

CURRICULUM VITAE

DAVID D. WOODS, Professor

Dept. of Integrated Systems Engineering

The Ohio State University

1971 Neil Ave, Columbus, OH 43210

woods.2@osu.edu 614-946-0123

EDUCATION:

Ph.D. Purdue University, 1979, Cognitive Psychology

M.S. Purdue University, 1977, Experimental Psychology

B.A. (cum laude) Canisius College, 1974, Psychology

PROFESSIONAL EXPERIENCE:

The Ohio State University:

Professor, 1996 to present

Associate Professor, 1990-1996

Assistant Professor, 1988 to 1990

Appointments:

Industrial and Systems Engineering,

Industrial Design, Anesthesiology,

Institute for Ergonomics

Westinghouse Research & Development Center, Pittsburgh, PA. 1979 to 1988, Senior Engineer

Created and managed a research program which studied human performance and error, control room design, human-computer interaction and the development of intelligent support systems. Principal investigator in external (sponsors included Electric Power Research Institute, Electricite de France, US Nuclear Regulatory Commission) and internal research projects. Five patents.

President, Resilience Engineering Association, 2011-2013.

President, Human Factors and Ergonomic Society, 1998-1999

Summary

For 40 years, studied the interaction of people and technology in complex, high performance, risk-critical settings across in crisis response, nuclear power emergencies, in pilot-automation teams, in anomaly response in space shuttle mission operations, in critical care medicine, in replanning military missions, and in professional information analysis. He has investigated accidents in these areas including acting as an advisor to the Columbia Space Shuttle Accident Investigation Board.

Frequently asked to advise government and industry organizations on pressing societal needs at the intersection of people and technology. Recent examples include FAA Human Factors and Cockpit Automation Team (2013), and the Defense Science Board Task Force on Autonomy (2012), US National Academy committee on Autonomy in Civil Aviation (2014). He has received many awards including the Ely Award for best paper in the journal *Human Factors* (1994), a Laurels Award from Aviation Week and Space Technology (1995) for research on the human factors of highly automated cockpits, the Jack Kraft Innovators Award from the Human Factors and Ergonomics Society (2002),

His current work focuses on building resilience to create proactive safety management. He identified the problem of brittleness in systems of people and automated and intelligent machines, first in the mid-1980's. He has been President of the Resilience Engineering Association and of the Human Factors and Ergonomics Society. His results on resilience in action and the dangers of brittle systems can be found in the books *Resilience Engineering: Concepts and Precepts* (2006), *Resilience Engineering in Practice* (2011). He is also the author of *A Tale of Two Stories: Contrasting Views of Patient Safety* (1998), *Joint Cognitive Systems: Foundations of Cognitive Systems Engineering* (2005) and *Joint Cognitive Systems: Patterns in Cognitive Systems Engineering*, (2006), and *Behind Human Error* (first edition 1994; second edition 2010).

Achievements

Resilience engineering for safety in complex systems 2000–present

Proposed and began to develop Resilience Engineering beginning in 2000-2003 as part of the response to several NASA accidents. Led first international meeting and first book on Resilience Engineering. His results on resilience in action and the dangers of brittle systems can be found in 20 papers and book chapters on resilience in socio-technical systems which have been cited over 3,000 times.

- Invited talk, NASA Invited Testimony to US Congress, Senate Committee on Commerce, Science and Transportation on safety at NASA and the need to develop Resilience Engineering, "Future of NASA", Washington DC, October 29, 2003.
- Co-organizer, First International Symposium on Resilience Engineering, October 20-25, 2004 Söderköping, Sweden. (22 + participants from 12 countries).
- Invited talk, Resilience as a Paradigm for Safety Management, NASA Ames Research Center, February 15, 2005.
- Co-editor and author of 7 chapters, *Resilience Engineering: Concepts and Precepts*, Ashgate, 2006, cited over 2000 times.
- Co-organizer, International Seminar on Resilience Engineering, Rio de Janeiro Brazil, December 12-13, 2006.
- Since 2008, taught course on Resilience Engineering: Introduction to the concept of "resilience" in systems engineering and its application to design and management problems in safety, risk management, and sustainability. Examines models and measures of adaptive capacity and multi-agent layered networked systems.
- Keynote address, International Symposium on Resilient Control Systems, Idaho National Laboratory/IEEE, Idaho Falls, August 11-14, 2009.
- Lead, OSU Initiative on Complexity in Natural, Social and Engineered Systems, 2009 to 2014.
- Advisory Board, Resilient Control Systems Group, Idaho National Laboratory, 2010-2013.
- Keynote address on Resilience Engineering, Annual Meeting of the Société d'ergonomie de langue française (SELF), Liege, Belgium, 9-13-10, 2010.
- **President**, Resilience Engineering Association, 2011-2013.
- Invited speaker, Workshop on Building a Resilient Workforce. See Woods, D. D. (2012). High-Reliability Organizations and Complex Adaptive Systems. In H. M. Colvin and R. M. Taylor (eds.), *Building a Resilient Workforce: Opportunities for the Department of Homeland Security - Workshop Summary*, National Academies Press, pp. 63-69.
- Invited speaker, [Ideas to Innovation \(I2I\) workshop](#) on "Stimulating Collaborations in the Application of Resilience Engineering to Healthcare, University-Industry Demonstration Project, National Academy of Science, June 13-14, 2013.
- Co-Organizer (Head, Organizing Committee, Program Committee), 5th Symposium on Resilience Engineering, 'Resilience Engineering: Managing trade-offs'. 24-27 June, 2013, Soesterberg, The Netherlands (140 participants from 20 countries, 67 papers, 8 workshops).
- Presidential Address, The State of Resilience Engineering: Progress and Challenges. 5th Symposium on Resilience Engineering, 25 June, 2013.
- Led a 4 hour workshop on Foundations of Resilient Control Systems jointly with Professor John Doyle of the California Institute of Technology during the 5th International Symposium on Resilient Control Systems, San Francisco CA, August 14, 2013.

- Invited Plenary Speaker, Workshop on Analytical Support for Societal and Regional Resiliency in Support of National Security, Decision and Information Sciences Division, Organized by Argonne National Laboratory and Military Operations Research Society (MORS), Argonne IL, September 10 to 12, 2013.
- Co-organizer and speaker, Powering the Drive for Resilient Societies and Enterprises: The Fundamental Science and Engineering for Building Resiliency, Panel of presentations for Transatlantic Science Week, Washington DC, November 13, 2013.
- Invited Seminar on Resilience Engineering, [Systems Integration Division](#), National Institute of Standards and Technology (NIST), "Brittleness and Resilience: A Challenge for Modern Complex Systems and Networks," Gaithersburg, MD, February 20, 2014.
- Invited Keynote Address, Reaching Resilience. Velocity: Web Operations and Performance, O'Reilly Media, NY, NY, September 15-18, 2014.
- Co-Organizer, 6th Symposium on Resilience Engineering, 'Resilience Engineering: Managing resilience, learning to be adaptable and proactive in an unpredictable world,' 22-25 June, 2015, Lisbon, Portugal.
- Co-organizer, Resilience Engineering: 10th Anniversary Seminar. Abbaye Sorreze, France, October 29-31, 2014.
- Electronic course on Resilience Engineering, produced January-March 2015: <http://csel.org.ohio-state.edu/ResilienceEngineering.html>
- Invited Speaker, "Reaching Resilience," 30th Emerging Issues Forum: Innovation Reconstructed, North Carolina State University, Raleigh, NC, February 9-10, 2015.
- Keynote Address, Resilience-in-Action. Fire Department Instructors Conference International (FDIC), Indianapolis, IN, April 26, 2017.
- Plenary Address, Moving Forward in Resilience Engineering: Fundamentals, Barriers, and Progress, 7th Symposium on Resilience Engineering, Resilience Engineering Association, Liege, Belgium, June 26-29, 2017.
- Keynote talk, Autonomy and Resilience, ES2 -WS3-2017 Systemic Thinking and Human Performance Conference, Eurocontrol, Brussels, Belgium, September 28, 2017.
- Plenary talk, *Developing strategic agility for organizations in a turbulent world*, Workshop on Human and Organizational Factors in High-Risk Companies, Foundation for Industrial Safety Culture (Foncsi), Royaumont Abbey (Paris Area, France), January 24th to 26th, 2018

Patient safety in health care 1996–present

Following a series of a publicized and severe patient injuries and deaths due to medical mistakes, helped US health care leaders strategize how to make patient safety a national priority and launch the patient safety movement. Helped health care translate and transfer results/best practices from other areas (human factors in aviation, crisis management, and process control).

- In 1996 invited contributor to the First Conference On Patient Safety, Annenberg Center For Health Sciences, Palm Springs California February 6, 2015 and helped plan sessions at the Second Conference "Enhancing Patient Safety and Reducing Errors in Health Care" in 1998.
- Helped to launch the National Safety Patient Foundation in 1996 including Board Member and Executive Committee, 1996 to 2002 and invited contributor at symposium to plan the foundation's patient safety agenda, February 21, 1997.

- Co-Director and organizer, Assembling the Scientific Basis for Patient Safety, Expert Working Group (50 attendees) for the National Patient Safety Foundation, Chicago IL, December 17-18, 1997.
- Invited Member, Executive Session on Medical Error and Patient Safety, Kennedy School of Government, Harvard University, 1998-1999. Harvard Executive Sessions are a forum for generating new ideas to begin organizational change on important public policy issues. The initiative on patient safety consists of 24 members including 10 heads of health care organizations, senior regulators, and a former NASA administrator.
- Led a three year patient safety culture change campaign for the Veterans Health Administration of Ohio:
 - ~ Proposed, set up and executed a Center for Inquiry on Patient Safety that conducted a campaign to build a safety culture in the Veterans Health Administration of Ohio, funded by the national Veterans Health Administration.
 - ~ Served as Associate Director of the Center, 1999 to 2002.
 - ~ Developed and implemented a multi-faceted set of activities to promote a culture of learning about patient safety at all organizational levels for all of the multiple Veterans Health Administration facilities in Ohio. The campaign included a variety of activities such as a role play simulation of an accident investigation with diverse participants from senior management to clinicians in multiple technical areas.
 - ~ Developed in 2000 and delivered several times a distant learning course on patient safety to transfer expertise to medical professionals and administrators. <http://csel.org.ohio-state.edu/productions/pex-is/getstarted/index.html>

Strategic Directions in R&D

Frequently invited to provide advice to national, government, and industry organizations on pressing societal issues related to socio-technical systems.

Invited Committee Member, Committee on Autonomy in Civil Aviation. National Research Council, Aeronautics and Space Engineering Board, July 2013 to July 2014.

Invited Briefing to board members of the National Transportation Safety Board on Mode Awareness and Aviation Safety, Washington DC, February 21, 2014.

National Research Council (2014). Autonomy Research for Civil Aviation: Toward a New Era of Flight. Washington DC: National Academies Press, , http://www.nap.edu/catalog.php?record_id=18815

Member, CAST/PARC/FAA Flight Deck Automation Working Group, 2013.

Final report: Abbott, K., McKenney, D. and Railsback, P. (2013). Operational Use of Flight Path Management Systems. Final report of the Flight Deck Automation Working Group, Performance-based operations Aviation Rulemaking Committee PARC / Commercial Aviation Safety Team CAST / FAA. http://www.faa.gov/about/office_org/headquarters_offices/avs/offices/afs/afs400/parc/parc_reco/media/2013/130908_PARC_FltDAWG_Final_Report_Recommendations.pdf

Member, Defense Science Board Task Force on Autonomy (2010-2012).

Final Report: Murphy R. R. and Shields, J. (2012). The Role of Autonomy in DoD Systems, Task Force Report, Office of the Secretary of Defense, July. <http://fas.org/irp/agency/dod/dsb/autonomy.pdf>

Invited Committee Member, "Sufficient Evidence? Building Certifiably Dependable Systems." Computer Science and Telecommunications Board, National Academy of Science. Final report: Software for Dependable Systems, National Academies Press, 2007.

Invited Speaker, Symposium on "The Social Life of Machines" honoring Donald A. Norman, the 2006 Benjamin Franklin Medal in Computer & Cognitive Science, Franklin Institute, Philadelphia, PA, April 27, 2006.

Invited panel member, National R&D Agenda for Visual Analytics, National Visual Analytics Center, PNNL and Department of Homeland Security, 2004.

Invited Testimony to Senate Committee on Commerce, Science and Transportation on the "Future of NASA" following the Columbia space shuttle accident. Washington DC, October 29, 2003.

Invited Speaker, Congressional Briefing, The Mechanics of Election Reform: From Registration To Results. Sponsored by American Political Science Association, American Psychological Association and the Consortium of Social Science Associations. Washington DC, March 16, 2001.

Invited Testimony, Technology and the Voting Process Hearing, Committee on House Administration, Longworth House Office Building, Washington DC, May 24, 2001. (www.house.gov/cha/business/business.html)

Organizing Committee and Working Group Leader, NSF/DARPA Workshop on Human-Robot Interaction, San Luis Obispo, CA, September 28-29, 2001.

Workshop designed to bring together leading roboticists and specialists on human-computer cooperation to develop assessment of the current state and plan future research directions on human-robot interaction.

<http://users.csc.calpoly.edu/~erogers/HRI/>

Steering Group and Working Group Head, NSF Workshop on Human-Centered Intelligent Systems, Washington DC, February, 1997.

Planning workshop for a new initiative from the Computer and Information Sciences Directorate to help users cope with the overload of data and complexity in electronic media.

Invited Participant and Working Group Chair, National Science Foundation Workshop on Human Performance in the Complex Workplace: Implications for Basic Research in Cognitive Science, September, 11-12, Alexandria VA, 1992.

Led one of the working groups to help NSF plan how their research agenda in Cognitive Science can better address the human performance issues important to different government agencies and industries.

Technical Advisor to FAA Human Factors Study Team on Advanced Flight Decks, Fall 1994 to July 1996

Served as Technical Advisor to a special team of FAA certification personnel set up to make recommendations on safety on highly automated flight deck given accidents that involved breakdowns in team play between the flight crew and the automation. This committee gathered data from all stake holders in the research, development, certification and operations of advanced aircraft (manufacturers, avionics developers, cockpit designers, airline companies, industry groups, and pilots unions in the US and in Europe), and develop a set of recommendation to ensure the highest levels of safety (final report and recommendations published by FAA in July 1996).

Member, Nuclear Safety Research Review Committee, U.S. Nuclear Regulatory Commission, 1990 to 1993.

This committee provides advice to the Director of the Office of Nuclear Regulatory Research of the Nuclear Regulatory Commission on matters of overall management importance in the di-

rection of the Nuclear Regulatory Commission's program of nuclear safety research. The committee is regularly briefed on NRC research plans and activities, reviews the research and advises the Director on ways that the research program can be more effective.

Executive Committee and Contributor, Workshop on Human Error in Anesthesia, sponsored by FDA and the Anesthesia Patient Safety Foundation, Feb. 26-March 1, 1991.

Helped to organize international meeting that brought together for the first time researchers on human error and researchers in anesthesia to examine anesthesia safety.

Panel Member, National Research Council panel on Human Behavior and Nuclear Safety, 1987 to 1988.

Developed a research agenda to consider the human contribution to risk and safety in the nuclear power industry.

Research Management Experience

Principal Investigator on over \$22 million in sponsored research from 1989 to present at the Ohio State University.

- Leadership team for a 8 year \$40 million university/business/government consortium of 14 organizations addressing the topic of Advanced Decision Architectures, sponsored by the Army Research Laboratory, 2001-2009.

Responsible for about 40% of the budget \$40 million in research projects which involved collaborations across multiple partnering organizations. PI for OSU-led projects in the program which totaled \$8.4 million.

As 1 of 3 technical area leads, responsible for annual program planning for \$2-3 million per year in consortium projects on computerized user-centered decision support systems, including robotics, layered sensing, collaboration (CSCW), cognitive models, adaptive systems, surveillance, command, risky decisions (@\$18 million). As area lead responsible for oversight of budgets, assessment of project progress, annual re-planning of project goals, reporting program accomplishments, facilitating transfer of results.

Created an effective portfolio of projects coordinating across the partnering organizations to meet multiple goals for different stakeholders: given the scale and visibility of the consortium, the portfolio of projects and results included scientific advances, advanced technology development, and successful transfer of results to end-user organizations.

Research Impact:

H index (measure of research impact) > 92 (15/44)¹

work cited > 37K Among the most influential research on human-machine systems as measured by citations. His books have been translated into Spanish, Japanese, and Italian.

books / monographs	4 / 2	books, co-editor	4
multimedia productions	15	keynote/plenary addresses	>45
book chapters, total	78	handbook chapters	12
journal articles	102 (since 1983)	patents	5

¹ based on Google scholar citation search (5-20-015). H index is the number of publications with at least that number of citations; '40' means 40 papers with at least 40 citations each. See Hirsch J. E., PNAS (2005) <http://www.pnas.org/content/102/46/16569>. The #s in parentheses are the # of publications with more than 500/200 citations.

One paper was named to the top 30 papers in the 50 year history of the journal "Human Factors" (Cooke and Salas, 2009).

Two publications were named to the top 100 papers in the history of the field of Human Factors (Moray, 2005).

One paper reprinted for 30th anniversary of the International Journal of Human-Computer Studies, 1999.

Honors/Awards:

Over his 39 years of R&D in high risk, high performance settings, he has received many awards such as a Laurels Award from Aviation Week and Space Technology (1995).

Jimmy Doolittle Fellow Award for Research on Human Performance, Air Force Association, Central Florida Chapter, 2012.

Best paper award, 5th International Conference on Information Systems for Crisis Response and Management (ISCRAM 2008), Washington DC, May 4-7, 2008.

2008 Google Research Award, Google, Mountain View CA

2005 IBM Faculty Award, Watson Research Center.

2002 Jack A. Kraft Innovator Award, Human Factors and Ergonomic Society, for advancing Cognitive Engineering and its application to safer systems.

1995 Laurels Award, Aviation Week and Space Technology, January 29, 1996, Commercial Air Transport category, for research on cockpit automation.

1994 Ely Award for best paper in Human Factors, for studies of integrated pattern displays.

Fellow, Human Factors and Ergonomic Society, 1994.
American Psychological Society, 1990.

American Psychological Association (Div. 21--Engineering Psychology), 1988.

Best professional paper award, Test & Evaluation Technical Group, Annual Meeting of the Human Factors and Ergonomic Society, 1994.

Outstanding Faculty Award, voted by Alpha Pi Mu undergraduate industrial engineering honorary society, 1990.

Westinghouse Engineering Achievement Award, 1984.

Sponsored Research Projects:

His research has addressed a wide range of risk-critical settings with a wide range of sponsors such as:

- Health care--patient safety; critical care; handovers (Anesthesia Patient Safety Foundation, Veterans Health Administration)
- Emergency response (Army Research Laboratory, Nuclear Regulatory Commission, EPRI)
- Information analytics (intelligence analysis) (Dept. of Defense, ARDA, Army Research Laboratory)
- Highly automated flight decks in aviation (NASA Ames Research Center, Federal Aviation Administration, NASA Langley Research Center).
- Air traffic management (NASA Ames Research Center, EuroControl, DFS Germany)
- Power plant control rooms (Nuclear Regulatory Commission, AECL, Westinghouse, EPRI)
- Distributed command and control, Information warfare (Human Effectiveness Directorate AFRL, Army Research Laboratory)
- Sensor Networks, Computer Vision and Human Perception (NSF, Air Force Research Laboratory)

- Space mission operations centers (NASA Johnson Space Center)
- Resilience of Critical Digital Services (Multiple IT, E-enterprise, and Financial Companies in an OSU-Industry Consortium).

Perceptual and Attentional Technologies for Networks of Sensors, UAVs and Robots, Air Force Research Laboratory, 2008-2016, \$1.3 million

A series of projects sponsored by AFRL in conjunction with several defense contractors to develop new technology to extend perception through networks of sensors and robots. Innovated perspective or viewpoint control technology to handle the multiple feed problem, keyhole (or soda straw) problem and other perceptual limitations associated with seeing a distant world through sensors on robots. Developed a computational model of artificial attention that refocuses across feeds from multiple sensors at different spatial and temporal scales.

Advanced Decision Architectures, Army Research Laboratory, 2001-2009, \$8.4 million

A university/business/government consortium of 14 organizations with over \$40 million in research projects on computerized user-centered decision support systems, including robotics, layered sensing, collaboration (CSCW), cognitive models, adaptive systems, surveillance, command, risky decisions. As an area lead, responsible for annual program planning for about \$5 million per year in consortium projects.

Cognitive Systems Engineering for Innovation in Information Analysis and Comprehension, Department of Defense, 2004-2009, \$1.7 million

Develop promising new directions to cope with data overload in information analysis and synthesis tasks and demonstrate innovation methods in human-centered design of advanced technologies. Results include studies and measures to assess the rigor of analytic process, studies of adversarial intent, studies of team cognition in analysis, cross-cultural factors, technology forecasting.

Macro-Cognitive Metrics, Air Force Research Laboratory (through SRA), 2006-2009, \$.7 million

Develop, evaluate and synthesize promising new measures to assess macro-cognitive functions such as anomaly response, sense making and re-planning, to assess coordination in distributed teams such as synchronization, and to assess the resilience and adaptive capacity of complex systems.

Multi-level, Active Attention Surveillance, National Science Foundation, 2004-2007, \$1.3 million (Co-PI)

Collaboration with computer vision researchers to develop layered sensing systems that link smart and decentralized sensing to distributed decision making systems.

US-Brazil Higher Education Consortia Program (FIPSE/CAPES), Department of Education, 2003-2007, \$198,980

Undergraduate engineering student exchange program between 2 U.S. and 2 Brazil universities, "Training Industrial Engineers to Manage High-Risk, Complex Systems: Applying Cognitive Engineering to Human Error and Automation."

PI in other Sponsored Research Projects:

- Maximizing Visualization Effectiveness, National Imagery and Mapping Agency, 2002 to 2004.
- Scenario-based evaluation of distributed crew interaction, NASA Johnson Space Center, 2002 to 2003.
- Center for Inquiry on Patient Safety, Veterans Health Administration, 1999 to 2003
- Creating Safety And Reducing Medical Errors With Bar Coding, Veterans Health Administration, 1999 to 2003.

- Orientation For Intervention: Supporting Mission Awareness In Space Operations, NASA Johnson Space Center, 1998 to 2001.
- Aiding The Intelligence Analyst In Situations Of Data Overload, Air Force Research Laboratory, 1996-1999.
- New Concepts for Supporting Anomaly Response, NASA Johnson Space Center, 1995 to 1999.
- Human Interaction Concepts for Cooperating Automation, NASA Johnson Space Center, 1995 to 1998.
- Enhancing Human-Human and Human-Computer Cooperation in Aeromedical Evacuation Planning and Reactive Replanning, Department of Defense, 1995 to 1997.
- Cognitive Factors in the Interface between Flight Crews and Modern Flight Deck Systems, NASA Langley Research Center, 1994 to 1996.
- The Price of Flexibility: Air-Ground Coordination with Digital Communication (DataLink), Federal Aviation Administration, 1993 to 1997.
- Controlling through the Computer: Opportunities and Problems with Soft Controls, AECL Canada, 1993 to 1995.
- New Concepts for Supporting Cooperative Fault Management, NASA Johnson Space Center, 1993 to 1994.
- Anesthesiologist-Technology Interaction in the Operating Room, Anesthesia Patient Safety Foundation, 1993 to 1994.
- How to Make Intelligent Systems Team Players, NASA Johnson Space Center, 1990 to 1994.
- Cognitive Engineering in Aerospace Applications, NASA Ames Research Center, 1989 to 1996.

Professional Service:

President, Resilience Engineering Association, 2011-2013

President, Human Factors and Ergonomic Society, 1998-1999

Executive Council, Human Factors and Ergonomic Society, 1997-2000

Editorial Board, Human Factors, 1993 to 1997

International Journal of Human-Computer Studies, 1991 to 1996

International Journal of Cognitive Ergonomics, 1996 to 2001

Le Travail Humain, 1991 to 2001.

Cognition, Technology and Work, 1999 to present.

Special Issue Editor, Cognition Technology and Work, 2010

IEEE SMC-A, Nov. 2004.

Human Factors, 42(1), 2000.

International Journal of Man-Machine Studies, 27, 1987.

Board Member and Executive Committee: National Patient Safety Foundation, 1996 to 2002.

Associate Director: Center for Inquiry on Patient Safety, Veterans Health Administration, VISN 10, Ohio, 1999 to 2002.

Teaching:

Graduate student advising:

- advised: 24 PhD students; 26 MS students; 5 MFA students in Industrial Design

Courses developed:

Behind Human Error: How Complex Systems Fail (originated in 1989): electronic course resource set developed 2001. Uses a case based method to examine the factors that influence human performance, how complex systems fail, how poor design creates predictable forms of error, how hind-

sight bias blocks organizational learning, how organizations can be resilient or brittle. <http://csel.eng.ohio-state.edu/pexis>

Designing Visualizations to Escape from Data Overload (originated in 1989)

Based on series of design exercises, class builds skills in visualization and representation design to overcome the penalties of data overload. Human-computer interaction techniques covered include pattern based visualizations, analog representations of complex concepts, navigation in large virtual data fields, and visual thinking.

How to Study Cognitive Systems in Context (originated in 1989)

Covers field research methods knowledge elicitation, scenario design, direct observation, critical incidents, process tracing, protocol analysis, scaled world simulations, envisioning promising designs, large scale exercises as learning labs, system evaluation. Studies examined demonstrate measures of cognitive work, coordination of distributed activity, and system adaptive capacity.

Human Collaboration with Intelligent and Automated Systems (originated in 1990)

Covers paradigms for cooperative human-machine problem solving and coordination of distributed work over multiple groups. Topics include: how to make automated and intelligent systems team players including human-centered automation, the design of computer based advisory systems, supervisory control, software agents, computers as critics, human-robot interaction.

Introduction to Cognitive Systems Engineering (since 1988)

Origins and foundations of Cognitive Systems Engineering. Applications of concepts and techniques to human error, automation surprises, human-robot interaction, data overload, re-planning, anomaly response, distributed work.

Systems Thinking & Introduction to Complexity (originated in 2006)

Concepts and heuristics in systems thinking and how to apply them to engineer complex projects in aerospace, health care, energy, security and other fields. Systems engineering concepts are applied to problems in managing complexity of development projects, reliability of software intensive systems, expanding adaptive control, system of systems design, and coordination of distributed work systems.

Information Analysis and Comprehension (originated in 2006)

Introduction to professional analytics for finding in meaning in massive data fields in engineering, intelligence/security, business, and health care with special focus on factors that make analytical processes shallow or rigorous. Course method: students perform information analysis exercises (energy safety analysis revised for terrorism threats, counter intelligence in asymmetric conflict) and examine cases from finance (fraud detection), space missions (Columbia space shuttle accident and the return to flight decision), intelligence (Yom Kippur war surprise), and security analysis.

Resilience Engineering (originated in 2008):

Introduction to the concept of "resilience" in systems engineering and its application to design and management problems in safety, risk management, and sustainability. Examines models and measures of adaptive capacity and multi-agent layered networked systems.

Special offerings:

Institute for Collaborative Innovation, Summer Institute, 2005, 2006, 2007 and 2009

Uses innovation methods to develop promising solutions to sensemaking and data overload problems in information analysis and comprehension tasks. About 25 people ranging from UGs to visiting professors from 5-6 different disciplines (e.g., design, art&technology, cognitive eng., international security, linguistics, psychology) and multiple universities participate in a 10 week

process. It culminates in a show that utilizes complex scenarios (such as the interaction of energy and security issues in multi-organization/cross-cultural settings) to demonstrate design seeds on themes such as uncertainty, culture, rigor, intent, hypothesis exploration, time value of information, visualization, and team cognition.

Design Project Classes:

- 1995 Apple Design Project, Integrating Physical and Virtual Environments, sponsored by Apple Computers.
- 1999 Image Overload, sponsored by Kodak.

Lists of Invited Talks, Keynotes, Advisory Activities

Recent Service To Human Factors/Cognitive Science:

Invited speaker, Expert Workshop on Control and Responsible Innovation in the Development of Autonomous Machines, Hastings Center, Garrison, NY, April 25-27, 2016.

Invited speaker, "Developing strategic agility for organizations in a turbulent world," Special President's session on People are Messy, Human Factors and Ergonomics Society Annual Meeting, AustinTX, October 10, 2017.

Invited Committee Member, "Sufficient Evidence? Building Certifiably Dependable Systems." Computer Science and Telecommunications Board, National Academy of Science. Final report: Software for Dependable Systems, National Academies Press, 2007.

Invited Speaker, Symposium on "The Social Life of Machines" honoring Donald A. Norman, the 2006 Benjamin Franklin Medal in Computer & Cognitive Science, Franklin Institute, Philadelphia, PA, April 27, 2006.

Invited Testimony to Senate Committee on Commerce, Science and Transportation on the "Future of NASA" following the Columbia space shuttle accident. Washington DC, October 29, 2003.

Invited Speaker, Congressional Briefing, The Mechanics of Election Reform: From Registration To Results. Sponsored by American Political Science Association, American Psychological Association and the Consortium of Social Science Associations. Washington DC, March 16, 2001.

Invited Testimony, Technology and the Voting Process Hearing, Committee on House Administration, Longworth House Office Building, Washington DC, May 24, 2001. (www.house.gov/cha/business/business.html)

Selected Service And Projects For Government And Industry:

Resilience

Head of Program Committee 7th Symposium on Resilience Engineering, Resilience Engineering Association, June 26-29, 2017.

Organized and led session "Coping with complexity: Making modern Internet-facing business IT resilient," Velocity Conference: Web Operations and Performance, New York, September 21, 2017
<https://conferences.oreilly.com/velocity/vl-ny-2016/public/schedule/detail/54958>

SNAFU Catchers Resilience Engineering Consortium industry workshop with Etsy/IBM/IEX, March 13-15, 2017, Brooklyn NY.

Invited talk, "Stories of technology change reveal the congestion, cascades & conflicts that arise when apparent benefits get hijacked," Workshop on New Perspectives on Sustainability and Resilience.

Launch of Purdue's interdisciplinary initiative on "Building Sustainable Communities," Purdue University, West Lafayette, IN, March 23-24, 2017.

Invited talk, "Always Adapting at the Intersections," Workshop: Perception, Action, and Cognition in Situated Activity: The Legacy of John Flach. Dayton OH, May 7, 2017.

Invited talk, "Resilience-in-Action," Naval Post-Graduate School, Monterey, CA, May 16, 2017.

Keynote talk, "Situation normal: All fouled up." Velocity Conference: Web Operations and Performance, New York, September 21, 2017, <https://www.oreilly.com/ideas/situation-normal-all-fouled-up>

Invited speaker, Interdisciplinary Resilience Summit, 2016 International Symposium on Sustainable Systems and Technology (ISSST). Phoenix, AZ, May 16-17, 2016.

Keynote Address at Workshop "Anything can happen - Resilience in Crisis Management", SINTEF, Trondheim, Norway, February, 5, 2016.

Invited talk at Workshop on Risk and Resilience in the Face of Global Change, Aspen Global Change Institute, November 30 to December 5, 2015, Aspen CO.

<https://vimeo.com/user17601098/review/156865482/5c9737f801>

Keynote talk, Pace x pressure: The wisdom of being fast and fresh as anomalies cascade, Financial Systems track, Velocity Conference: Web Operations and Performance, New York, October 12-14, 2015.

Invited Lecture, Is a Comprehensive Theory of Resilience Possible? Resilience Week, Philadelphia PA, August 2015.

Co-Organizer, 6th Symposium on Resilience Engineering, 'Resilience Engineering: Managing resilience, learning to be adaptable and proactive in an unpredictable world,' 22-25 June, 2015, Lisbon, Portugal.

Invited Talk, Resilience in Tangled Layered Networks, International Symposium on Sustainable Systems and Technology, Dearborn, MI, May 2015.

Invited Speaker, 30th Emerging Issues Forum: Innovation Reconstructed, North Carolina State University, Raleigh, NC, February 9-10, 2015.

Lead Speaker, TORC Project Workshop, Paris France, October 27-28, 2014

Co-organizer, Resilience Engineering: 10th Anniversary Seminar. Abbaye Sorreze, France, October 29-31, 2014.

Invited Keynote Address, Velocity: Web Operations and Performance, O'Reilly Media, NY, NY, September 15-18, 2014.

Invited Seminar, [Systems Integration Division](#), National Institute of Standards and Technology (NIST), "Brittleness and Resilience: A Challenge for Modern Complex Systems and Networks," Gaithersburg, MD, February 20, 2014.

Co-organizer and speaker, Powering the Drive for Resilient Societies and Enterprises: The Fundamental Science and Engineering for Building Resiliency, Panel of presentations for Transatlantic Science Week, Washington DC, November 13, 2013.

Invited Plenary Speaker, Workshop on Analytical Support for Societal and Regional Resiliency in Support of National Security, Decision and Information Sciences Division, Organized by Argonne National Laboratory and Military Operations Research Society (MORS), Argonne IL, September 10 to 12, 2013

Led a 4 hour workshop on Foundations of Resilient Control Systems jointly with Professor John Doyle of the California Institute of Technology during the 5th International Symposium on Resilient Control Systems, San Francisco CA, August 14, 2013.

Co-Organizer (Head, Organizing Committee, Program Committee), 5th Symposium on Resilience Engineering, 'Resilience Engineering: Managing trade-offs'. 24-27 June, 2013, Soesterberg, The Netherlands (140 participants from 20 countries, 67 papers, 8 workshops).

Presidential Address, The State of Resilience Engineering: Progress and Challenges. 5th Symposium on Resilience Engineering, 25 June, 2013.

Health Care

Invited speaker, [Ideas to Innovation \(I2I\) workshop](#) on "Stimulating Collaborations in the Application of Resilience Engineering to Healthcare, University-Industry Demonstration Project, National Academy of Science, June 13-14, 2013.

Invited testimony to IOM/NRC Committee on Patient Safety and Health Information Technology, February 24, 2011, Irvine CA.

Invited speaker, Surgical Outcomes Club, In association with Annual Meeting of the American College of Surgeons, Washington DC, October 3, 2010.

Invited speaker, Workshop on Cognitive Complexity and Patient Safety, McDonnell Foundation, Sedona AZ, October 26-28, 2009.

Invited speaker, Ninth Canadian Healthcare Safety Symposium, Montreal, Quebec, October 22-24, 2009.

Invited speaker, Health Care Transformation Through Systems Approaches. MacArthur Foundation Roundtable. The John D. and Catherine T. MacArthur Foundation. Chicago, IL, January 23, 2007.

Invited speaker, Expert Meeting on Healthcare Safety Management, Haute Autorité de Santé, Paris, May 22-24, 2006.

Invited contributor, National Academies Initiative in Health Informatics: Defining Domains for Action, Challenges, and Tasks. Washington DC, May 1-2, 2006.

Invited Committee Member, Engineering the Delivery of Health Care: Priorities For Application And Research, Joint National Academy of Engineering/Institute of Medicine Study Panel, September 2002 to July 2005.

Associate Director, Center for Inquiry on Patient Safety, Veterans Health Administration, VISN 10, Ohio, 1999 to 2002.

The Center carries out a number of research and organizational activities to promote a culture of learning about patient safety. One production is 'The Day After' - an accident investigation role play simulation that involves about 40 participants for a one and one half day workshop.

Invited contributor, Workshop on Improving Medical Device Safety: Supporting Resilience and Innovation in Healthcare Organizations. University of Chicago, Chicago, IL, September 19-22, 2002.

Invited Member, Executive Session on Medical Error and Patient Safety, Kennedy School of Government, Harvard University, 1998-1999.

Harvard Executive Sessions are a forum for generating new ideas to begin organizational change on important public policy issues. The initiative on patient safety consists of 24 members including 4 Harvard faculty and 10 heads of health care organizations, senior regulators, and a former NASA administrator.

Advisor, National Safety Patient Foundation, Fall 1996 to 2002

- Chair, National Health Care Safety Council, 1996-2002
- Member, Executive Committee and Governing Board, June 1997 to 2002.

- Research Committee, National Safety Patient Foundation, 1996-2001.
- Invited Contributor, National Safety Patient Foundation symposium to plan the foundation's patient safety agenda, February 21, 1997.

Recent invited talks to advise various health care organizations on patient safety:

- Deans Lecture, Vanderbilt Medical Center, January, 15, 2009.
- Invited speaker, Advancing Patient Safety in Surgery Conference, The Royal College of Surgeons of Edinburgh, Edinburgh Scotland, November 15, 2007.
- Keynote address, Conference for Medical Product Safety Network (MedSun), FDA Center for Devices and Radiological Health, Falls Church, VA, March 26-27, 2007
- Invited speaker, Safety of the Third Kind: Making Organization Resilient. Pursuing Perfection Project Workshop, Robert Wood Johnson Foundation and Institute for Healthcare Improvement, Cincinnati, OH, October 3-4, 2006.
- Invited talk, Symposium on Advances in Patient Safety and Medical Simulation, Vanderbilt University Medical Center, February 3, 2006, titled "Engineering High Resilience for Patient Safety."
- Plenary Address, Making Health Care Safer 2004, Royal College of Physicians and British Medical Journal, London, October 16-17, 2004.
- Invited Speaker, Escaping Conflicts between Learning and Accountability in Patient Safety. 10th Annual Clifford Symposium on Tort Law and Social Policy. Starting Over?: Redesigning the Medical Malpractice System. DePaul Law School, Chicago IL, April 15-16, 2004
- Keynote address, Escape from Data Overload, VHA eHealth University, Annual Meeting, Veterans Health Administration, Dallas TX, May 24-25, 2004 (over 1,000 attendees).
- Plenary Address, Second Annual Patient Safety Conference, San Diego Center for Patient Safety, March 19, 2004, San Diego, CA.
- Making Computers Team Players. R. Macklis, organizer, Promoting Patient Safety: Is technology the solution? April 30, 2001, The Cleveland Clinic.
- Creating Safety Under Pressure, L. Diamond Memorial Lecture, Renal Physicians Association, March 26, 2001, Washington DC.
- Testimony on behalf of Human Factors and Ergonomics Society, Research Summit, Agency for Healthcare Research and Quality, September 11, 2000, Washington DC.
- Clinical Quality Improvement Forum, AMA, April 28, 2000, Chicago IL
- Ohio State Medical Association and Ohio Hospital Association, Joint Task Force on Medical Error, March 31, 2000
- National Academy for State Health Policy, March 20, 2000, Boston MA
- Briefing for Senate staff, Human Factors and Patient Safety, February 8, 2000.
- University of Texas Medical Center, Department of Medical Informatics, February 10, 1999, Houston.
- Advisor, Veterans Health Administration on Patient Safety System Design, 1998.
- Advisory Panel Meeting, Washington DC, March 12-13, 1998.
- Work Group Meeting on Patient Safety Reporting, Analysis and Reporting, Dallas TX, June 10-12, 1998.

Aerospace

Invited speaker, "Transformative concepts in human-autonomy teaming: New roles, new risks, new opportunities." NextGen Flight Deck Symposium, NASA Langley Research Center, Hampton, VA, February 15-16, 2017.

Invited speaker, "Deploying Autonomous Capabilities," NASA Ames Research Center, May 17, 2017.

Invited speaker, "Deploying Autonomous Capabilities: Resilience, Detect & Avoid, & Degraded Comms," RTCA Special Committee Meeting, Washington DC, July 10-11, 2017

Plenary Address, Autonomous capabilities: The future is already here & it's not as advertised. 19th International Symposium on Aviation Psychology, Dayton, OH, May 10, 2017.

Invited speaker, "Deploying Autonomous Capabilities," NASA Ames Research Center, May 17, 2017.

Invited speaker, "Deploying Autonomous Capabilities: Resilience, Detect & Avoid, & Degraded Comms," RTCA Special Committee Meeting, Washington DC, July 10-11, 2017

Led Workshop on Autonomy, Complexity and Resilience in Aviation, Eurocontrol, ES2 -WS3-2017 Systemic Thinking and Human Performance Conference, September 27-29, 2017, Brussels/Belgium.

Invited speaker, "Deploying Autonomous Capabilities," NASA Ames Research Center, May 17, 2017.

Invited speaker, "Deploying Autonomous Capabilities: Resilience, Detect & Avoid, & Degraded Comms," RTCA Special Committee Meeting, Washington DC, July 10-11, 2017.

Invited Talk, "Risks of Autonomy: The Future is Already Here and It Doesn't Work as Advertised." International Symposium Human Factors in Automation, TNO, Soesterberg, The Netherlands, October 12-13, 2016. http://csel.org.ohio-state.edu/videos/Woods_TNO_Talk.mp4

Led Workshop on Proactive Safety and Resilience, Frankfurt Tower ATC, DFS Deutsche Flugsicherung Safety Department Frankfurt Germany, February, 9, 2016.

Keynote Address, Reaching Resilience, Norwegian Civil Aviation Conference / Luftfartskonferansen, Bodo Norway, February 3, 2016.

Led Workshop on Proactive Safety and Resilience, Norwegian Civil Aviation Conference / Luftfartskonferansen, Bodo Norway, February 3, 2016.

Invited Address, EuroControl Workshop on System Safety & Human Performance, Barcelona, Spain, October, 5-7, 2015.

http://www.skybrary.aero/index.php/Portal:Human_Factors_and_System_Safety_Seminar

Invited Speaker, Workshop on System Safety & Human Performance, EuroControl, ES2-WS3-13, Lisbon, Portugal, September 24-26, 2014.

Invited Committee Member, Committee on Autonomy in Civil Aviation. National Research Council, Aeronautics and Space Engineering Board, July 2013 to July 2014.

National Research Council (2014). Autonomy Research for Civil Aviation: Toward a New Era of Flight. Washington DC: National Academies Press, , http://www.nap.edu/catalog.php?record_id=18815

Invited Briefing to board members of the National Transportation Safety Board on Mode Awareness and Aviation Safety, Washington DC, February 21, 2014.

Led a 2 day workshop on System Safety & Human Performance: Why Things Go Right, with Professors Chris Johnson (Scotland) and Erik Hollnagel (Denmark) for EuroControl, ES2-WS3-13, Dublin, Ireland, September 26-27, 2013.

In Air Traffic Management, developed a partnership with DFS Deutsche Flugsicherung Safety Department to implement Resilience Engineering techniques in their Proactive Safety Management process (including scientific advisor on for their Air Navigation Safety Projects).

Member, CAST/PARC/FAA Flight Deck Automation Working Group, 2013.

Final report: Abbott, K., McKenney, D. and Railsback, P. (2013). Operational Use of Flight Path Management Systems. Final report of the Flight Deck Automation Working Group, Performance-based op-

erations Aviation Rulemaking Committee PARC / Commercial Aviation Safety Team CAST / FAA. http://www.faa.gov/about/office_org/headquarters_offices/avs/offices/afs/afs400/parc/parc_reco/media/2013/130908_PARC_FltDAWG_Final_Report_Recommendations.pdf

Invited speaker, Automation and Technology in Aviation, Air Safety Forum, Air Line Pilots Association (ALPA), Washington DC August 9, 2012.

Member, Independent Safety Review Team, Air France, December 2009 to December 2010.

NSF/AUVSI/FAA/DHS workshop on Unmanned Aerial Systems: Research Directions for the National Air Space, San Diego, CA, June, 2008.

Seminar on Resilience Engineering for Safety Management, for NASA Shuttle Program and Shuttle Safety Office, Johnson Space Center, Houston TX, November 30, 2005.

Invited Committee Member, Committee on Aerospace Research and Technology for Vision 2050. National Research Council, Aeronautics and Space Engineering Board. September 2002 to December 2003.

Invited speaker, Safety Symposium on Organizational Factors, Columbia Accident Investigation Board, Houston TX, April 27-28, 2003.

Consultant, Columbia Accident Investigation Board, April-August, 2003.

Plenary Address, NASA Design for Safety Workshop, October 10-12, 2000.

Technical Advisor to FAA Human Factors Study Team on Advanced Flight Decks, Fall 1994 to July 1996

Served as Technical Advisor to a special team of FAA certification personnel set up to make recommendations on safety on highly automated flight deck given accidents that involved breakdowns in team play between the flight crew and the automation. This committee gathered data from all stake holders in the research, development, certification and operations of advanced aircraft (manufacturers, avionics developers, cockpit designers, airline companies, industry groups, and pilots unions in the US and in Europe), and develop a set of recommendation to ensure the highest levels of safety (final report and recommendations published by FAA in July 1996.

Invited Contributor, NASA Ames Research Center Workshops

- Human and Organizational Risk Management Workshop, NASA Ames Research Center, April 25-27, 2001.
- Plenary Talk, Design for Safety Workshop, NASA Ames Research Center, October 10, 2000.
- Air Transportation Management Workshop (Invited Speaker), NASA Ames Research Center, January, 1995.
- Cognitive Modeling Workshop, NASA Ames Research Center, February, 1994.
- Workshop on Philosophies of Automation in Commercial Aviation (planning committee), Carmel Valley, CA, 1989.

Invited Speaker, Boeing Workshop on Human Error, Boeing, Seattle WA December 2-3, 1992.

Boeing invited 4 leading researchers on human error to help them consider techniques for addressing error in aircraft design and maintenance.

Defense

Invited seminar, Command and Control (C2) Symposium: Learning the lessons from last 20 years of Science and Technology. UK Ministry of Defense, Tidworth, UK, March 4-25, 2015. Address: 35 Years of Picking Up the Pieces after Explosions of Autonomy

<http://csel.org.ohio-state.edu/userFiles/balkin/WoodsUKTalk.html>

Invited Participant, Test, Evaluation, Verification and Validation for Autonomy Workshop, Air Force Research Laboratory, Wright Brothers Institute Innovation and Collaboration Center, Dayton OH, February 27-29, 2014.

Taught a tele-seminar on Human Supervision of Unmanned Aerial Systems October 16, 2013. Organized by the Ministry of Defense, The Netherlands: Universitair Docent Human Factors en SysteemVeiligheid, Faculteit Militaire Wetenschappen/Kennissectie Militaire Gedragwetenschappen & Filosofie, Nederlandse Defensie Academie, Ministerie van Defensie.

Invited Briefing, "Rigor and Analytic Tradecraft: Applying Studies of Information and Intelligence Analysis to Enhance Expertise." NASIC Chief Scientist Group Meeting, August 8, 2013.

Member, Defense Science Board Task Force on Autonomy (2010-2012).

Final Report: Murphy R. R. and Shields, J. (2012). The Role of Autonomy in DoD Systems, Task Force Report, Office of the Secretary of Defense, July. <http://fas.org/irp/agency/dod/dsb/autonomy.pdf>

Advisor, Chief Scientist, Human Effectiveness Directorate, 711th Performance Wing, Air Force Research Laboratory. Strategic research workshops on Autonomous Systems, 19/20 October, 9/10 November, and 15/16 December, 2010.

Invited participant, Workshop on Integrated Cognitive Architectures for Understanding Sense-making (ICARUS), IARPA, Arlington VA, July 21-22, 2009.

Invited speaker, Human Robot Interaction Workshop, Army Research Laboratory, Havre de Grace, MD, 19-20 May 2009.

Member, DARPA Information Science and Technology (ISAT) study group, CURIOUS - Continuous User-Oriented Reporting for Interaction Optimizations Using Sensors, 2007.

Keynote address, Commander's Predictive Environment, Air Force Research Laboratory, Fairfax, VA, September, 19-20, 2006.

Seminar on Distributed Work Systems, for Strategic Studies Group, Chief of Naval Operations, Naval War College, Newport RI, November 18, 2005.

Invited panel member, National R&D Agenda for Visual Analytics, National Visual Analytics Center, PNNL and Department of Homeland Security, 2004.

Invited speaker, Friends of the Intelligence Community (FOIC) Meeting, National Institute of Standards and Technology, January 21-23, 2004.

Invited speaker, Workshop on Cognitive Task Analysis of Intelligence Analysis, Sept 4-5 Dayton, OH.

Invited speaker, TTCP Workshop on Coalition Decision Making, Adelphi MD, May 6-8, 2003.

Invited participant, Adversarial Decision Making Modeling workshop, August, 27/28, 2002, Wright-Patterson AFB.

PI, Advanced Decision Architectures: Building Information Superiority in the Army Through User-Centered Decision Support, US Army Research Laboratory Collaborative Technology Alliances, cumulative funding @\$8 million, GFY 2001--2009 (DAAD19-00-R-0005): develop computerized user-centered decision support systems as part of university/business/government consortium.

PI, Finding the Decision Support Behind the Visualization, ARDA/NIMA Geo-Spatial Intelligence Information Visualization Program (GI²Vis), Aegis Research Corporation, Prime, cumulative funding @\$200K,

GFY 2003–2004 (NMA40102): analyze how leading edge visualizations support practitioner decision making.

PI, Aiding The Intelligence Analyst In Situations Of Data Overload, Human Effectiveness Directorate, Wright-Patterson AFB, cumulative funding @\$640K, GFY 1996–2000: develop concepts to help practitioners cope with data overload and apply these concepts to Intelligence Analysis applications.

Process Control, Energy and Nuclear Power

Advisory Board, Resilient Control Systems Group, Idaho National Laboratory, 2010-2013.

Invited participant, Advanced Instrumentation & Controls and Human Systems Interfaces: Research Needs and Directions Workshop, OSU, EPRI, INL, 3-19/20-09

Co-organizer, International Seminar on Resilience Engineering, Rio de Janeiro Brazil, December 12-13, 2006.

Keynote address, Lições sobre Confiabilidade provindas da investigação

do acidente com a Nave Columbia, Seminário De Confiabilidade Da Petrobras (PETROBRAS Reliability Seminar), Rio de Janeiro Brazil, December 8, 2003.

Invited Contributor, Workshop on Advanced Human-Machine Interface Research, Electric Power Research Institute, Alexandria, VA, May, 1994.

Discussion of problems and possible research directions in the area of advanced I&C systems. Workshop developed and recommended a research agenda as input to EPRI's project planning process.

Member, Nuclear Safety Research Review Committee, U.S. Nuclear Regulatory Commission, 1990 to 1993.

This committee provides advice to the Director of the Office of Nuclear Regulatory Research of the Nuclear Regulatory Commission on matters of overall management importance in the direction of the Nuclear Regulatory Commission's program of nuclear safety research. The committee is regularly briefed on NRC research plans and activities, reviews the research and advises the Director on ways that the research program can be more effective.

Panel Member, National Research Council panel on Human Behavior and Nuclear Safety, 1987 to 1988.

Developed a research agenda to consider the human contribution to risk and safety in the nuclear power industry.

National Science Foundation

Invited participant, NSF Workshop on Adaptive Human-Centered Engineered Systems, Arlington VA, February 22, 2016.

Organizing Committee/Group Leader/Panelist, National Workshop on Resilience Research (NWRR) for Critical Infrastructure: Current Status and Challenges, NSF, Arlington VA, October 22-23, 2015.

Invited speaker, MIT-NSF Workshop: Smarter Service Systems through Innovation Partnerships and Trans-Disciplinary Research. Cambridge MA, November 20-21, 2014.

Invited speaker, NSF Resilient Infrastructures, Annual Contractors Workshop, Washington DC, December, 7-8, 2009.

Organizing Committee and Working Group Leader, NSF/DARPA Workshop on Human-Robot Interaction, San Luis Obispo, CA, September 28-29, 2001.

Workshop designed to bring together leading roboticists and specialists on human-computer cooperation to develop assessment of the current state and plan future research directions on human-robot interaction.

<http://users.csc.calpoly.edu/~erogers/HRI/>

Steering Group and Working Group Head, NSF Workshop on Human-Centered Intelligent Systems, Washington DC, February, 1997.

Planning workshop for a new initiative from the Computer and Information Sciences Directorate to help users cope with the overload of data and complexity in electronic media.

Invited Participant and Working Group Chair, National Science Foundation Workshop on Human Performance in the Complex Workplace: Implications for Basic Research in Cognitive Science, September, 11-12, Alexandria VA, 1992.

Led one of the working groups to help NSF plan how their research agenda in Cognitive Science can better address the human performance issues important to different government agencies and industries.

Human Factors Research

Invited Contributor to Committee on Human Factors, National Research Council panel meetings Research Needs in Supervisory Control, 1983.

Research needs in Human Performance Models in Computer Aided Engineering, 1988-89.

Human Error I: Models, Woods Hole, MA, 1990.

Human Error IV: Design to Prevent Error, Irvine CA, Feb. 1993.

Briefing to Committee on Human Factors on Human Factors and Patient Safety Movement, May 9, 2000.

Selected Scientific Meetings

Head of Program Committee 7th Symposium on Resilience Engineering, Resilience Engineering Association, June 26-29, 2017.

Invited speaker, Expert Workshop on Control and Responsible Innovation in the Development of Autonomous Machines, Hastings Center, Garrison, NY, April 25-27, 2016.

Invited speaker, Interdisciplinary Resilience Summit, 2016 International Symposium on Sustainable Systems and Technology (ISSST). Phoenix, AZ, May 16-17, 2016.

Invited Talk, "Risks of Autonomy: The Future is Already Here and It Doesn't Work as Advertised." International Symposium Human Factors in Automation, TNO, Soesterberg, The Netherlands, October 12-13, 2016. http://csel.org.ohio-state.edu/videos/Woods_TNO_Talk.mp4

Invited Speaker, Symposium: HumanMachine Symbiosis 50 Years Later, 37th Annual Meeting of the Cognitive Science Society, Pasadena, CA, July 2015.

Invited Talk, Reaching Resilience, 12th International Naturalistic Decision Making Conference, June 2015.

Keynote address, Annual Meeting of the Association of Canadian Ergonomists (ACE), Kelowna, British Columbia, Canada, 10-5-2010.

Keynote address, Annual Meeting of the Societe de Ergonomie de la Langue Francais (SELF), Liege, Belgium, 9-13-10, 2010.

Keynote address, International Symposium on Resilient Control Systems, Idaho National Laboratory/

IEEE, Idaho Falls, August 11-14, 2009.

Plenary Speaker, Workshop on Trust in CyberDomains, Air Force Research Laboratory, Pensacola FL, July 15-16, 2009.

Invited address, Experience Laboratory, Mediamatics and Industrial Design Engineering, Technical University, Delft, The Netherlands, May 13, 2008.

Invited participant, Research Methods Symposium, Observing and Measuring Behaviour: Non-Technical Skills in the Operating Theatre. Royal College of Surgeons of Edinburgh and University of Aberdeen, Edinburgh, Scotland 11-16-07.

Invited participant, Merging Cognitive Systems Engineering and Systems Engineering Workshop, Pensacola FL, October 16-17, 2007.

Keynote address, Measuring How Design Changes Cognition at Work, 20TH ACM UIST Symposium (User Interface Systems and Technology, Newport, Rhode Island, October 7, 2007 (see <http://www.acm.org/uist/uist2007/> and <http://www.acm.org/uist/uist2007/program/keynote1.html>).

Invited address, Creating Safety by Engineering Resilience, Almaden Institute 2007, Navigating Complexity, IBM Almaden Research Center, April 11-12, 2007. (see <http://www.almaden.ibm.com/institute/> and <http://csel.eng.ohio-state.edu/productions/ibm>).

Plenary Address, Human-Robot Interaction Conference HRI'06, Salt Lake City, UT, March 2-4, 2006.

Co-organizer, Workshop on Intelligent Decision Support, August 31–September 2, 2005, Siena Italy (42 + participants from 15 countries).

Co-organizer, International Symposium on Resilience Engineering, October 20-25, 2004 Soderoping Sweden. (22 + participants from 12 countries).

Invited talk, Hindsight bias and traffic accident causal analysis, Transportation Research Board, 84th Annual meeting, Washington DC, 1-12-2005.

Invited talk, Resilience as a Paradigm for Safety Management, NASA Ames Research Center, February 15, 2005.

Keynote Address, Interaction between Humans and Autonomous Systems over Extended Operation, 2004 AAAI Spring Symposium, James Gunderson and Cheryl Martin, Co-chairs, March 22-24, 2004, Stanford CA.

Keynote address, Laws that Govern Cognitive Work. Accidentes em Sistemas Complexos, Conferencia Internacional, Federal University of Rio de Janeiro, Rio de Janeiro Brazil, December 9, 2003.

Plenary Address, Cognitive Systems Engineering Consortium Workshop, Dayton OH, October, 29-31, 2003.

Invited Speaker, Biannual Conference on Naturalistic Decision Making (NDM):

NDM VII (Plenary Address), Amsterdam, The Netherlands, June 15-17, 2005.

NDM VI (Plenary Address), Pensacola FL, May 2003.

NDM IV (Keynote Address), Washington DC, May 1998.

NDM II (Panel Chair), Dayton OH, June 1994.

NDM I Dayton OH, 1989

Invited contributor, Workshop on Improving Medical Device Safety: Supporting Resilience and Innovation in Healthcare Organizations (Third 'Clambake' Conference on Human Error), Convened by the Developing Center for Patient Safety at the University of Chicago and the Food and Drug Administration (FDA), Chicago, Illinois, September 19-22, 2002.

Keynote Address, Psycho-Technology Thematic Track, Annual Meeting of American Psychological Association. Chicago, IL, August 24, 2002.

Plenary Address, Annual Meeting of the Cognitive Science Society, Fairfax, VA, August 10, 2002.

Invited Address, Louis H. Diamond Lecture, 2001 Annual Meeting of the Renal Physicians Association, Washington DC, March 24, 2001.

Plenary Address, 44th Annual Meeting of the Human Factors and Ergonomics Society and International Ergonomic Association, August 1, 2000.

Keynote Address, National Symposium on Building Health Care Systems that Do No Harm: Advancing Patient Safety Through Partnership and Shared Knowledge. June 28 - 30, 2000, Dallas.

Keynote Address, Society for Technology in Anesthesia, Seventh Annual Meeting, Tucson, NM, January 15, 1998.

Invited Contributor, organized and spoke in panel on Incident Reporting, Enhancing Patient Safety and Reducing Errors in Health Care, Annenberg Center for Health Sciences, November, 1998.

Co-Director and organizer, Assembling the Scientific Basis for Patient Safety, Expert Working Group (50 attendees) convened under the auspices of the National Health Care Safety Council of the National Patient Safety Foundation, Chicago IL, December 17-18, 1997.

Invited contributor, NATO and Office of Naval Research Workshop on Cognitive Task Analysis, Washington DC, October, 1997.

Invited Contributor, Examining Errors in Health Care: Developing a Prevention, Education and Research Agenda, Annenberg Center for Health Sciences, October, 1996

Invited Address, Annual Meeting of the Joint Council Initiative in Cognitive Science and Human-Computer Interaction. London, England, March 1995.

Keynote Address, Annual Meeting of the Cognitive Science Society, Atlanta, GA, August, 1994.

Invited Speaker, Society for Intravenous Anesthesia, Third Annual Meeting, San Francisco, CA, October, 1994.

Keynote Address, Conference on Automation Technology and Human Performance, Washington DC, April 1994.

Plenary Address, International Workshop on Intelligent User Interfaces, ACM, January, 1993.

Executive Committee and Contributor, Workshop on Human Error in Anesthesia, sponsored by FDA and the Anesthesia Patient Safety Foundation, Feb. 26-March 1, 1991.

Helped to organize international meeting that brought together for the first time researchers on human error and researchers in anesthesia to examine anesthesia safety.

Publications: David D. Woods

Books and Monographs

1. Hollnagel, E., Paries, J., Woods, D.D., and Wreathall, J., Eds. (2011). *Resilience Engineering in Practice*. Ashgate, Aldershot, UK.
Japanese translation: JUUSE Press Limited, 5-4-2, Sendagaya, Shibuya-ku, Tokyo, 151-0051, Japan, December 2013.
2. Woods, D.D., Dekker, S.W.A., Cook, R.I., Johannesen, L.L. and Sarter, N.B. (2010). *Behind Human Error (2nd Edition)*. Ashgate, Aldershot, UK.
Italian translation: Hirelia Edizioni, Milano, IT, 2012.
3. Woods, D.D. and Hollnagel, E. (2006). *Joint Cognitive Systems: Patterns in Cognitive Systems Engineering*. Boca Raton FL: Taylor & Francis.
4. Hollnagel, E., Woods, D.D. and Leveson, N., Eds. (2006). *Resilience Engineering: Concepts and Precepts*. Ashgate, Aldershot, UK.
Spanish translation: Ingenieria de la Resiliencia: Conceptos y preceptos. Modus Laborandi, 2010. <http://www.moduslaborandi.com/index.php?page=resiliencia>
Japanese translation: JUUSE Press Limited, 5-4-2, Sendagaya, Shibuya-ku, Tokyo, 151-0051, Japan, 2012.
5. Hollnagel, E. and Woods, D.D. (2005). *Joint Cognitive Systems: Foundations of Cognitive Systems Engineering*. Boca Raton FL: Taylor & Francis.
6. Cook, R.I., Woods, D.D. and Miller, C. (1998). *A Tale of Two Stories: Contrasting Views on Patient Safety*. National Patient Safety Foundation, Chicago IL, April 1998 (available at http://csel.eng.ohio-state.edu/woods/medicine/patientsafety/npsf_rpt.pdf)
7. Woods, D.D., Johannesen, L. L., Cook, R.I. and Sarter, N. B. (1994). *Behind Human Error: Cognitive Systems, Computers and Hindsight*. Human Systems Integration Information and Analysis Center, WPAFB, Dayton OH.
8. E. Hollnagel, G. Mancini, and D.D. Woods, Eds. *Cognitive Engineering in Complex, Dynamic Worlds*. Academic Press, London, 1988.
9. E. Hollnagel, G. Mancini, and D.D. Woods, Eds. *Intelligent Decision Support in Process Environments*. Springer-Verlag, New York, 1986.

Multimedia/Web Productions & Publications

Zelik, D., Woods, D. and CSEL (2010). Cognitive Systems Engineering for Innovation in Information Analysis: Topic Landscape: http://csel.eng.ohio-state.edu/productions/intelligence/http://csel.eng.ohio-state.edu/productions/intelligence/Woods_CSEforInnovation_CSEL-2010-TR-01.pdf

Woods, D. D. (2009). Fundamentals to Engineer Resilient Systems: How Adaptive Systems Fail and the Quest for Polycentric Control Architectures. Plenary Address at International Symposium Resilient Control Architectures, Idaho National Laboratory, August 2009. <https://secure.inl.gov/isrcs2009/showvideo.aspx>

Woods, D. D. (2007). Creating Safety by Engineering Resilience, Invited address, Almaden Institute 2007, Navigating Complexity, IBM Almaden Research Center, April 11-12, 2007. (see <http://www.almaden.ibm.com/institute/> and <http://csel.eng.ohio-state.edu/productions/ibm>).

Woods, D. D. Reducing the Risk of Shallow Information Analysis. Google Tech Talks, Mountain View, CA., April 10, 2007. <http://video.google.com/videoplay?docid=3049239277254163324>

Zelik, D. and CSEL (2007). Understanding Rigor in Information Analysis. Multi-Media Topic Landscape. <http://csel.eng.ohio-state.edu/zelik/rigor/index.html>.

Voshell, M. et al. (2006). Coping with Overload and Narrowing in Intelligence Analysis. DigitalTopicLandscape. Cognitive Systems Engineering Laboratory, Institute for Ergonomics, The Ohio State University, Columbus OH.

Woods, D. D., Voshell, M., Roesler, A., Phillips, F., Feil, M. and Tittle, J. (2006). The Law of Stretched Systems in Action: Exploiting Robots. Podcast available at <http://csel.eng.ohio-state.edu/podcasts/woods/>

Tuzar, D. and Woods, D. D. (2006). Reorientation in Dynamic Situations. MediaPaper. Cognitive Systems Engineering Laboratory, Institute for Ergonomics, The Ohio State University, Columbus OH. url: <http://csel.eng.ohio-state.edu/woods/metrics/reorientation-mepa-v7.pdf>

Schoenwald, J., Trent, S., Tittle, J., and Woods, D. D. (2005). Scenarios for Collaborative Envisioning of New Sensor Technology in Military Urban Operations. Cognitive Systems Engineering Laboratory, Institute for Ergonomics, The Ohio State University, Columbus OH. url: <http://csel.eng.ohio-state.edu/productions/xcta>

Woods, D. D., Tinapple, D. Roesler, A. and Feil, M. (2002). Studying Cognitive Work in Context: Facilitating Insight at the Intersection of People, Technology and Work. Cognitive Systems Engineering Laboratory, Institute for Ergonomics, The Ohio State University, Columbus OH at url: <http://csel.eng.ohio-state.edu/productions/woodscta/>

Roesler, A., Tittle, J. and Woods, D. D. (2002). View Tracks: 3-D Virtual Displays are Viewpoint Dependent. Media-Paper CD. Cognitive Systems Engineering Laboratory, Institute for Ergonomics, The Ohio State University, Columbus OH, April 2002.

Woods, D. D. and Grossman, J. (2002). Performance Experts in Safety (PEXiS): Behind Human Error. Electronic course designed to help people see past typical misunderstandings about how systems fail and how people contribute to both success and failure. The trial version available at url: <http://csel.eng.ohio-state.edu/productions/pexis>

Woods, D.D. Roesler, A., Feil, M. and Tinapple, D. (2002). Steering the Reverberations of Technology Change on Fields of Practice: Laws that Govern Cognitive Work. Multimedia Production at url: <http://csel.eng.ohio-state.edu/productions/laws/>

Tittle, J., Roesler, A., and Woods, D. D. (2001). The Role of 2-D and 3-D Task Performance in the Design and Use of Visual Displays. MediaPaper CD. Cognitive Systems Engineering Laboratory, Institute for Ergonomics, The Ohio State University, Columbus OH, November 2001.

Roesler, A., Feil, M. and Woods, D. D. (2001). Design is Telling (Sharing) Stories about the Future. MediaPaper CD. Cognitive Systems Engineering Laboratory, Institute for Ergonomics, The Ohio State University, Columbus OH, December 2001 at url: <http://csel.eng.ohio-state.edu/animock>

E.S. Patterson, D.D. Woods, D. Tinapple, and E. M. Roth. (2001). Using CTA to Seed Designs Concepts for Intelligence Analysts Under Data Overload. Cognitive Systems Engineering Laboratory, Institute for Ergonomics, The Ohio State University, Columbus OH, Multimedia Production at url: <http://csel.eng.ohio-state.edu/productions/analystoverload/>

D.D. Woods and D. Tinapple. W3: Watching Human Factors Watch People at Work. Presidential Address, 43rd Annual Meeting of the Human Factors and Ergonomics Society, September 28, 1999. Multimedia Production at url <http://csel.eng.ohio-state.edu/productions/hf99/>

Book Chapters

1. Woods, D.D. (2020). The Strategic Agility Gap: How Organizations are Slow and Stale to Adapt in a Turbulent World. In Journé, B., Laroche, H., Bieder, C. and Gilbert, C. (Eds.), *Human and Organizational Factors: Practices and Strategies for a Changing World*. Springer Open & the Foundation for Industrial Safety Culture, Springer Briefs in Safety Management, Toulouse France, pp. 95-104 <https://doi.org/10.1007/978-3-030-25639-5>
2. Woods, D.D. (2019). Essentials of Resilience, Revisited. In M. Ruth and S. G. Reisman (Eds.), *Handbook on Resilience of Socio-Technical Systems*. Edward Elgar Publishing, pp. 52-65.
3. Woods, D. D. (2018a). Resilience is a verb. In Trump, B. D., Florin, M.-V., & Linkov, I. (Eds.). *IRGC resource guide on resilience (vol. 2): Domains of resilience for complex interconnected systems*. Lausanne, CH: EPFL International Risk Governance Center. Available on irgc.epfl.ch and irgc.org.
4. Woods, D.D. (2018b). Origins of Cognitive Systems Engineering: Personal Reflections. In P. Smith and R. Hoffman (Eds.) *Cognitive Systems Engineering: A Future for a Changing World*. Taylor and Francis, pp. 25-52.
5. Watts-Englert, J., Woods, D.D. and Patterson, E.S. (2017). Human SpaceFlight Mission Control Center. In B. Kanki, J-F. Clervoy, G. Sandal and T. Sgobba (Eds.), *Space Safety and Human Performance*, Elsevier, pp. 573-580.
6. Watts-Englert, J., Woods, D.D. and Patterson, E.S. (2017). Resilient Anomaly Response in Mission Control Center. In B. Kanki, J-F. Clervoy, G. Sandal and T. Sgobba (Eds.), *Space Safety and Human Performance*, Elsevier, pp. 581-591.
7. Woods, D. D. (2016). Resilience as Graceful Extensibility to Overcome Brittleness. *Resource Guide on Resilience, Volume 1*. EPFL International Risk Governance Center. v29-07-2016 (IRGC), Lausanne, Switzerland. <https://www.irgc.org/wp-content/uploads/2016/04/Woods-Resilience-as-Graceful-Extensibility-to-Overcome-Brittleness.pdf>
8. Stephens, R. J., Woods, D.D. and Patterson, E. S. (2015). Patient Boarding in the Emergency Department as a Symptom of Complexity-Induced Risks. In R.L. Wears, E. Hollnagel, J. Braithwaite, (Eds.), *Resilience in Everyday Clinical Work*. Farnham, UK: Ashgate, pp. 129-144.
9. Morison, A., Woods, D.D. and Murphy T. B. (2015). Human-Robot Interaction as Extending Human Perception to New Scales. In R. R. Hoffman, P. A. Hancock, M. Scerbo, R. Parasuraman and J. R. Szalma (Eds.), *Handbook of Applied Perception Research, Volume 2*, Cambridge University Press, NY, pp. 848-868.
10. Flach, J. M., Bennett, K. B., Woods, D. D. and Jagacinski, R. J. (2015). Interface Design: A Control Theoretic Context for a Triadic Meaning Processing Approach. In R. R. Hoffman, P. A. Hancock, M. Scerbo, R. Parasuraman and J. R. Szalma (Eds.), *Handbook of Applied Perception Research*, Cambridge University Press, NY, pp. 647-668.
11. Woods, D. D. and Cook, R.I. (2012). Mistaking Error. In B. J. Youngberg (Ed.) *Patient Safety Handbook* (second edition), Jones and Bartlett, Sudbury MA, pp. 99-110.
12. Woods, D. D. (2012). High-Reliability Organizations and Complex Adaptive Systems. In H. M. Colvin and R. M. Taylor (eds.), *Building a Resilient Workforce: Opportunities for the Department of Homeland Security - Workshop Summary*, National Academies Press, pp. 63-69.

13. McGuirl, J. M., Sarter, N. B. and Woods, D. D. (2011). See is Believing? The Effects of Real-Time imaging on Decision-Making in a Simulated Incident Command Task. M. E. Jennex (Ed.), *Crisis Response and Management and Emerging Information Systems: Critical Applications*. IGI Publishing.
14. Woods, D. D. (2011). Resilience and the Ability to Anticipate. In E. Hollnagel, Paries, J., Woods, D.D., and Wreathall, J., Eds., *Resilience Engineering in Practice*. Ashgate, Aldershot, UK, pp. 121-125.
15. Woods, D. D. and Branlat, M. (2011). How Adaptive Systems Fail. In E. Hollnagel, Paries, J., Woods, D.D., and Wreathall, J., Eds., *Resilience Engineering in Practice*. Ashgate, Aldershot, UK, pp. 127-143.
16. Zelik, D., Patterson, E. S. and Woods, D. D. (2010). Measuring Attributes of Rigor in Information Analysis. In E. S. Patterson and J. Miller (eds.), *Macro-cognition Metrics and Scenarios: Design and Evaluation for Real-World Teams* (pp. 65-83). Ashgate, Aldershot, UK.
17. Patterson, E. S., Roth, E. M. and Woods D. D. (2010). Facets of Complexity in Situated Work. In E. S. Patterson and J. Miller (eds.), *Macro-cognition Metrics and Scenarios: Design and Evaluation for Real-World Teams*. Ashgate, Aldershot, UK.
18. Dekker, S. W. A. and Woods, D.D. (2010). The High Reliability Organizational Perspective. In E. Salas, T. Allard, and D. Maurino (Eds.), *Human Factors in Aviation*, Second Edition, Elsevier.
19. Morison, A., Voshell, M., Roesler, A., Feil, M, Tittle, J., Tinapple, D. and Woods, D.D. (2009). Integrating Diverse Feeds to Extend Human Perception into Distant Scenes. In P. McDermott (Ed.), *Advanced Decision Architectures for the Warfighter: Foundation and Technology*. (pp. 177-200). Alion Science, Boulder CO.
20. Trent, S., Smith, M. W., Woods, D. D., et al. (2009). Reading Intent and other Cognitive Challenges in Intelligence Analysis. In P. McDermott (Ed.), *Advanced Decision Architectures for the Warfighter: Foundation and Technology*. Alion Science.
21. Woods, D. D., Schenk, J. and Allen, T. (2009). Preliminary Comparison of Selected Models of Resilience. In C. Nemeth, E. Hollnagel, and S. W. A. Dekker (eds.), *Resilience Engineering Perspectives 2: Preparation and Restoration: Resilience in Human Systems*. (pp. 73-94), Ashgate, Aldershot, UK.
22. Hoffman, R. R., Militello, L., & Woods, D. D. (2009). Methodological Challenges for Cognitive Task Analysis. In R. R. Hoffman & L. Militello (Aus.), *Perspectives on Cognitive Task Analysis: Historical Origins and Modern Communities of Practice*. (pp. 379-398). NY: Psychology Press.
23. Hoffman, R. R., Militello, L., & Woods, D. D. (2009). Emergence of the Communities of Practice. In R. R. Hoffman & L. Militello (Aus.), *Perspectives on Cognitive Task Analysis: Historical Origins and Modern Communities of Practice*. (pp. 69-90). NY: Psychology Press.
24. Nemeth, C., Wears, R. L., Woods, D. D., Hollnagel, E. and Cook, R. I. (2008). Minding the Gaps: Creating Resilience in Health Care. In K. Henriksen, J. B. Battles, M. A. Keyes and M. L. Grady (Eds.), *Advances in Patient Safety: New Directions and Alternative Approaches, Vol. 3. Performance and Tools*. AHRQ Publication No. 08-0034-3. Rockville, MD: Agency for Healthcare Research and Quality; August 2008. <http://www.ahrq.gov/qual/advances2/>
25. Woods, D. D. and Wreathall, J. (2008). Stress-Strain Plot as a Basis for Assessing System Resilience. In E. Hollnagel, C. Nemeth and S. W. A. Dekker, eds., *Resilience Engineering Perspectives 1: Remaining sensitive to the possibility of failure*. Ashgate, Aldershot, UK, pp. 145-161.
26. Branlat, M., Anders, S., Woods, D. D. and Patterson, E. S. (2008). Detecting an Erroneous Plan: Does a System Allow for Effective Cross-Checking? In E. Hollnagel, C. Nemeth and S. W. A. Dekker, eds., *Resilience Engineering Perspectives 1: Remaining sensitive to the possibility of failure*. Ashgate, Aldershot, UK, pp. 247-257.

27. Wears, R. L., Perry, S. J., Anders, S. and Woods, D. D. (2008). Resilience in the Emergency Department. In E. Hollnagel, C. Nemeth and S. W. A. Dekker, eds., *Resilience Engineering Perspectives 1: Remaining sensitive to the possibility of failure*. Ashgate, Aldershot, UK, pp. 193-209.
28. Roesler, A. and Woods, D. D. (2007). Designing for Expertise. In H.N.J. Schifferstein & P. Hekkert (Eds.), *Product Experience: A Multidisciplinary Approach* (pp. 215-237). Amsterdam: Elsevier.
29. Woods, D. D. and Roesler, A. (2007). Connecting Design with Cognition at Work. In H.N.J. Schifferstein & P. Hekkert (Eds.), *Product Experience: A Multidisciplinary Approach* (pp. 199-213). Amsterdam: Elsevier.
30. Patterson, E. S., Perotti, J. and Woods, D. D. (2007). Voice Loops: Engineering Overhearing to Aid Team Coordination. In C. Nemeth (Ed.), *Improving Healthcare Team Communication--Building on Lessons from Aviation and Aerospace*. Aldershot, UK: Ashgate.
31. Woods, D. D., Patterson, E. S. and Cook, R. I. (2006). Behind Human Error: Taming Complexity to Improve Patient Safety. In P. Carayon (ed.) *Handbook of Human Factors in Health Care*. Erlbaum (pp. 455-472).
32. Rogers, M., Patterson, E. S., Woods, D. D., and Render, M. L. (2006). Cognitive Work Analysis in Health Care. In P. Carayon (ed.) *Handbook of Human Factors in Health Care*. Erlbaum (pp. 601-614).
33. Woods, D. D. (2006). How to Design a Safety Organization: Test Case for Resilience Engineering. In E. Hollnagel, D.D. Woods and N. Leveson, eds., *Resilience Engineering: Concepts and Precepts*. Ashgate, Aldershot, UK, pp. 315--324.
34. Woods, D. D. and Cook, R. I. (2006). Incidents: Are they markers of resilience or brittleness? In E. Hollnagel, D.D. Woods and N. Leveson, eds., *Resilience Engineering: Concepts and Precepts*. Ashgate, Aldershot, UK, pp. 69-76.
35. Cook, R. I. and Woods, D. D. (2006). Distancing through Differencing: An Obstacle to Learning Following Accidents. In E. Hollnagel, D.D. Woods and N. Leveson, eds., *Resilience Engineering: Concepts and Precepts*. Ashgate, Aldershot, UK, pp. 329--338.
36. Woods, D. D. (2006). Essential Characteristics of Resilience for Organizations. In E. Hollnagel, D.D. Woods and N. Leveson, eds., *Resilience Engineering: Concepts and Precepts*. Ashgate, Aldershot, UK, pp. 21-34.
37. Woods, D. D. (2005). Creating Foresight: Lessons for Resilience from Columbia. In W. H. Starbuck and M. Farjoun (eds.), *Organization at the Limit: NASA and the Columbia Disaster*. pp. 289--308. Malden, MA: Blackwell.
38. Klein, G., Feltovich, P., Bradshaw, J. M. and Woods, D. D. (2005). Common Ground and Coordination in Joint Activity. In W. Rouse and K. Boff (Ed.). *Organizational Simulation*, Wiley, pp. 139--178.
39. Roesler, A. Woods, D. D. and Feil, M. (2005). Inventing the Future of Cognitive Work. In W. Jonas, R. Chow, N. Verhaag (eds.) *Design-System-Evolution: Application of systemic and evolutionary approaches to design theory, design practice, design research and design education*. European Academy of Design, Bremen, Germany.
40. Cook, R.I., O'Connor, M., Render, M. and Woods, D. D. (2004). Operating at the Sharp End: The Human Factors of Complex Technical Work and Its Implications for Patient Safety. In Manuel & Nora, eds., *Surgical Patient Safety*. Chicago: American College of Surgeons.
41. Woods, D. D. and Cook, R.I. (2004). Mistaking Error. In M. J. Hatlie and B. J. Youngberg (Eds.) *Patient Safety Handbook*, Jones and Bartlett, Sudbury MA, pp. 95-108.

42. Woods, D. D. (2003). Discovering How Distributed Cognitive Systems Work. In E. Hollnagel (ed.), *Handbook of Cognitive Task Design*. Erlbaum, pp. 37-54.
43. Christoffersen, K. and Woods, D.D. (2002). How to make automated systems team players. In E. Salas (Ed.), *Advances in Human Performance and Cognitive Engineering Research*, Volume 2. St. Louis, MO, Elsevier Science, 1-12, 2002.
44. D.D. Woods and K. Christoffersen. Balancing Practice-Centered Research and Design. In M. McNeese and M. A. Vidulich (editors), *Cognitive Systems Engineering in Military Aviation Domains*. Wright-Patterson AFB, OH: Human Systems Information Analysis Center, 2002, p. 121-136.
45. Woods, D. D. and Cook, R. I. (2001). From Counting Failures to Anticipating Risks: Possible Futures for Patient Safety. In L. Zipperer and S. Cushman (editors), *Lessons in Patient Safety: A Primer*. National Patient Safety Foundation, Chicago, IL.
46. Woods, D. D. and Patterson, E. S. (2000). How Unexpected Events Produce an Escalation of Cognitive and Coordinative Demands. In *Stress Workload and Fatigue*. P. A. Hancock and P. Desmond (eds.) Lawrence Erlbaum, Hillsdale NJ, pp. 290--302.
47. Woods, D. D. and Sarter, N. (2000). Learning from Automation Surprises and Going Sour Accidents. In N. Sarter and R. Amalberti (Eds.), *Cognitive Engineering in the Aviation Domain*, Erlbaum, Hillsdale NJ, pp. 327-354.
48. Potter, S. S., Roth, E. M., Woods, D. D. and Elm, W. (2000). Bootstrapping Multiple Converging Cognitive Task Analysis Techniques for System Design. In Schraagen, J.M.C., Chipman, S.F., & Shalin, V.L. (Eds.), *Cognitive Task Analysis*. Mahwah, NJ: Lawrence Erlbaum Associates, pp. 317-340.
49. L. G. Shattuck and D. D. Woods. (2000). Communication of Intent in Military Command and Control Systems. In Carol McCann and Ross Pigeau (editors), *The Human in Command: Exploring the Modern Military Experience*. New York : Kluwer Academic/Plenum Publishers, pp. 279-292.
50. Dekker, S. W. A. and Woods, D.D. (1999). Automation and its Impact on Human Cognition. In S. Dekker and E. Hollnagel (Eds.), *Coping with Computers in the Cockpit.*, Ashgate, p. 131-143.
51. Dekker, S. W. A. and Woods, D.D. (1999). Extracting Data from the Future: Assessment and Certification of Envisioned Systems. In S. Dekker and E. Hollnagel (Eds.), *Coping with Computers in the Cockpit*, Ashgate, p. 7-27.
52. Woods, D.D. and Cook, R. I.. (1999). Perspectives on Human Error: Hindsight Bias and Local Rationality. In F. Durso (Eds.), *Handbook of Applied Cognition* (first edition), Wiley, p. 141-171.
53. Smith P. J., Woods, D.D., Billings, C. et al. (1999). Conclusions from the Application of a Methodology to Evaluate Future Air Traffic Management System Designs. In M. W. Scerbo and M. Mouloua (eds.), *Automation technology and human performance: Current research and trends*. Mahwah, N.J.: Lawrence Erlbaum, p. 81-85.
54. K. Christoffersen and D.D. Woods. How Complex Human-Machine Systems Fail: Putting "Human Error" in Context. In W. Karwoski and W. Marras (Eds.), *Handbook of Occupational Ergonomics*, CRC Press, 1999.
55. Woods, D. D. and Watts, J.C. (1997). How Not To Have To Navigate Through Too Many Displays. In Helander, M.G., Landauer, T.K. and Prabhu, P. (Eds.) *Handbook of Human-Computer Interaction, 2nd edition*. Amsterdam, The Netherlands: Elsevier Science.

56. N. Sarter, D.D. Woods and C. Billings. Automation Surprises. In G. Salvendy, editor, *Handbook of Human Factors/Ergonomics*, second edition, Wiley, New York, pp. 1926-1943, 1997. (Reprinted in N. Moray, editor, *Ergonomics: Major Writings*. Taylor & Francis, 2004.)
57. T.E. Miller and D.D. Woods. Key Issues for Naturalistic Decision Making Researchers in Systems Design. In C. Zambok and G. Klein (eds.) *Naturalistic Decision Making*, Erlbaum, 1997.
58. D.D. Woods. Decomposing Automation: Apparent Simplicity, Real Complexity, In R. Parasuraman and M. Mouloula, editors, *Automation Technology and Human Performance: Theory and Applications*, Erlbaum, p. 3-17, 1996.
59. D.D. Woods and E.M. Roth. Symbolic AI Computer Simulations as a Tool for Investigating the Dynamics of Joint Cognitive Systems. In J-M. Hoc, P.C. Cacciabue, and E. Hollnagel, editors, *Expertise and Technology: Cognition and Human-Computer Cooperation*, Erlbaum, 1995.
60. D.D. Woods. Towards a Theoretical Base for Representation Design in the Computer Medium: Ecological Perception and Aiding Human Cognition. In J. Flach, P. Hancock, J. Caird, and K. Vicente, editors, *An Ecological Approach To Human Machine Systems I: A Global Perspective*, Erlbaum, 1995.
61. Cook, R.I. and Woods, D.D. (1994). Operating at the 'Sharp End:' The Complexity of Human Error. In M.S. Bogner, editor, *Human Error in Medicine*, Erlbaum.
62. Woods, D.D. (1994). Cognitive Demands and Activities in Dynamic Fault Management: Abduction and Disturbance Management. In N. Stanton, editor, *Human Factors of Alarm Design*, Taylor & Francis, London, pp. 63-92.
63. C.E. Billings and D.D. Woods. Concerns about adaptive automation in aviation systems. In M. Mouloua and R. Parasuraman (eds.), *Automation and Human Performance: Recent Research and Trends* (pp. 264-269). Hillsdale NJ: Erlbaum, 1994.
64. Woods, D.D. and N. Sarter. N.B. (1993). Evaluating the Impact of New Technology on Human-Machine Cooperation. In J. Wise, V. D. Hopkin, and P. Stager, editors, *Verification and Validation of Complex Systems: Human Factors Issues*, Springer-Verlag, Berlin.
65. Woods, D.D. (1993). Process Tracing Methods for the Study of Cognition Outside of the Experimental Psychology Laboratory. In G. A. Klein, J. Orasanu and R. Calderwood, editors, *Decision Making in Action: Models and Methods*, Ablex, New Jersey, p. 228-251.
66. G.A. Klein and D.D. Woods. Conclusions: Decision Making in Action. In G. A. Klein, J. Orasanu and R. Calderwood, editors, *Decision Making in Action: Models and Methods*, Ablex, New Jersey, 1993.
67. E. Moll van Charante, R.I. Cook, D.D. Woods, L. Yue and M.B. Howie. Human-computer interaction in context: Physician interaction with automated intravenous controllers in the heart room. In H.G. Stassen, editor, *Analysis, Design and Evaluation of Man-Machine Systems 1992*, Pergamon Press, 1993, p. 263-274.
68. D.D. Woods. The Cognitive Engineering of Problem Representations. In G.R.S. Weir and J.L. Alty, editors, *Human-Computer Interaction and Complex Systems*, Academic Press, London, 1991.
69. De Keyser, V. and Woods, D.D. (1990). Fixation errors: Failures to revise situation assessment in dynamic and risky systems. In A.G. Colombo and A. Saiz de Bustamante, editors, *Systems Reliability Assessment*, Kluwer Academic Publishers, Dordrechts, The Netherlands, p. 231-252.

70. D.D. Woods, E.M. Roth, and K.B. Bennett. Explorations in joint human-machine cognitive systems. In S. Robertson, W. Zachary, and J. Black, editors, *Cognition, Computing and Cooperation*, Ablex Publishing, Norwood, NJ, 1990.
71. D.D. Woods. Modeling and predicting human error. In J. Elkind, S. Card, J. Hochberg, and B. Huey, editors, *Human Performance Models for Computer-Aided Engineering*, National Academic Press, New York, 1990.
72. E.M. Roth and D.D. Woods. Cognitive Task Analysis: An approach to knowledge acquisition for intelligent system design. In G. Guida and C. Tasso, editors, *Topics in Expert System Design*, North-Holland, New York, 1989.
73. Woods, D. D., The effects of automation on the human's role. In *Flightdeck Automation. Promises and Realities*, ed. S. Norman and H. Orlady. NASA. Ames Research Center, Moffett Field, CA, 1989, pp. 61-85.
74. D.D. Woods. Coping with complexity: The psychology of human behavior in complex systems. In L.P. Goodstein, H.B. Andersen, and S.E. Olsen, editors, *Mental Models, Tasks and Errors*, Taylor & Francis, London, 1988 (p. 128-148).
75. Woods D. D. and Roth, E. M. (1988). Cognitive Systems Engineering. In M. Helander, editor, *Handbook of Human-Computer Interaction*, North-Holland, New York. (Reprinted in N. Moray, editor, *Ergonomics: Major Writings*. Taylor & Francis, 2004.)
76. D.D. Woods. Technology alone is not enough: Reducing the potential for disaster in risky technologies. In D. Embrey, editor, *Human Reliability in Nuclear Power*, IBC Technical Services, London, 1987.
77. D.D. Woods, J. O'Brien, and L.F. Hanes. Human factors challenges in process control: The case of nuclear power plants. In G. Salvendy, editor, *Handbook of Human Factors/Ergonomics*, Wiley, New York, 1987, pp. 1724–1770.
78. D.D. Woods. Paradigms for intelligent decision support. In E. Hollnagel, G. Mancini, and D.D. Woods, editors, *Intelligent Decision Support in Process Environments*, Springer-Verlag, New York, 1986, p. 153-173.
79. D.D. Woods. Some results on operator performance in emergency events. In D. Whitfield, editor, *Ergonomic Problems in Process Operations*, Inst. Chem. Eng. Symp. Ser. 90, 1984.

Journal Papers (1983 to present)

1. Farjadian, A. B., Thomson, B., Annaswamy, A. M. and Woods, D. D. (2021). Resilient Flight Control: An Architecture for Human Supervision of Automation. *IEEE Transactions on Control Systems Technology*, 1, 29-42. DOI: 10.1109/TCST.2019.2959542
2. Mount-Campbell, A. F., Evans, K. D., Woods, D. D., Chipps, E., Moffatt-Bruce, S. D., Patel, K. and Patterson, E. S., (2020). Uncovering the value of a historical paper-based collaborative artifact: The nursing unit's Kardex system. *Frontiers in Digital Health*, in press.
3. Provan, D.J., Woods, D. D., Dekker, S. W. A. and J. Rae, A. J. (2020). Safety Differently Professionals: How resilience engineering can transform safety practice. *Reliability Engineering and Systems Safety*, 195 (March). <https://doi.org/10.1016/j.ress.2019.106740>
4. Woods, D. D. and Allspaw, J. (2020). Revealing the Critical Role of Human Performance in Software. *Communications of the ACM*, 63(5), p. 64-67. DOI:10.1145/3380468. Also in *ACM Queue*, 17(6), November-December, 2019, pp. 1-9.
5. Cuvelier, L. and Woods, D. D. (2019). Sécurité réglée vs. sécurité gérée: Quand l'ingénierie de la résilience réinterroge l'ergonomie de l'activité. *Le Travail Humain*, 82, 41-66.

6. Chuang, S., Chang, K.-S., Woods, D. D., Chen, H.-C., Reynolds, M., and Chien, D.-K. (2019). Beyond surge: Coping with mass burn casualty in the closest hospital to the Formosa Fun Coast Dust Explosion. *Burns*, 45, 964-973.
7. Chuang, S., Woods, D. D., Ting, D., Cook, R. I. and Hsu, J.-C. (2019). Coping with Mass Casualty: Insights Into A Hospital's Emergency Response and Adaptations After the Formosa Fun Coast Dust Explosion. *Disaster Medicine and Public Health Preparedness*, 1-10. doi: 10.1017/dmp.201969
8. Patterson, E. S., Mount-Campbell, A. F., Evans, K. D., Woods, D. D., Chipps, E. and Moffatt-Bruce, S. D. (2019). Value and usage of a workaround artifact: A cognitive work analysis of 'brains' use by hospital nurses. *Journal of Cognitive Engineering and Decision Making*, 13(2), 67-80. <https://doi.org/10.1177/1555343418825429>
9. Woods, D. D. (2018). The Theory of Graceful Extensibility. *Environment Systems and Decisions*, 38:433-457. <https://doi.org/10.1007/s10669-018-9708-3>
10. Klein, D. E., Woods, D. D., Klein, G. and Perry, S. J. (2018). EBM: Rationalist Fever Dreams. *Journal of Cognitive Engineering and Decision Making*, 12(3), 227-230. DOI: 10.1177/1555343418779677
11. Linkov, I. Allen, Fox-Lent, C., Allen, C. R., Arnott, J. C., Bellini, E., Coaffee, J., Flrin, M.-V., C. R., Hatfield, K., Hyde, I., Hynes, W., Jovanovic, A., Kaspersen, R., Katzenberger, J., Keys, P. W., Lambert, J. H., Moss, R., Murdoch, P. S., Palma-Oliveira, J. M., Pulwarty, R. S., Read, L. Sands, D., Thomas, E. A., Tye, M. R. and Woods, D. D. (2018). Tiered Approach to Resilience Assessment. *Risk Analysis*. DOI: 10.1111/risa.12991
12. Connelly, E.B., Allen, C. R., Hatfield, K., Palma-Oliveira, J. M., Woods, D. D. and Linkov, I. (2017). Features of resilience. *Environment Systems and Decisions*, 37(1), 46-50.
13. Morison, A. and Woods, D. D. (2016). Opening up the Black Box of Sensor Processing Algorithms through New Visualizations. *Informatics*, 3(3), 16; doi:[10.3390/informatics3030016](https://doi.org/10.3390/informatics3030016).
14. Klein, D. E., Woods, D. D., Klein, G. and Perry, S. J. (2016). Can We Trust Best Practices? Six Cognitive Challenges of Evidence-Based Approaches. *Journal of Cognitive Engineering and Decision Making*, 10(3), 244-254.
15. Woods, D. D. (2016). The Risks of Autonomy: Doyle's Catch. *Journal of Cognitive Engineering and Decision Making*, 10(2), 131-133.
16. Woods, D. D. (2015). Four Concepts of Resilience and the Implications for Resilience Engineering. *Reliability Engineering and Systems Safety*, 141, 5-9. published online: 3 APR 2015 | doi:10.1016/j.res.2015.03.018.
17. Woods, D. D., Branlat, M., Herrera, I. and Woltjer, R. (2015). Where is the organization looking in order to be proactive about safety? A framework for revealing whether it is mostly looking back, also looking forward, or simply looking away. *Journal of Contingencies and Crisis Management*, 23(2), published online: 31 MAR 2015 | DOI: 10.1111/1468-5973.12079.
18. Johnson, M., Bradshaw, J., Hoffman, R. R., Feltovich, P. J., and Woods, D. D. (2014). Seven Cardinal Virtues for Human-Machine Teamwork: Examples from the DARPA Robotic Challenge." *IEEE Intelligent Systems*, 29(6), 74-80.
19. Fairbanks, R. J., Wears, R. L., Woods, D. D., Hollnagel, E., Plsek, P. and Richard I Cook, R. I. (2014). Resilience and Resilience Engineering in Health Care. *The Joint Commission Journal on Quality and Patient Safety*, 40(8), 376-383.

20. Smith, M. W., Bentley, M. A., Fernandez, A. R., Gibson, G., Schweikhart, S. and Woods, D. D. (2013). Paramedics' Cognitive Strategies For Managing Challenging Scenarios: A Cognitive Task Analysis Study. *Annals of Emergency Medicine*, 62(4), 367-379.
21. Bradshaw, J., Feltovich, P., Hoffman, R. R., Johnson, M., and Woods, D. D. (2013). The Seven Deadly Myths of "Autonomous Systems". *IEEE Intelligent Systems*, 28(3), May/June, 54-61.
22. Anders, S. H., Woods, D. D., Schweikhart, S., Ebricht, P. and Patterson, E. S. (2012). The Effects of Health Information Technology Change Over Time: A Study of Tele-ICU Functions. *Applied Clinical Informatics*, 3(2), 239-47.
23. Hoffman, R. R. and Woods, D. D. (2011). Beyond Simon's Slice: Five Fundamental Trade-Offs that Bound the Performance of Human Macrocognitive Work Systems. *IEEE Intelligent Systems*, 26(6), November/December, 67-71.
24. Hernandez, O. K., Sommerich, C. M. and Woods, D. D. (2011). The Potential for Tele-Presence to Assist and Aid with Medication Self-Management. *Ergonomics in Design*, July, 15-23.
25. Woods, D. D. and Branlat, M. (2010). Hollnagel's test: being 'in control' of highly interdependent multi-layered networked systems. *Cognition, Technology, and Work*, 12(2), 95-101.
26. Woods, D. D. and Sarter, N. B. (2010). Capturing the Dynamics of Attention Control From Individual to Distributed Systems. *Theoretical Issues in Ergonomics*, 11(1), 7-28.
27. Gomes, J. O., Carvalho, P. V. R., Woods, D. D., Benchekroun, T. H. and Borges, M. R. S. (2009). Resilience and Brittleness of Work Systems and Sustainability: Brazilian case studies in nuclear, aviation, and emergency domains. *Laboreal* (the Ibero-Latin American Journal of Human Factors), (in Portuguese). 5(1).
<http://laboreal.up.pt/revista/index.php?id=37t45nSU547112412591512431>
28. Hoffman, R. R., Lee, J. D., Woods, D. D., Shadbolt, N., Miller, J. and Bradshaw, J. (2009). The Dynamics of Trust in Cyberdomains. *IEEE Intelligent Systems*, 24(6), November/December, p. 5-11.
29. Murphy, R. R. and Woods, D. D. (2009). Beyond Asimov: The Three Laws of Responsible Robotics. *IEEE Intelligent Systems*, 24(4), July/August, pp. 14-20. [Reprinted in W. Wallach and P. M. Asaro, *Machine Ethics and Robot Ethics*. Ashgate, in press.]
30. Watts-Perotti, J. and Woods, D. D. (2009). Cooperative Advocacy: A Strategy for Integrating Diverse Perspectives in Anomaly Response. *Computer Supported Cooperative Work: The Journal of Collaborative Computing*, 18(2), 175-198.
31. Woods, D. D. (2009). Escaping Failures of Foresight. *Safety Science*, 47(4), 498-501.
32. McGuirl, J. M., Sarter, N. B. and Woods, D. D. (2009). See is Believing? The effects of real-time imaging on Decision-Making in a Simulated Incident Command Task. *International Journal of Information Systems for Crisis Response and Management*, 1(1), 54-69.
33. Gomes, J. O., Woods, D. D., Rodrigues de Carvalho, P. V., Huber, G. and Borges, M. (2009). Resilience and brittleness in the offshore helicopter transportation system: Identification of constraints and sacrifice decisions in pilots' work. *Reliability Engineering & System Safety*. 94, 311-319.
34. Wears, R. L. and Woods, D. D. (2007). Always Adapting. *Annals of Emergency Medicine*, 50(5), 517-519.
35. Watts-Perotti, J. and Woods, D. D. (2007). How Anomaly Response is Distributed Across Functionally Distinct Teams in Space Shuttle Mission Control. *Journal of Cognitive Engineering and Decision Making*, 1(4), 405-433.

36. Trent, S., Patterson, E. S. and Woods, D.D. (2007). Cognitive Challenges of Intelligence Analysis. *Journal of Cognitive Engineering and Decision Making*, 1(1), 75-97.
37. Davis, J. W. Morison, A. and Woods, D. D. (2007). An Adaptive Focus-of-Attention Model for Video Surveillance and Monitoring. *Machine Vision and Applications Journal*. 18(1), 41-64.
38. Christoffersen, K., Woods, D. D. and Blike, G. T. (2007). Discovering the Events Expert Practitioners Extract from Dynamic Data Streams: The mUMP Technique. *Cognition, Technology, and Work*, 9, 81-98.
39. Patterson E.S., Woods, D. D., Cook, R.I., and Render, M. L. (2007). Collaborative Cross-Checking to Enhance Resilience. *Cognitive Technology and Work*, 9(3), 155-162.
40. Patterson, E. S., Woods, D.D. Roth, E. M., Cook, R. I., Wears, R. L. and Render, M.L. (2006). Three Key Levers for Achieving Resilience in Medication Delivery with Information Technology. *Journal of Patient Safety*, 2(1), 33-38.
41. Miller, J. E., Patterson, E. S. and Woods, D. D. (2006). Elicitation by Critiquing as a Cognitive Task Analysis Methodology. *Cognition, Technology, and Work*, 8, 1-13.
42. Woods, D.D. (2005). Conflicts between Learning and Accountability in Patient Safety. *DePaul Law Review*. 54(2), 485-502.
43. Klein, G., Pliske, R., Crandall, B. and Woods, D. (2005). Problem Detection. *Cognition, Technology, and Work*. 7(1), 14-28.
44. Hoffman, R. R. and Woods, D. D. (2005). Toward a Theory of Complex and Cognitive Systems. *IEEE Intelligent Systems*, 20(1), 76-79.
45. Nemeth, C., Cook, R. I. and Woods, D. D. (2004). Messy Details: Insights from the Study of Technical Work in Healthcare. *IEEE SMC Part A*, 34(6), 689-692.
46. Patterson, E. S., Cook, R. I., Woods, D.D. and Render, M.L. (2004). Examining the Complexity Behind a Medication Error: Generic Patterns in Communication. *IEEE SMC Part A*, 34(6), 749-756.
47. Klein, G., Woods, D.D., Bradshaw, J., Hoffman, R.R., and Feltovich, P.J., (2004). Ten Challenges for Making Automation a "Team Player" in Joint Human-Agent Activity. *IEEE Intelligent Systems*, 19(6), 91-95.
48. Woods, D. D., Tittle, J., Feil, M. and Roesler, A. (2004). Envisioning Human-Robot Coordination for Future Operations. *IEEE SMC Part C*, 34(2), 210-218.
49. Feltovich, P. J., Hoffman, R.R., Woods, D.D. and Roesler, A. (2004). Looking at Cognitive Engineers Doing Cognitive Engineering: Implications of the Reductive Tendency for the Design of Complex Sociotechnical Systems. *IEEE Intelligent Systems*, 19(3), 90-94.
50. Patterson, E.S., Roth, E.M., Woods, D.D., Chow, R., Gomes, J.O. (2004). Handoff strategies in settings with high consequences for failure: Lessons for health care operations. *International Journal for Quality in Health Care*, 16(2), 125-132.
51. Dekker, S. W. A., Mooij, M., & Woods, D. D. (2002). Envisioned practice, enhanced performance: The riddle of future (ATM) systems. *International Journal of Applied Aviation Studies*, 2(1), 23-32.

52. Hoffman, R.R., Ford, K. M., Feltovich, P.J., Woods, D.D., Klein, G. and Feltovich, A. (2002). A Rose by Any Other Name ... Would Probably be Given An Acronym. *IEEE Intelligent Systems*, 17(4), 72-79.
53. Dekker, S. W. A. and Woods, D.D. (2002). MABA_MABA or Abracadabra? Progress in human-automation coordination. *Cognition, Technology, and Work*, 4(4), 240-244.
54. Woods, D.D. and Cook, R.I. (2002). Nine Steps to Move Forward from Error. *Cognition, Technology, and Work*, 4(2): 137-144.
55. Woods, D.D., Patterson, E.S., and Roth, E.M. (2002). Can we ever escape from data overload? A cognitive systems diagnosis. *Cognition, Technology, and Work*, 4(1): 22-36.
56. Patterson, E.S., and Woods, D.D. (2001). Shift changes, updates, and the on-call model in space shuttle mission control. *Computer Supported Cooperative Work: The Journal of Collaborative Computing*, 10(3-4), 317-346.
57. Patterson, E.S., Roth, E. M. and Woods, D.D. (2001). Predicting Vulnerabilities in Computer-Supported Inferential Analysis under Data Overload. *Cognition, Technology and Work*, 3(4), 224-237.
58. Woods, D.D. and Dekker, S. W. A. (2000). Anticipating the Effects of Technological Change: A New Era of Dynamics for Human Factors. *Theoretical Issues in Ergonomic Science*, 1(3), 272-282.
59. Woods, D.D. and Shattuck, L. G. (2000). Distant supervision—local action given the potential for surprise. *Cognition, Technology and Work*, 2, 242-245.
60. Cooper JB, Gaba DM, Liang B, Woods D, Blum LN. Agenda for Research and Development in Patient Safety of The National Patient Safety Foundation. *Medscape General Medicine*, June, 2000.
61. Sarter, N. and Woods, D.D. (2000). Team Play with a Powerful and Independent Agent: A Full Mission Simulation. *Human Factors*, 42, 390-402.
62. K. B. Bennett, D. A. Malek and D.D. Woods. The potential for misinterpretation considered more globally: A response to Vicente and Ethier. *Human Factors*, 42, 455-457, 2000.
63. R. Hoffman and D.D. Woods. Studying Cognitive Systems in Context. *Human Factors*, 42(1), 1-7, 2000.
64. Cook, R. I., Render M. L. and Woods, D. D. (2000). Gaps in the continuity of care and progress on patient safety. *British Medical Journal*, 320, 791-794, March 18, 2000.
65. Watts-Perotti, J. and Woods, D. D. (1999). How Experienced Users Avoid Getting Lost in Large Display Networks. *International Journal of Human-Computer Interaction*, 11(4), 269-299.
66. Dekker, S. W. A. and Woods, D.D. (1999). To Intervene or Not to Intervene: The Dilemma of Management by Exception. *Cognition, Technology and Work*, 1, 86-96.
67. Patterson, E. S., Watts-Perotti, J. C. and Woods, D.D. (1999). Voice Loops as Coordination Aids in Space Shuttle Mission Control. *Computer Supported Cooperative Work*, 8, 353-371.
68. L. L. Leape, D. D. Woods, M. J. Hatlie, K. W. Kizer, S. A. Schroeder, and G. A. Lundberg. Promoting Patient Safety by Reducing Medical Errors, *JAMA*, 280, 1444-1447, October 28, 1998 (editorial)
69. Woods, D.D. (1998). Designs are Hypotheses about How Artifacts Shape Cognition and Collaboration. *Ergonomics*, 41, 168-173.

70. Thomas B. Sheridan, Harold P. Van Cott, David D. Woods, Pew, R. W., Hancock, P. A. (1998). Allocating Functions Rationally between Humans and Machines. *Ergonomics in Design*, 6, 3: 20-25.
71. P. Smith, D. Woods, E. McCoy, C. Billings, N. Sarter, R. Denning and S. Dekker. Using forecasts of future incidents to evaluate future ATM system designs. *Air Traffic Control Quarterly*, 6(1), 71–85, 1998.
72. Sarter, N. and Woods, D.D. (1997). Team play with a Powerful and Independent Agent: A Corpus of Operational Experiences and Automation Surprises on the Airbus A-320. *Human Factors*, 39, 553–569.
73. Cook R. I. and Woods, D. D. (1996). Adapting to new technology in the operating room. *Human Factors*, 38(4), 593–613.
74. Obradovich J.H. and Woods, D. D. (1996). Users as designers: How people cope with poor HCI design in computer-based medical devices. *Human Factors*, 38(4), 574–592.
75. Cook R. I. and Woods, D. D. (1996). Implications of automation surprises in aviation for the future of total intravenous anesthesia (TIVA). *Journal of Clinical Anesthesia*, 8:29s–37s.
76. Woods, D. D. (1995). The alarm problem and directed attention in dynamic fault management. *Ergonomics*, 38(11), 2371–2393.
77. Sarter N. B. and Woods, D. D. (1995). "How in the world did we get into that mode?" Mode error and awareness in supervisory control. *Human Factors*, 37: 5–19.
Reprinted in N. Cooke and E. Salas (Eds.), *Best of Human Factors: Thirty Classic Contributions to Human Factors/Ergonomics Science and Engineering*. Santa Monica, CA: Human Factors and Ergonomics Society, 2008.
78. D.D. Woods, R.I. Cook and C.E. Billings. The impact of technology on physician cognition and performance. *Journal of Clinical Monitoring*, 11:92–95, 1995.
79. Jastremski, M., Jastremski, C., Shepherd, M. P. E., Friedman, V., Porembka, D., Smith, R., Gonzales, E., Swedlow, D., Belzberg, H., Crass, R., Jannett, T., Richards, E., Thys, D. and Woods, D. D. (1995). A model for technology assessment as applied to closed loop infusion systems. *Critical Care Medicine*, 23(10), 1745-1755.
80. Sarter N. and Woods, D.D. (1994). Pilot Interaction with Cockpit Automation II: An Experimental Study of Pilot's Model and Awareness of the Flight Management System. *International Journal of Aviation Psychology*, 4:1–28.
81. Woods, D.D. (1993). The price of flexibility in intelligent interfaces. *Knowledge-Based Systems*, 6(4):189-195.
82. K.B. Bennett, M.L. Toms and D.D. Woods. Emergent features and configural elements: Designing more effective integral computer based displays of data. *Human Factors*, 35:71--98, 1993.
[Ely Award for Best Paper in Human Factors, 1994]
83. N. Sarter and D.D. Woods. Pilot Interaction with Cockpit Automation I: Operational Experiences with the Flight Management System. *International Journal of Aviation Psychology*, 2:303--321, 1992.
84. Cook R. I., Woods, D. D. and Howie, M. B. (1992). Unintentional delivery of vasoactive drugs with an electro-mechanical infusion device. *Journal of Cardiothoracic and Vascular Anesthesia*, 6:238--244.
85. E.M. Roth, D.D. Woods and H.E. Pople, Jr. Cognitive simulation as a tool for cognitive task analysis. *Ergonomics*, 35:1163--1198, 1992.
86. D.D. Woods, H.E. Pople, Jr. and E.M. Roth. Cognitive Environment Simulation: A tool for modeling intention formation in human reliability analysis. *Nuclear Engineering and Design*, 134:371--380, 1992.

87. D.D. Woods, L. Johannesen and S.S. Potter. Human Interaction with Intelligent Systems: An Overview and Bibliography. *SIGART Bulletin*, 2:39--50, 1991.
88. R.I. Cook, S. Potter, D.D. Woods, and J.S. McDonald. Evaluating the human engineering of microprocessor controlled operating room devices. *Journal of Clinical Monitoring*, 7:217--226, 1991.
89. Sarter N. B. and Woods, D. D. (1991). Situation Awareness: A critical but ill-defined phenomenon. *International Journal of Aviation Psychology*, 1(1):43-55. (Reprinted in E. Salas and A. S. Dietz (eds.), *Situational Awareness*, Ashgate, 2011).
90. D.D. Woods. Risk and Human Performance: Measuring the Potential for Disaster. *Reliability Engineering and System Safety*, 29:387--405, 1990.
91. D.D. Woods. On taking human performance seriously in risk analysis. *Reliability Engineering and System Safety*, 29:375--381, 1990.
92. Woods D.D. and Roth. E.M. (1988). Cognitive engineering: Human problem solving with tools. *Human Factors*, 30:415--430.
93. Roth E.M. and Woods D.D. (1988). Aiding human performance: I. Cognitive analysis. *Le Travail Humain*, 51(1):39--64.
94. Woods D.D. and Roth. E.M. (1988). Aiding human performance: II. From cognitive analysis to support systems. *Le Travail Humain*, 51(2):139--171.
95. D.D. Woods, E.M. Roth, and H. Pople, Jr. Modeling human intention formation for human reliability assessment. *Reliability Engineering & System Safety*, 22:169--200, 1988.
96. D.D. Woods. Cognitive engineering in complex and dynamic worlds. *International Journal of Man-Machine Studies*, 27:479--525, 1987.
97. E.M. Roth, K. Bennett, and D.D. Woods. Human interaction with an 'intelligent' machine. *International Journal of Man-Machine Studies*, 27:479--525, 1987. (Reprinted in E. Hollnagel, G. Mancini, and D.D. Woods, Eds. *Cognitive Engineering in Complex, Dynamic Worlds*. Academic Press, London, 1988.)
98. D.D. Woods and E. Hollnagel. Mapping cognitive demands in complex problem solving worlds. *International Journal of Man-Machine Studies*, 26:257--275, 1987. (Reprinted in B. Gaines and J. Boose, editors, *Knowledge Acquisition for Knowledge Based Systems*, Academic Press, London, 1988.)
99. Woods, D.D. Cognitive Technologies: The design of joint human-machine cognitive systems. *AI Magazine*, 6:86--92, 1985.
100. Sorkin, R. D. and Woods, D.D. (1985). Systems with human monitors: A signal detection analysis. *Human-Computer Interaction*, 1:49--75.
101. Woods, D. D. (1984). Visual Momentum: A concept to improve the cognitive coupling of person and computer. *International Journal of Man-Machine Studies*, 21:229--244.
102. E. Hollnagel and D.D. Woods. Cognitive Systems Engineering: New wine in new bottles. *International Journal of Man-Machine Studies*, 18:583--600, 1983. [originally Riso Report M2330, February 1982] (Reprinted *International Journal of Human-Computer Studies*, 51(2), 339--356, 1999 as part of special 30th anniversary issue).

Other Publications

Herrera, I., Schraagen, J. M., van der Vorm, J. and Woods, D.D. (2014). Proceedings 5th Symposium on Resilience Engineering: Managing Trade-offs. 24th-27th June 2013 Soesterberg, Netherlands. Resilience Engineering Association, Sophia Antipolis Cedex, France. <http://www.resilience-engineering-association.org/> , download at <http://hdl.handle.net/1811/60454> , published February, 2014.

Woods, D. D. (2012). High-Reliability Organizations and Complex Adaptive Systems. In H. M. Colvin and R. M. Taylor (eds.), *Building a Resilient Workforce: Opportunities for the Department of Homeland Security - Workshop Summary*, National Academies Press, pp. 63-69.

McKenna, B., Tittle, J., Gualtieri, J., Elm, W., Grossman, J., Jennings, D., Voshell, M. and Woods, D. (2008). How Do You Know What is Happening -- Just Beyond Your View? *The Next Wave: National Security Agency's Review of Emerging Technologies*, 17(2), pp. 20-25.

Patterson, E. S. and Woods, D. D. (2007). Heuristics for designing coordination during patient handoffs. *Forum: reducing risks during handoff*. March 2007; 25(1): 8-9.

Wreathall, J., Woods, D. D., Bing, A. j. and Christoffersen, K. (2007). Relative Risk of Workload Transitions in Positive Train Control. Federal Railroad Administration, US Dept. of Transportation, DOT/FRA/ORD-07/12, March 2007.

D.D. Woods. Proactive Safety Management: Resilience Engineering makes a difference between a disruption and a disaster. *Industrial Engineer*, 39(6), 44-48, June 2007.

Patterson, E. S. and Woods, D. D. (2007) Heuristics for designing coordination during patient handoffs. In Special Issue "Reducing Risk During Handoffs", *Harvard Risk Management Forum* 25(1), 8-9. http://www.rmfm.harvard.edu/files/documents/Forum_V25N1.pdf.

D.D. Woods. Resilience Engineering: Redefining the Culture of Safety and Risk Management. *HFES Bulletin*, December, 2006.

D.D. Woods. Creating Foresight: How Resilience Engineering Can Transform NASA's Approach to Risky Decision Making. Testimony on The Future of NASA to Senate Committee on Commerce, Science and Transportation, John McCain, Chair, Washington D.C., October 29, 2003.

D.D. Woods. Human Factors and the Technology of Voting. In *The Mechanics of Election Reform: From Registration to Results*. Congressional Briefing, March 16, 2001. Consortium of Social Science Associations.

Billings, C. E. and Woods, D. D. Human Error in Perspective: The Patient Safety Movement. *Postgraduate Medicine*, January, 2001.

D.D. Woods. Behind Human Error: Human Factors Research to Improve Patient Safety. National Summit on Medical Errors and Patient Safety Research, Quality Interagency Coordination Task Force and Agency for Healthcare Research and Quality, September 11, 2000.

<http://www.apa.org/ppo/issues/shumfactors2.html>

D.D. Woods. Patient Safety and Human Factors Opportunities. *Human Factors and Ergonomics Society Bulletin*, 43(5), 2000.

Woods, David D. 2000. "Testimony of David Woods, Panel 2: Broad-based Systems Approaches. Written Statement.". National Summit on Medical Errors and Patient Safety Research. September 2000 Accessed 23 December 2015. <http://archive.ahrq.gov/quic/summit/wwoods.htm>.

D.D. Woods. Human Factors, Politics, and Stakeholders: Some thoughts stimulated by the public policy debate over workplace ergonomics. *Human Factors and Ergonomics Society Bulletin*, 42(8), 1999.

D.D. Woods and L. Strother. Taking a Position on Science. *Human Factors and Ergonomics Society Bulletin*, 42(6-7), 5-6, 1999.

D.D. Woods. The Age of Ergonomic Problems. *Human Factors and Ergonomics Society Bulletin*, 42(3), 1-2, 1999.

D.D. Woods. Look to the Interface. *Aviation Week and Space Technology*, 148(13), March 30, 1998, p.6.

Selected Technical Reports

Woods, David D. (2020, March 29). What Matters When We are in the Middle of Evolving Covid-19 Pandemic? (Version 1.0). Zenodo. <http://doi.org/10.5281/zenodo.3748062>

Woods, David D. (2020, March 29). Building Adaptive Capacity in this series of Beyond-Surge-Capacity Outbreaks (Version 1.0). Zenodo. <http://doi.org/10.5281/zenodo.3748069>

Woods, David D., Seager, Thomas P., & Alderson, David L. (2020, April 10). When Can We Move Forward From COVID-19? When Four Capabilities Are In Action. (Version 1.0). Zenodo. <http://doi.org/10.5281/zenodo.3748052>

Woods, David D. (2020, June 23). Bets Against the Odds in a Pandemic: Which of three Coronavirus bets are you willing to gamble on?. Zenodo. <http://doi.org/10.5281/zenodo.3905287>

Woods, D. D. and Balkin, E. A. (2018). A Resiliency Trade Space Study of Detect and Avoid Autonomy on Drones When Communications are Degraded. Report for NASA Ames Research Center June 30, 2018.

Woods, D. D., ed. (2017). STELLA Report from the SNAFUcatchers Workshop on Coping With Complexity. SNAFU Catchers Consortium, October 4, 2017, downloaded from stella.report 10/05/2017.

Woods, D. D. and Morison, A. (2012). Feasibility of Artificial Attention at Beyond-Human-Scales. Air Force Research Laboratory, Technical Report, AFRL-RH-WP-TR-2012-0113, April 2012.

Woods, D. D. and Morison, A. (2012). Automatic Target Recognition Human Factors. Air Force Research Laboratory, Technical Report, AFRL-RY-WP-TR-2012-0076, January, 2012.

Branlat, M., Morison, A. and Woods, D. D. (2011). Challenges to adversarial interplay under high uncertainty: Staged-world study of a cyber security event. Cognitive Systems Engineering Laboratory, Institute for Ergonomics, The Ohio State University, Columbus OH. November 2011, Prepared for Idaho National Laboratory, Resilient Controls.

Stephens, R., Morison, A. and Woods, D. D. (2009). Trust, ATR, and Layered Sensing: Models, Metrics, and Directions for Design. Cognitive Systems Engineering Laboratory, Institute for Ergonomics, The Ohio State University, Columbus OH. May 2009, Prepared for Air Force Research Laboratory, Sensors Directorate.

Voshell, M. and Woods, D. D. (2009). Planning Support for Running Large Scale Exercises as Learning Laboratories. Cognitive Systems Engineering Laboratory, Institute for Ergonomics, The Ohio State University, Columbus OH. May 2009, Prepared for Army Research Laboratory.

Dekker, S.W.A., Hollnagel, E., Woods, D.D. and Cook, R.I. (2008). *Resilience Engineering: New directions for measuring and maintaining safety in complex systems*. Lund University, Sweden. <https://www.msb.se/Upload/Kunskapsbank/Forskningsrapporter/Slutrapporter/2009%20Resilience%20Engineering%20New%20directions%20>

for%20measuring%20and%20maintaining%20safety%20in%20complex%20systems.pdf

Woods, D. D. (2004). Event Template Hierarchies as Means for Collaborative Autonomy in Surveillance. Cognitive Systems Engineering Laboratory, Institute for Ergonomics, The Ohio State University, Columbus OH. March 8, 2004

Christoffersen, K., Blike, G. T., and Woods, D. D. (2003). Discovering the Events Expert Practitioners Find Meaningful in Dynamic Data Streams. Cognitive Systems Engineering Laboratory, Institute for Ergonomics, The Ohio State University, Columbus OH.

Christoffersen, K. and Woods, D. D. (2003). Making Sense of Change: Extracting Events From Dynamic Process Data. Institute for Ergonomics/Cognitive Systems Engineering Laboratory Report, ERGO-CSEL 01-TR-02. September 25, 2003.

Emily S. Patterson, David D. Woods, David Tinapple, Emilie M. Roth, J.M. Finley, Gilbert G. Kuperman. (2001). Aiding The Intelligence Analyst In Situations Of Data Overload: From Problem Definition To Design Concept Exploration. Institute for Ergonomics/Cognitive Systems Engineering Laboratory Report, ERGO-CSEL 01-TR-01. March 30, 2001.

G. Klein, A. Armstrong , D. Woods, M. Gokulachandra and H. A. Klein. (2000). Cognitive Wavelength: The Role of Common Ground in Distributed Replanning. Technical Report AFRL-HE-WP-TR-2001-0029, Wright Patterson Air Force Research Laboratory, September 2000.

R. Chow, K. Christoffersen, D. D. Woods, J. Watts-Perotti, and E. Patterson. (2000). Communication during Distributed Anomaly Response and Replanning. . Institute for Ergonomics/Cognitive Systems Engineering Laboratory Report, ERGO-CSEL 00-TR-02, The Ohio State University, Columbus OH, September, 2000.

J. Cooper, D. Gaba, D. Woods, et al. (1999). Agenda for Research and Development in Patient Safety. National Patient Safety Foundation, May, 1999.

Woods, D. D., Sarter, N., Graham, J. and Dekker, S. (1999). Predicting How Technological Change May Create Human Error. Institute for Ergonomics/Cognitive Systems Engineering Laboratory Report, ERGO-CSEL 99-TR-02, The Ohio State University, Columbus OH, March, 1999.

G. Klein, R. Pliske, M. Thordsen, R. Hutton, P. Lake and D.D. Woods. (1998). Evaluation of a Process Model of Problem Detection. Klein Associates Technical Report, June 1998.

S. S. Potter, E. M. Roth, D. D. Woods and W. C. Elm. (1998). Toward the Development of a Computer-Aided Cognitive Engineering Tool to Facilitate the Development of Advanced Decision Support Systems for Information Warfare Domains. Carnegie Group, Inc, Pittsburgh PA, January 1998. Prepared for Armstrong Laboratory Crew Systems Integration Branch (AL/CFHI), WPAFB.

T. Winograd and D.D. Woods, Challenges for Human-Centered Design. (1997). In Human-Centered Systems: Information, Interactivity, and Intelligence. J. Flanagan, T. Huang, P. Jones, S. Kasif, (Eds.), National Science Foundation, Washington DC, July, 1997.

P. Smith, D. Woods, C. Billings, N. Sarter, E. McCoy, R. Denning and S. Dekker. Human-Centered Technologies And Procedures For Future Air Traffic Management. Cognitive Systems Engineering Laboratory Report, CSEL 97-TR-04, The Ohio State University, Columbus OH, March 1997. Prepared for NASA Ames Research Center.

J. Watts Perotti and D.D. Woods. A Cognitive Analysis of Anomaly Response in Space Shuttle Mission Control. CSEL 97-TR-02, The Ohio State University, Columbus OH, March 1997. Prepared for NASA Johnson Space Center.

D. Ranson and D.D. Woods. Opening Up Black Boxes: Visualizing Automation Activity. Cognitive Systems Engineering Laboratory Report, CSEL 97-TR-03, The Ohio State University, Columbus OH, January 1997.

K. Abbott, S. Slotte, D. Stimson, E. Bollin, S. Hecht, T. Imrich, R. Lalley, G. Lyddane, G. Thiel, R. Amalberti, F. Fabre, T. Newman, R. Pearson, H. Tigchelaar, N. Sarter, R. Helmreich and D. Woods. The Interfaces Between Flightcrews and Modern Flight Deck Systems. Federal Aviation Administration, Washington D. C., June 18, 1996.

D. Ranson and D.D. Woods. Making Automation Activities Visible. Cognitive Systems Engineering Laboratory Report, CSEL 95-TR-03, The Ohio State University, Columbus OH, December 1995. Prepared for AECL

D. Ranson and D.D. Woods. Controlling What's Important with Soft Controls. Cognitive Systems Engineering Laboratory Report, CSEL 94-TR-01, The Ohio State University, Columbus OH, March 1994. Prepared for AECL.

L. Johannesen, R.I. Cook and D.D. Woods. Grounding Explanations in Evolving Diagnostic Situations. Cognitive Systems Engineering Laboratory Report, CSEL 94-TR-03, The Ohio State University, Columbus OH, December 1994. Prepared for NASA Johnson Space Center.

S.D. Potter and D.D. Woods. Breaking Down Barriers in Cooperative Fault Management: Temporal and Functional Information Displays. Cognitive Systems Engineering Laboratory Report, CSEL 94-TR-02, The Ohio State University, Columbus OH, March 1994. Prepared for NASA Johnson Space Center.

N. Sarter and D.D. Woods. Cognitive Engineering in Aerospace Applications: Pilot Interaction with Cockpit Automation. NASA Ames Research Center, Moffett Field, CA, NASA CR-177617, August, 1993.

L. Yue, D.D. Woods and R.I. Cook. Reducing the Potential for Error Through Device Design: Infusion Controllers in Cardiac Surgery. Cognitive Systems Engineering Laboratory Report TR-01-92, The Ohio State University, Columbus OH, January 1992.

R.I. Cook, D.D. Woods and J.S. McDonald. Human Performance in Anesthesia: A Corpus of Cases. Cognitive Systems Engineering Laboratory Report, prepared for Anesthesia Patient Safety Foundation, April 1991.

D.D. Woods, S.S. Potter, L. Johannesen and M. Holloway. Human Interaction with Intelligent Systems: Trends, Problems, New Directions (2 volumes). Cognitive Systems Engineering Laboratory Report, prepared for NASA Johnson Space Center, February 1991.

J. Malin, D. Schreckenghost, D. Woods, S. Potter, L. Johannesen, M. Holloway and K. Forbus. Making Intelligent Systems Team Players. NASA Technical Report 104738, Johnson Space Center, Houston TX, 1991.

E.M. Roth, H.E. Pople, Jr. and D.D. Woods. Extending the Modeling Capabilities of the Cognitive Environment Simulation. U. S. Nuclear Regulatory Commission, Washington D. C., Technical Report NUREG-CR-5593, 1991.

D.D. Woods, H.E. Pople, Jr. and E.M. Roth. The Cognitive Environment Simulation as a Tool for Modeling Human Performance and Reliability (2 volumes). U. S. Nuclear Regulatory Commission, Washington D. C., 1990. Technical Report NUREG-CR-5213.

D.D. Woods. The effects of automation on the human's role: Experience from non-aviation industries. In S. Norman and H. Orlady, editors, Flightdeck Automation: Promises and Realities, NASA Ames Research Center, Moffett Field CA, 1989.

D.D. Woods, E.M. Roth, and H.E. Pople, Jr. Cognitive Environment Simulation: An Artificial Intelligence System for Human Performance Assessment (3 volumes). U. S. Nuclear Regulatory Commission, Washington D. C., 1987. Technical Report NUREG-CR-4862.

D.D. Woods and E.M. Roth. Models of Cognitive Behavior in Nuclear Power Plant Personnel (2 volumes). U. S. Nuclear Regulatory Commission, Washington D. C., 1986. Technical Report NUREG-CR-4532.

D.D. Woods. Operator decision making behavior during the steam generator tube rupture at the Ginna nuclear power station. In W. Brown and R. Wyrick, editors, *Analysis of Steam Generator Tube Rupture Events at Oconee and Ginna*, Institute of Nuclear Power Operations, 82-030 1982.

D.D. Woods. Visual momentum: An Example of Cognitive Models Applied to Interface Design. In Sheridan, T., Jenkins, J. and Kisner, R., editors, (1982). *Proceedings of Workshop on Cognitive Modeling of Nuclear Plant Control Room Operators*, NUREG/CR-3114, August 15-18, 1982, pp. 63--72.

D.D. Woods, J.A. Wise, and L.F. Hanes. Evaluation of Safety Parameter Display Concepts. Electric Power Research Institute, Palo Alto, CA, 1982. Technical Report NP-2239.

Selected Articles in Conference Proceedings

1. Walker K. E., Woods, D. D. and Rayo, M. (2016). Multiple Systemic Contributors versus Root Cause: Learning from a NASA Near Miss. *Proceedings of the Human Factors and Ergonomics Society*, Washington DC, September 2016.
2. Morison, A., Murphy, T. and Woods, D. D. (2016). Seeing Through Multiple Sensors Into Distant Scenes: The Essential Power of Viewpoint Control. *Proceedings of HCI International*, Toronto, ON, CA July 2016, Springer.
3. Fariadian, A. B., Annaswamy, A. M. and Woods, D. D. (2016). Towards A Resilient Control Architecture: A Demonstration of Bumpless Re-Engagement Following an Anomaly in Flight Control. *Proceedings of the International Symposium on Sustainable Systems and Technologies* (ISSN 2329-9169). Jun-Ki Choi and Annick Anctil, co-editors, Sustainable Conoscente Network, ISSSTNetwork@gmail.com.
4. Morison, A. and Woods, D. D. (2016). Artificial Attention at Scale. AAAI 2016 Workshop on Symbiotic Cognitive Systems, *Proceedings of Thirtieth Conference on Artificial Intelligence*, AAAI, Phoenix AZ, February 12-13, 2016, AAAI Press, Menlo Park, CA.
5. Robert F. Stark, David D. Woods, Michael Farry, Alex Morison, Wayne Thornton, Arthur Wollocko- Visualizations and Interaction Methods for Resilient Submarine Decision Support. *Proceedings of the Human Factors and Ergonomics Society Annual Meeting*, 56, 1: 238-242. 2016.
6. Balkin, E. A. and Woods, D. D. (2014). Recognizing Technology-Induced Changes to Teamwork and Roles in Surgical Settings. *Proceedings of Third Symposium on Human Factors and Ergonomics in Healthcare*, Chicago, IL, March 16-19, 2014.
7. Deary, D. S., Walker, K. E. and Woods, D. D. (2013). Resilience in the Face of a Superstorm: A Transportation Firm Confronts Hurricane Sandy. In *Proceedings of the Human Factors and Ergonomics Society 57th Annual Meeting*. pp. 329-333 <https://doi.org/10.1177/1541931213571072> .
8. Pruchnicki S. and Woods, D. D. (2013). Cognitive Demands of Staying in Control on Highly Automated Aircraft When Faced with Surprise. In *Proceedings Fifth Symposium on Resilience Engineering: Managing Trade-Offs*, 24-27, June 2013, Soesterberg, Netherlands. Download from Knowledge Bank at OSU <http://hdl.handle.net/1811/60454> or search at <http://kb.osu.edu>
9. Woods, D. D., Chan, Y. J. and Wreathall, J. (2013). The Stress-Strain Model of Resilience Operationalizes the Four Cornerstones of Resilience Engineering. In *Proceedings Fifth Symposium on Resilience Engineering: Managing Trade-Offs*, 24-27, June 2013, Soesterberg, Netherlands. Download from Knowledge Bank at OSU <http://hdl.handle.net/1811/60454> or search at <http://kb.osu.edu>

10. Rankin, A., Woltjer, R., Field, J. and Woods, D. D. (2013). "Staying ahead of the aircraft" and Managing Surprise in Modern Airliners. In Proceedings Fifth Symposium on Resilience Engineering: Managing Trade-Offs, 24-27, June 2013, Soesterberg, Netherlands. Download from Knowledge Bank at OSU <http://hdl.handle.net/1811/60454> or search at <http://kb.osu.edu>
11. Walker, K. E., Deary, D. S. and Woods, D. D. (2013). Reducing the Potential for Cascade: Recognizing and Mitigating Situations That Threaten Business Viability. In Proceedings Fifth Symposium on Resilience Engineering: Managing Trade-Offs, 24-27, June 2013, Soesterberg, Netherlands. Download from Knowledge Bank at OSU <http://hdl.handle.net/1811/60454> or search at <http://kb.osu.edu>
12. Woods, D. D., Woltjer, R., Branlat, M. and Herrera, I. (2013). Identifying Imbalances in a Portfolio of Safety Metrics: The Q4-Balance Framework for Economy-Safety Tradeoffs. In Proceedings Fifth Symposium on Resilience Engineering: Managing Trade-Offs, 24-27, June 2013, Soesterberg, Netherlands. Download from Knowledge Bank at OSU <http://hdl.handle.net/1811/60454> or search at <http://kb.osu.edu>
13. Stark, R. F., Woods, D. D., Michael Farry, M., Morrison, A., Thornton, W. and Wollocko, A. (2012). Designing Resilient Decision Support Systems for Submarines. In Proceedings of the Human Factors and Ergonomics Society 56th Annual Meeting.
14. Rayo M., Woods D., Weinger M. B., & Patterson E. S. (2012). Why Are They Ignoring our Alarms? Proceedings of First Annual Human Factors in Healthcare Symposium, Baltimore, MD, March 10, 2012.
15. Branlat, M., Morison, A. and Woods, D. D. (2011). Challenges in managing uncertainty during cyber events: Lessons from the staged-world study of a large-scale adversarial cyber security exercise. Human Systems Integration Symposium, Vienna VA, 10-25 to 10-27-2011. [Best student paper award]
16. Woods, D. D. and Branlat, M. (2011). How Human Adaptive Systems Balance Fundamental Trade-Offs: Implications For Polycentric Governance Architectures. Fourth International Symposium On Resilience Engineering, Sophia Antipolis, France, June 8-10, 2011.
17. Stephens, R. J., Woods, D. D., Branlat, M. And Wears, R. L. (2011). Colliding Dilemmas: Interactions Of Locally Adaptive Strategies In A Hospital Setting. Fourth International Symposium On Resilience Engineering, Sophia Antipolis, France, June 8-10, 2011.
18. Hoffman, R. R. and Woods, D. D. (2011). Simon's Slice: Five Fundamental Tradeoffs that Bound the Performance of Human Work Systems. 10th International Conference on Naturalistic Decision Making, Orlando FL, 5-31 to 6-3-2011.
19. Woods, D. D. and Morison, A. (2011). Crossing the Rubicon: Artificial Attention at a Beyond Human Scale. 10th International Conference on Naturalistic Decision Making, Orlando FL, 5-31 to 6-3-2011. (Keynote)
20. Smith, M. W., Schweikhart, S. B., Bentley, M., Gibson, G., Patterson, E. S. and Woods, D. D. (2011). Engaging Experts: Comparing Findings from Story Elicitation and a Staged-World Study of Paramedics. 10th International Conference on Naturalistic Decision Making, Orlando FL, 5-31 to 6-3-2011.
21. Branlat, M., Morison, A., Finco, G., Gertman, D., Le Blanc, K. and Woods, D. D. (2011). A study of adversarial interplay in a cybersecurity event. 10th International Conference on Naturalistic Decision Making, Orlando FL, 5-31 to 6-3-2011.
22. MW Smith, SB Schweikhart, M Bentley, B Gibson, ES Patterson, DD Woods. Engaging Experts: Comparing Findings from Story Elicitation and a Staged-World Study of Paramedics. Proceedings of the 10th International Conference on Naturalistic Decision Making; 01/2011

23. Woods, D. D. and Hoffman, R. R. (2011). Five Fundamental Tradeoffs that Bound the Performance of All Human Adaptive Systems. 4th International Symposium on Resilience Engineering, Nice France, June 8-10, 2011.
24. Branlat, M. and Woods, D. D. (2010). How do Systems Manage Their Adaptive Capacity to Successfully Handle Disruptions? A Resilience Engineering Perspective. AAAI Fall Symposium on Complex Adaptive Systems—Resilience, Robustness, and Evolvability, M. Hadzikadic and T. Carmichael, (Eds.), Technical Report FS-10-03, The AAAI Press, Menlo Park, California, p. 26-34. available at <http://www.aaai.org/Library/Symposia/Fall/fs10-03.php>
25. Morison, A., Woods, D. D. and Davis, J. W. (2009). How panoramic visualization can support human supervision of intelligent surveillance. In Proceedings of the Human Factors and Ergonomics Society 53rd Annual Meeting, October 20-24, San Antonio TX.
26. Woods, D. D. (2009). Fundamentals to Engineer Resilient Systems: Adaptive Governance, Polycentric Control and Distributed Systems. 2nd International Symposium on Resilient Control Systems, Idaho Falls, ID, August 11-13, 2009. [keynote]
27. Murphy, R. R. and Woods, D. D. (2009). Safety Oriented Alternatives to Asimov's Laws. IEEE International Conference on Robotics and Automation (ICRA), Kobe, Japan, May 12-17, 2009.
28. Patterson ES, Anders S, Schweikhart S, Ebright P, Woods DD. (2009). Barriers and Facilitators to Increasing Access to Care with an Electronic Intensive Care Unit (e-ICU). Proceedings of the 2009 AMIA Spring Congress. Orlando, FL.
29. Woods, D. D. (2009). Rasmussen's S-R-K 30 Years Later: Is Human Factors Best in 3's? *Proceedings of the Human Factors and Ergonomics Society Annual Meeting*, 53, 4: 217-221.
30. Ames, A., Branlat, M., Murphy, R., Woods, D.D., Valasek, J. and Zourntos, T. (2008). Human-Cyber-Physical Systems for Emergency Response. Special Session, Robotics and Cyber-Physical Systems. IEEE/RSJ 2008 International Conference on Intelligent Robots and Systems (IROS08), Nice, France, Wednesday, Sept. 24, 2008,
31. http://www.ece.cmu.edu/~webk/IROS_CPS/#invited
32. Anders, S., Patterson, E., Woods, D. D. and Schweikhart, S. (2008). Shifts in Functions of a New Technology over Time: An Analysis of Logged Electronic Intensive Care Unit Interventions. In Proceedings of the Human Factors and Ergonomics Society 52nd Annual Meeting. September 22-26, NY, NY.
33. Patterson, E. S., Zelik, D., McNee, S., & Woods, D. D. (2008). Insights from applying rigor metric to healthcare incident investigations. *Proceedings of the Human Factors and Ergonomics Society 52nd Annual Meeting* (pp. 1766-1770). Santa Monica, CA: Human Factors and Ergonomics Society.
34. Guerlain, S., David Woods, D. D. and Gomes, J. O. (2008). US-Brazil Cognitive Systems Engineering Exchange Program. Human Factors and Ergonomics Society Annual Meeting Proceedings 09/2008; 52(8):649-653. DOI:10.1177/154193120805200808
35. Prue, B., Voshell, M., Woods, D. D., Peffer, J., Tittle, J. and Elm, W. (2008). Synchronized coordination loops: A model for assessing distributed teamwork. NATO HFM Symposium on Adaptability on Coalition Teamwork, Copenhagen, April 21-23, 2008, RTO-MP-IST-999.
36. Smith, M., Branlat, M., Stephens, R. J. and Woods, D. D. (2008). Collaboration support via analysis of factions. NATO HFM Symposium on Adaptability on Coalition Teamwork, Copenhagen, April 21-23, 2008, RTO-MP-IST-999.

37. McGuirl, J. M., Sarter, N. B. and Woods, D. D. (2008). See is Believing? The effects of real-time image-based feedback on emergency management decision-making. Proceedings of Information Systems for Crisis Response and Management (ISCRAM 2008), Washington DC, May 4-7, 2008. [Best Paper Award]
38. Emily S. Patterson, Stephanie McNee, Daniel Zelik, David D. Woods. Insights from Applying Rigor Metric to Healthcare Incident Investigations. Human Factors and Ergonomics Society Annual Meeting Proceedings 09/2008; 52(21). DOI:10.1177/154193120805202116
39. Smith, M., Patterson, E. S. and Woods, D. D. (2007). Collaboration and Context in Handovers. Workshop: Handovers--Collaboration for Continuity of Work, European Conference on Computer Supported Cooperative Work. September 24-28, 2007, Limerick Ireland,
40. Zelik, D., Patterson. E. S. and Woods, D. D. (2007). Judging sufficiency: How professional intelligence analysts assess analytical rigor. In *Proceedings of the Human Factors and Ergonomics Society 51st Annual Meeting* (pp. 318-322). Santa Monica, CA: Human Factors and Ergonomics Society.
41. Grossman, J., Trent, S., Patterson, E.S. and Woods, D. D. (2007). Supporting The Cognitive Work of Information Analysis and Synthesis: A Study Of The Military Intelligence Domain. In Proceedings of the Human Factors and Ergonomics Society 51st Annual Meeting. October 1-5, Baltimore, MD.
42. Anders, S., Zelik, D., Jacoby, T., Patterson, E. S., & Woods, D. D. (2007). Exploring Challenges of Information Dynamics Using an Animock. *Proceedings of the Human Factors and Ergonomics Society 51st Annual Meeting* (pp. 323-327). Santa Monica, CA: Human Factors and Ergonomics Society.
43. Zelik, D., Patterson. E. S. and Woods, D. D. (2007). Supporting the Assessment of Rigor: Representing Analysis to Create Process Insight. 2nd Annual Workshop on Meta-Information Portrayal, Air Force Research Laboratory, Washington DC, August 21-23 2007.
44. Voshell, M., Woods, D. D., Prue, B. and Fern. L. (2007). Synchronization Loops: A New Unit of Analysis for Distributed Work. In K.Mosier & U. Fischer (eds.), Proceedings of Naturalistic Decision Making 8, June 2007.
45. Zelik, D., Patterson. E. S. and Woods, D. D. (2007). Understanding Rigor in Information Analysis: The Role of Rigor in Professional Intelligence Analysis. In K.Mosier & U. Fischer (eds.), Proceedings of Naturalistic Decision Making 8, June 2007.
46. Woods, D. D. and Patterson. E. S. (2007). Managing Complexity: The Reduce, Reveal and Focus Heuristics. In K.Mosier & U. Fischer (eds.), Proceedings of Naturalistic Decision Making 8, June 2007.
47. Anders, S., Patterson, E. S., Woods, D. D. and Ebright, P. (2007). Projecting Trajectories for a New Technology Based on Cognitive Task Analysis and Archetypal Patterns: The Electronic ICU. In K.Mosier & U. Fischer (eds.), Proceedings of Naturalistic Decision Making 8, June 2007.
48. Smith, M., Patterson. E. S., Zelik, D. and Woods, D. D. (2007). Faction Display: Visualizing the Spectrum of Perspectives. In K.Mosier & U. Fischer (eds.), Proceedings of Naturalistic Decision Making 8, June 2007.
49. Gunawan, L. T., Voshell, M., Oomes, A. H. J. and Woods, D. D. (2007). Envisioning Collaboration at a Distance for the Evacuation of Walking Wounded. Proceedings of the 4th International Conference on Information Systems for Crisis Response and Management (ISCRAM), B. Van de Walle, P. Burghardt and C. Nieuwenhuis, eds., pp. 431-437, Delft, the Netherlands, May 2007.
50. Shilo Anders, Dan Zelik, Timothy Jacoby, Amos Epstein, Emily S Patterson, David D Woods. Exploring Challenges of Information Dynamics Using an Animock. Human Factors and Ergonomics Society Annual Meeting Proceedings 10/2007; 51(4). DOI:10.1177/154193120705100437
51. Davis, J. W. Morison, A. and Woods, D. D. (2007). Building Adaptive Camera Models for Video Surveillance.

IEEE Workshop on Applications of Computer Vision. February 21-22, 2007, Austin, TX.

52. Lee, D.-S. and Woods, D. D. (2006). Taming Increasing Complexity in Design: A New Role of Design Management for Strategic Innovation. International Conference on Strategic Innovation and Creativity in Brand & Design Management. November 29, Seoul, Korea.
53. Woods, D. D., Wreathall, J. and Anders, S. (2006). Stress-Strain Plots as a Model of an Organization's Resilience. Second International Symposium on Resilience Engineering. Juan-les-Pins, France, November 8-10, 2006.
54. Anders, S. Woods, D. D., Wears, R., Perry, S. and Patterson, E. (2006). Limits on Adaptation: Modeling Resilience and Brittleness in Hospital Emergency Departments. Second International Symposium on Resilience Engineering. Juan-les-Pins, France, November 8-10, 2006.
55. da Mata, T.F, Santos, A.G., Abech, M.P. Gomes, J.O. Woods, D D. Huber, G.J. Borges, M.R.S. Carvalho, P.V.R. (2006). Goal Conflicts in Helicopter Safety: Dilemmas Across Maintenance, Pilots, and Management. Second International Symposium on Resilience Engineering. Juan-les-Pins, France, November 8-10, 2006.
56. S. S. Potter, D. D. Woods, E. M. Roth, J. Fowlkes, R. R. Hoffman. Evaluating the Effectiveness of a Joint Cognitive System: Metrics, Techniques, and Frameworks. Human Factors and Ergonomics Society Annual Meeting Proceedings 10/2006; 50(3):314-318. DOI:10.1177/154193120605000322
57. Lee, D.-S., Woods, D. D. and Kidwell, D. (2006). Escape from designers' dilemma on creeping featurism. Proceedings of the Human Factors and Ergonomics Society 50th Annual Meeting. 17-21 October, San Francisco, CA.
58. Woods, D. D. (2006). Engineering Organizational Resilience to Enhance Safety: A Progress Report on the Emerging Field of Resilience Engineering. Proceedings of the Human Factors and Ergonomics Society 50th Annual Meeting, 50, 2237-2241. 17-21 October, San Francisco, CA.
59. Potter, S. S., Woods, D. D., Roth, E. M., Fowlkes, J. and Hoffman, R. R. (2006). Evaluating the Effectiveness of a Joint Cognitive System: Metrics, Techniques, and Frameworks. Proceedings of the Human Factors and Ergonomics Society Annual Meeting October, 50: 314-318, doi:10.1177/154193120605000322
60. Lee, D.-S., Woods, D. D. and Kidwell, D. (2006). Escaping the design traps of creeping featurism: Introducing a fitness management strategy. Usability Professionals' Association Annual Conference, Broomfield, Colorado, June 12 - 16, 2006.
61. Scott S. Potter, David D. Woods, Emilie M. Roth, Jennifer Fowlkes, Robert R. Hoffman. Evaluating the Effectiveness of a Joint Cognitive System: Metrics, Techniques, and Frameworks. Proceedings of the Human Factors and Ergonomics Society Annual Meeting, 50, 3: 314-318. 2006.
62. Woods, D. D. (2005). Generic Support Requirements for Cognitive Work: Laws that Govern Cognitive Work in Action. Proceedings of the Human Factors and Ergonomics Society 49th Annual Meeting, 49(3), 317-321. 26-28 September, Orlando FL.
63. Schoenwald, J., Trent, S., Tittle, J. and Woods, D. D. (2005). Scenarios As A Tool For Collaborative Envisioning: Using The Case of New Sensor Technologies for Military Urban Operations. Proceedings of the Human Factors and Ergonomics Society 49th Annual Meeting. 26-28 September, Orlando FL.
64. Woods, D. D., Davis, J. W. and Christoffersen, K. (2005). Event Template Hierarchies as Means for Human-Automation Collaboration in Security Surveillance. Proceedings of the Human Factors and Ergonomics Society 49th Annual Meeting. 26-28 September, Orlando FL.

65. Patterson, E.S., Woods, D.D., Cook, R.I., Render, M.L. (2005). Collaborative cross-checking to enhance resilience. Proceedings of the Human Factors and Ergonomics Society 49th Annual Meeting. Santa Monica, CA: Human Factors and Ergonomics Society.
66. Voshell, M. G., Woods, D. D. and Phillips, F. (2005). Human-Robot Interaction: From Fieldwork to Simulation to Design. Proceedings of the Human Factors and Ergonomics Society 49th Annual Meeting. 26-28 September, Orlando FL.
67. Voshell, M. G., Woods, D. D. and Phillips, F. (2005). Overcoming the keyhole in human-robot coordination: simulation and evaluation. Proceedings of the 49th Annual Meeting of the Human Factors and Ergonomics Society Orlando, FL, Sept. 26-30, 2005.
68. Elm, W., Potter, S., Tittle, J., Woods, D., Patterson, E., and Grossman, J. (2005). Finding Decision Support Requirements for Effective Intelligence Analysis Tools. Proceedings of the Human Factors and Ergonomics Society 49th Annual Meeting, 49, 3: 297-301. 26-28 September, Orlando FL.
69. Woods, D. D. (2005). Supporting Cognitive Work: How to Achieve High Levels of Coordination and Resilience in Joint Cognitive Systems. To appear in *Naturalistic Decision Making 7*. Amsterdam, The Netherlands, June 15, 2005.
70. Weil, S. A., Tinapple, D. and Woods, D.D. (2004). New Approaches to Overcoming E-Mail Overload, Proceedings of the Human Factors and Ergonomics Society 48th Annual Meeting. 20-24 September, New Orleans LA.
71. Tinapple, D. and Woods, D.D. (2003). Message Overload from the Inbox to Intelligence Analysis: How Spam and Blogs Point to New Tools. Proceedings of the Human Factors and Ergonomics Society 47th Annual Meeting, 47, 3: 419-423. 13-17 October, Denver, CO.
72. Miller, J. E. , Patterson. E. S. and Woods, D.D. (2003). Elicitation by Critiquing: An Exploratory Study. Proceedings of the Human Factors and Ergonomics Society 47th Annual Meeting. 13-17 October, Denver, CO.
73. Woods, D.D. (2002). GUTs or no GUTs (Grand Unified Theories): Does/Can/Should Cognitive Engineering have G.U.T.s? Proceedings of the Human Factors and Ergonomics Society 46th Annual Meeting, 46, 3: 468-471. 1-5 October, Baltimore, MD.
74. William C. Elm, David D. Woods, Kevin Bennett, Ann Bisantz, Robert Eggleston, Christine Mitchell (2002). Behind the Curtain: The Cognitive Tasks behind the Visualizations. Proceedings of the Human Factors and Ergonomics Society Annual Meeting, 46, 3: 285-288.
75. Tittle, J., Roesler, A., and Woods, D. D. (2002). The Remote Perception Problem. Proceedings of the Human Factors and Ergonomics Society 46th Annual Meeting. 1-5 October, Baltimore, MD.
76. Howard, M. and Woods, D. D. (2002). The Squidgy: An Order of Magnitude Display. Proceedings of the Eleventh European Conference on Cognitive Ergonomics (ECCE-11), Catania, Sicily, September 9-11, 2002.
77. Nunnally M, Brunetti V, Woods D, Cook R. (2002). Infusion device characteristics related to user error during programming and operation determined by finite state modeling. *Anesthesiology*. 96:A520.
78. Woods, D.D. (2002). Steering the Reverberations of Technology Change on Fields of Practice: Laws that Govern Cognitive Work. Proceedings of the 24th Annual Meeting of the Cognitive Science Society. [Plenary Address]
- 79.
80. Miller, J. E., Patterson, E.S. and Woods, D.D. (2001). Modeling Expertise in a Domain with Diversity. Proceedings of the Human Factors and Ergonomics Society 45th annual meeting. 8-12 October, Minneapolis, MN.

81. Patterson, E.S., Woods, D.D., Tinapple, D., Roth, E.M. (2001). Using cognitive task analysis (CTA) to seed design concepts for intelligence analysts under data overload. Proceedings of the Human Factors and Ergonomics Society 45th annual meeting. 8-12 October, Minneapolis, MN.
82. Christoffersen, K., Woods, D. D. and Blike, G. T. (2001). Extracting Event Patterns From Telemetry Data. Proceedings of the Human Factors and Ergonomics Society 45th annual meeting. 8-12 October, Minneapolis, MN.
83. Patterson, E.S., Cook, R.I., Woods, D.D., Render, M.L. (2001). New Arctic Air Crash Aftermath Role-Play Simulation™: Orchestrating a Fundamental Surprise. Proceedings of the Human Factors and Ergonomics Society 45th annual meeting. 8-12 October, Minneapolis, MN.
84. Jeff Caird, Nic Ward, Steve Scallen, Jan Davies, Peter Hancock, David Woods. Why Does Dilbert, the Far Side, and other Cartoons Convey Essential Truths about Human Factors and Ergonomics? Proceedings of the Human Factors and Ergonomics Society Annual Meeting, 45, 9: 783. 2001.
85. Tittle, J., Woods, D. D., Roesler, A., Howard, M., Phillips, F. (2001). The Role of 2-D and 3-D Task Performance In the Design and Use of Visual Displays. Proceedings of the Human Factors and Ergonomics Society 45th annual meeting, 45, 4: 331-335. 8-12 October, Minneapolis, MN.
86. Patterson, E.S., Coelho, D.A., Woods, D.D., Cook, R.I., & Render, M.L. (2000). The Natural History of Technology Change: How Introducing Bar Coding Changes Medication Administration. Proceedings of the Fifth Conference on Naturalistic Decision Making. Tammsvik, Sweden, 26-28 May.
87. Chow, R., Christoffersen, K. and Woods, D.D. (2000). A Model of Communication in Support of Distributed Anomaly Response and Replanning. In Proceedings of the IEA 2000/HFES 2000 Congress, Human Factors and Ergonomics Society, 44, 1: 34-37, July, 2000. DOI:10.1177/154193120004400110
88. Woods, D. D. (1999). Improving the Reporting and Analysis of Incidents. In Enhancing Patient Safety and Reducing Errors in Health Care. National Patient Safety Foundation, Chicago IL.
89. Woods, D. D., Patterson, E. S., Roth, E. M. and Christoffersen, K. (1999). Can We Ever Escape from Data Overload? A Cognitive Systems Diagnosis. Proceedings of the Human Factors and Ergonomics Society Annual Meeting, 43, 3: 174-178.
90. Woods, David D. 1998. "Improving the reporting and analysis of incidents." Proceedings of the Second Annenberg Conference on Enhancing Patient Safety and Reducing Errors in Health Care, Rancho Mirage, CA, 8 - 10 November 1998.
91. Potter, S. S., Roth, E. M., Woods, D. D. and Elm, W. C. A Framework for Integrating Cognitive Task Analysis into the System Development Process. In Proceedings of the 42nd Annual Meeting of the Human Factors and Ergonomics Society, September, 1998.
92. Woods, D. D. (1998). Patterns in Distributed Cognition: Field Work on Cognition and Collaboration in Anomaly Response. Proceedings of Naturalistic Decision Making 4, Warrenton VA, May 30-31, 1998.
93. Woods, D. D. (1998). Enhancing Patient Safety: A New Movement in Health Care. Proceedings of the Human Factors and Ergonomics Society Annual Meeting, 42, 14: 1009-1012.
94. Jodi Heintz Obradovich, Philip J. Smith, Rebecca Denning, Roger Chapman, Charles Billings, Elaine McCoy, David D. Woods. Cooperative Problem-Solving Challenges for the Movement of Aircraft on the Ground. Proceedings of the Human Factors and Ergonomics Society Annual Meeting, 42, 1: 57-61, 1998.

95. Scott S. Potter, Emilie M. Roth, David D. Woods, William C. Elm. A framework for integrating cognitive task analysis into the system development process. *Proceedings of the Human Factors and Ergonomics Society Annual Meeting*, 42, 3: 395-399, 1998.
96. Patterson, E.S., Woods, D.D., Sarter, N.B., & Watts-Perotti, J. (1998). Patterns in cooperative cognition. COOP '98, Third International Conference on the Design of Cooperative Systems. Cannes, France, 26-29 May.
97. Smith, P.J., Billings, C. Woods, D., McCoy, C.E., Sarter, N., Denning, R. and Dekker, S. (1997). Can automation enable a cooperative future ATM system? *Proceedings of the 1997 Aviation Psychology Symposium*, 1481-1485.
98. J. H. Obradovich, P. J. Smith, R. Denning, R. Chapman, C. Billings, E. McCoy, D. D. Woods. Cooperative Problem-Solving Challenges for the Movement of Aircraft on the Ground. *Human Factors and Ergonomics Society Annual Meeting Proceedings 10/1998*; 42(1):57-61. DOI:10.1177/154193129804200114
99. L. Shattuck and D.D. Woods. Communication Of Intent In Distributed Supervisory Control Systems. In *Proceedings of the 41st Annual Meeting of the Human Factors and Ergonomics Society*, September, 1997.
100. Peter A. Hancock, Richard W. Pew, Harold P. VanCot, David D. Woods, Thomas B. Sheridan, Harold E. Price. A Debate on: Resolved: Allocating Functions between Humans and Machines can Never be Done on a Rational Basis. *Proceedings of the Human Factors and Ergonomics Society Annual Meeting*, 41,1: 248. 1997.
101. Woods, D.D., Patterson, E.S., Corban, J. and Watts, J.C. (1996). Bridging the Gap between User-Centered Intentions and Actual Design Practice. *Proceedings of the 40th Annual Meeting of the Human Factors and Ergonomics Society*, 40, 19: 967-971.
102. David D. Woods, J.C. Watts, John Graham, Daniel L. Kidwell. Challenges in teaching cognitive engineering. *Human Factors and Ergonomics Society 40th annual Meeting*, Philadelphia, PA; 09/1996.
103. R. Cook, D. Woods, M. Walters, K. Christoffersen. The cognitive systems engineering of automated medical evacuation scheduling and its implications. *Proceedings of the 3rd Symposium on Human Interaction with Complex Systems (HICS '96)*; 08/1996.
104. D. Ranson and D.D. Woods. *Animating Computer Agents*. *Proceedings of Human Interaction with Complex Systems*, IEEE Computer Society Press, Los Alamitos, CA, 1996.
105. J.C. Watts, D.D. Woods, E.S. Patterson. Functionally Distributed Coordination during Anomaly Response in Space Shuttle Mission Control. *Proceedings of Human Interaction with Complex Systems*, IEEE Computer Society Press, Los Alamitos, CA, 1996.
106. R.I. Cook, D.D. Woods, M. Walters and K. Christoffersen. The Cognitive Systems Engineering of Automated Medical Evacuation Scheduling. *Proceedings of Human Interaction with Complex Systems*, IEEE Computer Society Press, Los Alamitos, CA, 1996.
107. Nadine B. Sarter and David D. Woods. "From Tool To Agent": The Evolution of (Cockpit) Automation And Its Impact on Human-Machine Coordination. In *Proceedings of the Human Factors and Ergonomics Society 39th Annual Meeting*. San Diego, CA, October, 1995.
108. Mica R. Endsley, Gary Klein, David D. Woods, Philip J. Smith, Stephen J. Selcon. Future Directions in Cognitive Engineering and Naturalistic Decision Making. *Proceedings of the Human Factors and Ergonomics Society Annual Meeting*, 39, 9: 450-453. 1995.

109. D. Ranson and D.D. Woods. Controlling What's Important with Soft Controls: Problems, Opportunities and Benefits. In T. Sheridan (ed.), *Proceedings of Analysis, Design and Evaluation of Man-Machine Systems 1995*, IFAC, Cambridge MA, June 1995.
110. N. Sarter and D.D. Woods. Autonomy, Authority, Observability: Properties of Advanced Automation and Their Impact on Human Machine Coordination. In T. Sheridan (ed.), *Proceedings of Analysis, Design and Evaluation of Man-Machine Systems 1995*, IFAC, Cambridge MA, June 1995.
111. C. Billings and D.D. Woods. Coordination, Coupling and Complexity in the Future Aviation System. In *Proceedings of the Eighth International Symposium on Aviation Psychology*, Columbus, OH, April 1995.
112. L. Shattuck and D.D. Woods. Critical Incident Technique 40 Years Later. In *Proceedings of the 38th Annual Meeting of the Human Factors and Ergonomics Society*, October, Nashville TN, 1994. [Best Professional Paper Award, Test & Evaluation Technical Group]
113. L. Johannesen, R.I. Cook, and D.D. Woods. Cooperative communications in dynamic fault management. In *Proceedings of the 38th Annual Meeting of the Human Factors and Ergonomics Society*, October, Nashville TN, 1994.
114. D.D. Woods, J. Watts, M. Holloway, M. Tschudy. Discovering Requirements: Integrating HCI Principles into Software Engineering. Position Paper for Workshop on HCI and Software Engineering. *Human Factors and Ergonomics Society Annual Meeting*, October, Nashville TN, 1994.
115. D.D. Woods. Observations from Studying Cognitive Systems in Context. In *Proceedings of the Sixteenth Annual Conference of the Cognitive Science Society*, August 1994. [Keynote Address]
116. D.D. Woods. Automation: Apparent Simplicity, Real Complexity. In *Proceedings of the First Automation Technology and Human Performance Conference*, Washington DC, April, 1994. [Keynote Address]
117. C.E. Billings and D.D. Woods. Concerns about Adaptive Automation in Aviation Systems. In *Proceedings of the First Automation Technology and Human Performance Conference*, Washington DC, April, 1994.
118. S.S. Potter, D.D. Woods, T. Hill, R. Boyer and W. Morris. Visualization of dynamic processes: Function-based displays for human-intelligent system interaction. In *Proceedings of IEEE International Conference on Systems, Man, and Cybernetics*, IEEE, 1992.
119. Woods, D. D. and Sarter, N. B. (1992). Mode Error in Supervisory Control of Automated Systems. *Proceedings of the Human Factors and Ergonomics Society Annual Meeting*, 36, 1: 26-29.
120. Woods, D. D., Johannesen, L. and Potter, S. S. (1992). The Sophistry of Guidelines: Revisiting Recipes for Color Use in Human-Computer Interface Design. In *Proceedings of the Human Factors Society, 36th Annual Meeting*, 36, 4: 418-422.
121. E. Moll van Charante, R.I. Cook, D.D. Woods, L. Yue and M.B. Howie. Human-computer interaction in context: Physician interaction with automated intravenous controllers in the heart room. In H.G. Stassen, editor, *Analysis, Design and Evaluation of Man-Machine Systems 1992*, Pergamon Press, 1993, p. 263-274.
122. D.D. Woods. Representation Aiding: A ten year retrospective. In *Proceedings of IEEE International Conference on Systems, Man, and Cybernetics*, IEEE, 1991.
123. S.S. Potter and D.D. Woods. Event-driven timeline displays: Beyond message lists in human-intelligent system interaction. In *Proceedings of IEEE International Conference on Systems, Man, and Cybernetics*, IEEE, 1991.

124. L. Johannesen and D.D. Woods. Human-intelligent system cooperation in space applications: Trends, problems, new directions. In Proceedings of IEEE International Conference on Systems, Man, and Cybernetics, IEEE, 1991.
125. E.M. Roth and H.E. Pople, Jr. and D.D. Woods. Cognitive Environment Simulation: A tool for modeling operator cognitive performance during emergencies. In G. Apostolakis, editor, Probabilistic Safety Assessment and Management. Elsevier, New York, 1991.
126. R I Cook, D D Woods, J S McDonald. Anesthetic Critical Incidents Analyzed Using Cognitive Science Techniques. *Anesthesiology* 01/1991; 75. Doi:10.1097/0000542-199109001-00864
127. Woods, D. D., Roth, E. M. and Pople, H. E. (1990). Modeling Operator Performance in Emergencies. *Proceedings of the Human Factors Society Annual Meeting*, 34, 16: 1132-1136.
128. N. B. Sarter, D. D. Woods. Situation Awareness in the Advanced Commercial Aircraft Cockpit. *Human Factors and Ergonomics Society Annual Meeting Proceedings* 10/1990; 34(1):21-25. DOI:10.1177/154193129003400106
129. The Role of Human Factors Guidelines in Designing Usable Systems: A Case Study of Operating Room Equipment. S. S. Potter, R. I. Cook, D. D. Woods, J. S. McDonald. *Human Factors and Ergonomics Society Annual Meeting Proceedings* 10/1990; 34(4):392-395. DOI:10.1177/154193129003400434
130. Woods, D. D., Roth, E. M., Stubler, W. F. and Mumaw, R. J. (1990). Navigating through Large Display Networks in Dynamic Control Applications. *Proceedings of the Human Factors Society Annual Meeting*, 34, 4: 396-399.
131. Roth, E. M., Elm, W. C., Woods, D. D. and Gallagher, J. M. (1987). Providing On-Line Advice for a Dynamic Control Task: A Case Study in Intelligent Support System Design. *Human Factors and Ergonomics Society Annual Meeting Proceedings* 09/1987; 31(1):36-40. DOI:10.1177/154193128703100108
132. Roth, E. M., Woods, D. D. and Gallagher, J. M. (1986). Analysis of Expertise in a Dynamic Control Task. *Human Factors and Ergonomics Society Annual Meeting Proceedings* 09/1986; 30(2):179-181. DOI:10.1177/154193128603000217
133. M. C. Eastman, D. D. Woods, W. C. Elm. Specifying and Communicating data structure in Computer-Based Graphic Displays. *Human Factors and Ergonomics Society Annual Meeting Proceedings* 09/1986; 30(10):1034-1037. DOI:10.1177/154193128603001021
134. Woods, D. D. (1985). Knowledge Based Development of Graphic Display Systems. *Proceedings of the Human Factors Society Annual Meeting*, 29, 4: 325-329.
135. Woods, D. D. and Elias, G. (1985). Significance Messages: An Integrated Display Concept. *Proceedings of the Human Factors Society Annual Meeting*, 32, 19: 1350-1354.
136. Woods, D. D. and Hollnagel, E. (1982). A Technique to Analyze Human Performance in Training Simulators. *Human Factors and Ergonomics Society Annual Meeting Proceedings* 10/1982; 26(7):674-675. DOI 10.1177/154193128202600721
137. Woods, D. D., Wise, J. A. and Hanes, L. F. (1981). An Evaluation of Nuclear Power Plant Safety Parameter Display Systems. *Proceedings of the Human Factors Society Annual Meeting*, 25, 1: 110-114.