



Cognitive Engineering and Decision Making Technical Group

The Cognitive Engineering and Decision Making Technical Group was established to serve HFES members who share an interest in human cognition and decision making in a variety of complex real-world tasks. CETG encourages research on cognitive engineering and the application of this knowledge to the design, development, and maintenance of machines, automation, and other support systems, training programs, personnel selection devices, and coordination environments for people who work in teams or groups.

TECHNICAL FOCUS

CETG seeks to understand how people make decisions in real settings. The technical group is interested in advances in the theory of cognition in actual work environments, empirical results obtained from the study of real-world decision processes, and innovative methodologies for conducting research in natural settings. This focus is called *naturalistic decision making* and includes an examination of situations with the following characteristics:

- Ill-structured problems
- Uncertain information and missing data
- Time stress
- High risk
- Group or team settings
- Dynamic environments with rapidly changing information and goals
- Complex systems requiring a series of critical decisions
- Decisions in the context of large, complex organizations
- Incompatible goals of two or more group members or between the decision maker and the larger organization

The CETG supports research that grapples with the messy, hard-to-define, and difficult to study realities that confront humans as they attempt to interact effectively with a complex environment. Emphasis is on descriptive models of decision making, by people alone or in conjunction with other individuals or intelligent systems, and the factors affecting decision-making and cognition in realistic settings.

The CETG focus on human cognition in real-world contexts encompasses all aspects of human problem solving, including situation awareness, problem definition, solution validation and metacognition. There is an interest in understanding how people structure their knowledge and the nature of human error and how better to design systems based on this knowledge.

The CETG is interested in understanding the nature and structure of real-world expertise and expert knowledge. This knowledge is used to enhance efforts in eliciting and representing knowledge from human experts in computerized decision aids or expert systems.

The CETG does not focus on any one-application area. It rather seeks to find and apply theories, principles, and methods to support user-centered design and enhanced training programs in many different contexts and domains, including aviation, air traffic control, process control, transportation, manufacturing systems, maintenance and diagnostic systems, medical and emergency services, teleoperations, command and control, and military systems. Applications of CEDM work include interfaces for complex and distributed systems, ecological interface designs and situation awareness oriented designs, interfaces for collaborative systems, technologies for supporting human decision making, human-centered automation, and training programs for improving decision making.

MEMBERSHIP

The CETG draws members from educational institutions, government agencies, branches of the military, and a wide variety of consulting, manufacturing, and contracting firms in private industry. CETG was formed to provide an integrated forum within HFES for the growing interest in cognitive engineering and decision making in a wide variety of domains. It serves to encourage research, to disseminate knowledge, and to facilitate discussion and the exchange of information among its members on these topics.

BENEFITS OF MEMBERSHIP

CETG performs a variety of functions and services including sponsoring technical paper sessions, special symposia, and poster sessions on topics in decision making and cognition at the HFES Annual Meeting. Members also receive the CETG Newsletter and have access to the CEDM Web site, Internet List Server, LinkedIn and Facebook social networking sites which provide important news, descriptions of current research, discussions of current issues, and announcements of interest. It is not necessary to be an HFES member to join CETG. Additional information or membership in CETG can be found in the HFES Web site <http://hfes.org> or through the CEDM Web Site Page: <http://www.cedm.hfes.org>

ADDITIONAL READINGS

If you would like to learn more about cognitive engineering and decision making, consult the following:

- Bisantz, A.M. & Burns, C.M. (2008). *Applications of Cognitive Work Analysis*. Boca Raton, FL: CRC Press.
- Burns, C.M. and Hajdukiewicz, J.R. (2004). *Ecological Interface Design*. Boca Raton, FL: CRC Press.
- Cooke, N.J., Salas, E., Cannon-Bowers, J. A., & Stout, R. (2000). Measuring team knowledge. *Human Factors*, 42, 151-173.
- Cooke, N.J. (1999). Knowledge elicitation. In F.T. Durso, (Ed.), *Handbook of Applied Cognition*, pp. 479-509. UK: Wiley. *Human Factors*. (2000). Special section: Cognitive Task Analysis, Vol 42, No. 1.
- Flach, J., Hancock, P., Caird, J., & Vicente, K. (1995). *Global perspectives on the ecology of human-machine systems*. Hillsdale, NJ: Erlbaum.
- Hollnagel, E. & Woods, D.D. *Joint Cognitive Systems: Foundations of Cognitive Systems Engineering*. Boca Raton, FL: CRC Press.
- Hutchins, E. (1995). *Cognition in the wild*. Cambridge: MIT Press.
- Klein, G.A. *Sources of power: How people make decisions*. Cambridge, MA: MIT Press
- Klein, G. A., Orasanu, J., Calderwood, R., & Zsombok, C. E. (Eds.). (1993). *Decision making in action: Models and methods*. Norwood, NJ: Ablex.
- Rasmussen, J., Pejtersen, A. M., & Goodstein, L. P. (1994) *Cognitive systems engineering*. New York: Wiley.
- Salas, E., Bowers, C.A., & Rhodenizer, L. (1998). *It is not how much you have but how you use it: Toward a rational use of simulation to support aviation training*. *The International Journal of Aviation Psychology*, 8, 197-208.
- Salas, E., & Klein, G.A. (Eds.). (2001). *Linking expertise and naturalistic decision making*. Mahwah, NJ: Erlbaum.
- Sarter, N.B., & Amalberti, R.R. (Eds.). (2000). *Cognitive engineering in the aviation domain*. Mahwah, NJ: Erlbaum.: CSERIAC.
- Vicente, K.J. (1999). *Cognitive work analysis: Toward safe productive, and healthy computer-based work*. Mahwah, NJ: Erlbaum.
- Woods, D. D., Johannesen, L. J., Cook, R. I., & Sarter, N. B. (1994). *Behind human error: Cognitive systems, computers and hindsight*. Wright-Patterson Air Force Base, OH