 943-976, 1986.

Thomas, N.C., and E.A. Straker, *Application of Verification and Validation to Safety Parameter Display Systems*, Technical Report, Science Applications International Corporation, Lynchburg, Virginia, 1985.

Thomas, N.C., and H.L. Reeves, Jr., *Experiences In Testing Nuclear Power Plant Protection System Software*, MIDCON/79 Conference, Chicago, Illinois, Science Applications International Corporation, Lynchburg, Virginia, November 1979.

Thomas, N.C., and C.L. Evans. *Life-Cycle Verification, Validation and Testing*, Insights '86 Engineering & Operating Computer Forum, Edison Electric Institute, Washington, D.C., September 1986.

Thomassen, B.B., J.O. Hol, G. Ohra, and F. Pettersen, *Basic Design Criteria For Computer-Based Information Systems in Control Rooms With Mixed Instrumentation*, Technical Report: OECD Halden Reactor Project, HWR-207, Institutt for Energiteknikk, Halden, Norway, May 1987.

Thornton, D.S., *Expert System Life-Cycle and Test*, Technical Report, IBM Federal Systems Division, Gaithersburg, Maryland.

Tung, C., *On Control Flow Error Detection and Path Testing*, Proceedings of Third International Conference on Software for Strategic Systems, Huntsville, Alabama, February 27-28, pp. 144-153, Addison-Wesley Publishing Company, Order Department, Jacob Way, Reading, Massachusetts 01867, 1990.

Tuthill, G.S., *Legal Liabilities and Expert Systems*, AI Expert, Vol. 6, No. 3, pp. 44-51, March 1991.

TVA-TR81-01, *BWR Transient Analysis Model Utilizing the RETRAN Program*, Tennessee Valley Authority, December 31, 1981.

U.S. Nuclear Regulatory Commission, *Foreign Trip Report November 6 and 7, 1990 - Canada*, December 1990.

U.S. Nuclear Regulatory Commission, *Briefing Book: Commissioner Rogers' Trip to Canada, October 2-5, 1990*, 1990.

U.S. Nuclear Regulatory Commission, *Presentation slides from the ACRS Subcommittee Meeting on Software Development and Design Concepts*, Advisory Committee on Reactor Safeguards, Washington, D.C., August 20-21, 1992.

U.S. Nuclear Regulatory Commission, *10CFR50, Title 10 of the Code of Federal Regulations, Part 50*, January 1992.

U.S. Army Information Systems Engineering Command (USAISEC), *Expert System Development Methodology (ASQBG-A-89-033)*, USAISEC, Fort Huachuca, Arizona, July 1989.

U.S. Army Information Systems Engineering Command (USAISEC), *Expert System Evaluation Methodology (ASQBG-A-89-034)*, USAISEC, Fort Huachuca, Arizona, July 1989.

U.S. Nuclear Regulatory Commission Regulatory Guide 1.70, *Format and Content of Safety Analysis Reports for Nuclear Power Plants*, 1982.

U.S. Nuclear Regulatory Commission Safety Evaluation Report, *Main Steam Line Break Analysis - Yankee Nuclear Power Station*, November 30, 1983.

U.S. Nuclear Regulatory Commission Safety Evaluation Report, *Reactor Physics and Reload Safety Evaluation Methods Technical Reports NSPNAD-8101P and -8102P for the Northern States Power Company Prairie Island Nuclear Generating Plant, Unit Nos. 1 and 2*, February 22, 1983.

UAI 83-15, *Qualification of DYNODE-P for Anticipated Transients With and Without SCRAM Using LOFT Tests*, Utility Associates International (service of Control Data Corporation), April 1, 1983.

United Kingdom Ministry of Defense Draft Interim Defense Standard 00-55, *Requirements for the Procurement of Safety Critical Software in Defense Equipment*, National Institute of Standards and Technology Computer Systems Laboratory, Gaithersburg, Maryland 20899, May 9, 1989.

Upadhyaya, B.R. and E. Eryurek, *Application of Neural Networks for Sensor Validation and Plant Monitoring*, Nuclear Technology, Vol. 97, February 1992.

Valiente, G., *Using Layered Support Graphs for Verifying External Adequacy in Rule-Based Expert Systems*, SIGART Bulletin, Vol. 3, No. 1.

Van de Brug, A., J. Bachant, and J. McDermott, *The Taming of R1*, IEEE Expert, pp. 33-38, Fall 1986.

VEP-FRD-19, *The PDQ07 Discrete Model*, Virginia Electric and Power Company Richmond, Virginia, July 1976.

VEP-FRD-20, *The PDQ07 One Zone Model*, Virginia Electric and Power Company, Richmond, Virginia, January 1977.

VEP-FRD-23, *Reactor Core Thermal Hydraulic Analysis Model Using LYNX1 and LYNX2 Computer Codes*, Virginia Electric and Power Company, Richmond, Virginia, August 1978.

VEP-FRD-24, *The VEPCO FLAME Model*, Virginia Electric and Power Company, Richmond, Virginia, October 1978.

VEP-FRD-33, *Reactor Core Thermal-Hydraulic Analysis using the COBRAIIIC/MIT Computer Code*, Virginia Electric and Power Company, Richmond, Virginia, August 1979.

VEP-FRD-41, *Reactor System Transient Analyses using the RETRAN Computer Code*, Virginia Electric and Power Company, Richmond, Virginia, March 1981.

VEP-NFE-2, *VEPCO Evaluation of the Control Rod Ejection Transient*, Virginia Electric and Power Company, Richmond, Virginia, October 1983.

Vick, S., and K. Lindenmayer, *Verification and Validation of Rulebased Systems for Hubble Space Telescope Ground Support*, The 1988 Goddard Conference on Space Applications of Artificial Intelligence, NASA, Goddard Space Flight Center, pp. 435-448, National Technical Information Service, U.S. Department of Commerce, Springfield, Virginia 22161, August 1988.



Vignollet, L., and M. Ayel, *A Conceptual Model For Building Sets of Test Samples For Knowledge Bases*, ECAI Proceedings, Stockholm, University of SAVOIE, France, August 1990.

Vignollet, L., and M. Ayel, *SYCOJET: A Tool for Buildings Automatically Sets of Tests for Knowledge Bases*, Proceedings of the SPIE - The International Society for Optical Engineering, Orlando, Florida, pp. 192-20, April 1990.

Vinze, A.S., D.R. Vogel, and J.F. Nunamaker Jr., *Validation of a Knowledge-based System: The ICE Case*, Proceedings of the Twenty-third Annual Hawaii International Conference on System Sciences. Volume 3: Decision Support and Knowledge Based Systems Track, Kailua-Kona, Hawaii, IEEE Service Center, Piscataway, New Jersey 08854, pp. 239-246, January 1990.

Voas, J.M., *PIE: A Dynamic Failure-Based Technique*, IEEE Transactions on Software Engineering, Vol. 18, No. 8, August 1992.

Von Mayrhauser, A., *Software Engineering: Methods and Management*, Academic Press, Inc., Boston, Massachusetts, 1990.

Waclo, J., B. Cook, and D. Adomaitis, *Certification of Digital System Software, A Nuclear Industry Case Study*, Proceedings of the American Power Conference, Electric Power Research Institute, Palo Alto, California, pp. 613-618, April-May 1991.

Waldinger, R.J., and M.E. Stickel, *Proving Properties of Rule-Based Systems*, Proceedings of the Seventh Conference on Artificial Intelligence Applications held at Miami Beach, Florida, February 24-28, IEEE Service Center, Piscataway, New Jersey, 08855, pp. 81-88, 1991.

Waldrop, M. M., *NASA Flight Controllers Become AI Pioneers*, Science, Vol. 244, pp. 1044-1045, June 1989.

Wallace, D.R., and R.U. Fujii, *Software Verification and Validation: An Overview*, From IEEE Software, Vol. 6, No. 3, May 1989.

Wallace, R., J. Stockenberg, and R. Charette. *A Unified Methodology for Developing Systems*, McGraw-Hill Inc., New York, New York, 1987.

Wallace, D.R., and R.U. Fujii, *Software Verification and Validation: Its Role in Computer Assurance and Its Relationship with Software Project Management Standards*, NIST Special Publication 500-165, National Institute of Standards and Technology Computer Systems Laboratory, Gaithersburg, Maryland 20899, September 1989.

Wang, J., and M. Modarres, *REX: An Intelligent Decision and Analysis Aid for Reliability and Risk Studies*, Reliability Engineering and System Safety, Elsevier Science Publishers Ltd., United Kingdom, 1990.

Ward, P., *The Transformation Schema: An Extension of the Data Flow Diagram to Represent Control and Timing*, IEEE Transactions on Software Engineering, 12(2), pp. 128-210, 1986.

Wasserman, A.I., *Extending State Transition Diagrams for the Specification of Human-Computer Interaction*, IEEE Transactions on Software Engineering, Vol SE-11 (8), pp. 699-713, 1985.

Webb, J.T., *Static Analysis using MALPAS, An Introduction With Examples*, Rex, Thompson & Partners Limited, United Kingdom, June 26, 1989.

Wells, S.A., *The VIVA Method: A Life-Cycle Independent Approach to KBS Validation.*, The VIVA Project, AIE Department, Lloyd's Project, Croydon, United Kingdom.

- Wensley, A.K.P, *Verifying and Validating an Audit Planning Expert System*, Knowledge Based Systems Verification, Validation and Testing Workshop Proceedings, AAAI-90, The MIT Press, Cambridge, Massachusetts 02142, July 1990.
- Wentworth, J.A. *Road Transport Research. A Guide for Developing Knowledge-Based Expert Systems*, Paper presented at the OECD Workshop on Knowledge-Based Expert Systems in Technology, Espoo, Finland, June 26-28, 1990.
- Weyuker, E.J., *The Evaluation of Program-Based Software Test Data Adequacy Criteria*, Communications of the ACM, Volume 31, No. 6, pp. 668-675, June 1988.
- Weyuker, E., and T. Ostrand, *Theories of Program Testing and the Application of Revealing Subdomains*, IEEE Transactions on Software Engineering, Vol. SE-6,( 3), 1980.
- Wilkins, D.C., and B.G. Buchanan, *On Debugging Rule Sets When Reasoning Under Uncertainty*, AAAI American Association-86, Vol. 1 Sciences, pp. 448-454, The MIT Press, Cambridge, Massachusetts 02142, August 1986.
- Wilkins, D.C., *Knowledge Base Refinement Using Apprenticeship Learning Techniques*, Proceedings from the AAAI-88 Seventh National Conference on Artificial Intelligence, Vol. 2, pp. 646-651, The MIT Press, Cambridge, Massachusetts 02142, August 1988.
- Williamson, K., *Submission to Workshop on Knowledge-Based Systems: Verification, Validation and Testing*, Boeing Computer Services, Seattle, Washington, April 12, 1990.
- Williges, R.C., B.H. Williges, and J. Elkerton, *Software Interface Design*, In G. Salvendy (Ed.) Handbook of Human Factors, pp. 1416-1449, John Wiley & Sons, New York, New York, 1987.
- Williges, B.H., and R.C. Williges, *Dialog Design Considerations for Interactive Computer Systems*, In F.A. Muckler (Ed.), Human Factors Review, The Human Factors Society, Inc., Santa Monica, California, pp. 167-208, 1984.
- Wilson, M., D. Duce, and D. Simpson, *Life-Cycles in Software and Knowledge Engineering: A Comparative Review*, Knowledge Engineering Review Vol. 4, No. 3, pp. 189-204, September 1989.
- Winblad, A.L., S.D. Edwards, and D.R. King, *Object Oriented Software, Reading*, Addison-Wesley Publishing Company, Order Department, Jacob Way, Reading, Massachusetts 01867, 1990.
- Winchester, J., and G. Estin, *Requirements Definition and its Interface to the SARA Design Methodology for Computer-based Systems*, AFIPS Conference Proceedings, 51, pp. 369-379, ((RDL)), Addison-Wesley Publishing Company, Order Department, Jacob Way, Reading, Massachusetts 01867, 1982.
- Winer, B.J., *Statistical Principles in Experimental Design*, Second Edition, McGraw-Hill Inc., New York, New York, 1971.
- Wirfs-Brock, R., B. Wilkerson, and L. Wiener, *Designing Object-Oriented Software*, Prentice-Hall, Englewood Cliffs, NJ, 1990.
- Wisconsin Public Service Corporation, *Reload Safety Evaluation Methods for Application to Kewaunee*.
- Wisconsin Public Service Corporation, *Qualification of Reactor Physics Methods for Application to Kewaunee*, September 29, 1978.
- Wise, B., *Summary of Work and Position*, Validation and Testing Knowledge-Based Systems Workshop Proceedings, AAAI-88, The MIT Press, Cambridge, Massachusetts 02142, August 1988.

Withrow, C., *Error Density and Size in Ada Software*, IEEE Software, January 1990, 26-30.

Wolfgram, D.D., T.J. Dear, and C.S. Galbraith, *Expert Systems for the Technical Professional*, John Wiley & Sons, New York, New York, 1987.

Wood, W.T., and E.N. Frankowski, *Verification of Rule-Based Expert Systems*, Expert Systems with Applications, Special Issue: Verification and Validation of Knowledge-Based Systems. Vol. 1, No. 3, pp. 317-322, Carnegie-Mellon University Library, Carnegie-Mellon University, EDSH 109, Pittsburgh, Pennsylvania 15213-3890, 1990.

Wood, W.T., and E.N. Frankowski, *Rule Based Expert System Verification*, Verification, Validation and Testing of Knowledge-Based Systems Workshop Proceedings, IJCAI-89, Morgan Kaufmann Publishers, Inc., Palo Alto, California 94303, August 1989.

Wood, D.P., and W.G. Wood, *Comparative Evaluations of Four Specification Methods for Real-time Systems*, Carnegie-Mellon University/Software Engineering Institute Technical Report CMU/SEI 89-TR-36, Carnegie-Mellon University Library, Carnegie-Mellon University, EDSH 109, Pittsburgh, Pennsylvania 15213-3890, 1989.

Wood, W., R. Pethia, L. Gold, and R. Firth, *A Guide to the Assessment of Software Development Methods*, Carnegie-Mellon University/Software Engineering Institute Technical Report CMU/SEI 88-TR-8, Carnegie-Mellon University Library, Carnegie-Mellon University, EDSH 109, Pittsburgh, Pennsylvania 15213-3890, April 1988.

Woods, D.D., *Cognitive Technologies: The Design of Joint Human-Machine Cognitive Systems*, The AI Magazine, 6(4), pp. 86-92, 1986.

World Technology Evaluation Center Pan Report, *European Nuclear Instrumentation and Controls*, Coordinated by Loyola College, Baltimore Maryland, December 1991.

Yadav, S.B., and D.R. Chand, *An Expert Modeling Support System for Modeling an Object System to Specify Its Information Requirements*, Elsevier Science Publishers B.V. (North-Holland), Englewood Cliffs, New Jersey, pp. 29-45, 1989.

Yager, R.R., *On Incomplete and Uncertain Knowledge Bases*, Institute of Electrical and Electronic Engineers, Inc., pp. 96-100, IEEE Service Center, Piscataway, New Jersey 08854, September 1986.

Yemini, S., and D.M. Berry, *A Modular Verifiable Exception-Handling Mechanism*, ACM Transactions on Programming Languages and Systems, Volume 7, No. 2, pp. 214-243, April 1985.

Yen, J., J. Lee, and D. Hamilton, *Designing Verifiable Expert Systems*, Proceedings of the 2nd International IEEE Conference on Tools for Artificial Intelligence, IEEE Service Center, Piscataway, New Jersey 08854, November 1990.

Yen, J. and J. Lee, *Enhancing Verification and Validation of Knowledge-based Systems Using a Formal Specification Method*, Department of Computer Science, Texas A&M University, College Station, Texas.

Yen, J., D. Hamilton, and J. Lee, *Towards a Design Methodology for Verification of Expert Systems*, Knowledge Based Systems Verification, Validation and Testing Workshop Proceedings, AAAI-90, The MIT Press, Cambridge, Massachusetts 02142, July 1990.

Yoon, J.P., *Techniques for Data and Rule Validation in Knowledge Based Systems*, Proceedings of the Fourth Annual Conference on Computer Assurance: Systems Integrity, Software Safety and Process Security, Gaithersburg, Maryland, IEEE Service Center, Piscataway, New Jersey 08854, June 1989.

Yu, V.L., B.G. Buchanan, E.H. Shortliffe, S.M. Wraith, R. Davis, A.C. Scott, and S.N. Cohen, *Evaluating The Performance of a Computer-Based Consultant*, Computer Programs in Biomedicine, 9, pp. 95-102, 1979.

Zdonik, S.B., and D. Maier (Eds.), *Readings in Object-Oriented Database Systems*, Morgan Kaufmann Publishers, Inc., San Mateo, CA, 1990.

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This volume contains all of the technical references found in Volumes 1-7 concerning the development of guidelines for the verification and validation of expert systems, knowledge-based systems, other AI systems, object-oriented systems, and conventional systems.

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