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Resilience Engineering: Redefining the Culture of Safety and Risk Management

By David D. Woods

The first impulse after tragic accidents in aviation, transportation, health care, or power generation is to label human error as the cause. Headlines continue to announce human error as if that explained how the accident occurred and how similar events could be prevented in the future. But research has consistently pointed to a different result: Rather than focus on an individual or specific human decision or action, the data are found to point to organizational factors that set up the conditions for failure to occur – organizational accidents.

The question then becomes, What is the difference between organizations that can manage high-consequence processes well and those that inadvertently create complexity and miss signals that risks are increasing? Research often focuses on the questions of what a safety culture is, what the indicators of poor safety culture are, and what ways leadership signals a commitment to safety.

Line managers push back when they hear about these results with responses such as “Changing culture is difficult and slow,” “I am under increasing schedule and financial pressure,” “I can demonstrate continual improvements in many areas of my operation,” and “I have decisions to make about how to invest limited resources in risky projects.”

Managing risk proactively is difficult. When organizations are struggling to meet daily pressures, how can they tell the difference between inefficiencies and buffers against the unexpected? Resilience engineering is one new approach that can provide tools for proactive safety management.

To provide some structure for this article, *HFES Bulletin* Features Editor Pam Savage-Knepshield posed a series of questions, which I answer below.

How do you define “resilience engineering,” and why do you consider it an emerging discipline?

Around 2000, I noticed a shift in the language and concepts that safety researchers were using to discuss how organizations succeed and fail. Many of the papers began to use words like *resilience* or *robustness* to describe organizations that were able to achieve ultra-high levels of safety despite high risks, difficult tasks, and constantly increasing pressures. Resilient organizations were proactive and adaptive, and this led to organizations that not only had high levels of safety but also were able to respond effectively to many

types of changes in today’s highly pressured business and operational settings.

NASA in particular realized the need for proactive safety management processes in the aftermath of, first, the series of Mars exploration failures in 1999 and, second, the *Columbia* space shuttle accident in 2003. NASA experienced how pressure to be “faster, better, cheaper” led to management decisions that pushed the organization closer to the edge of the performance envelope without anyone’s realizing how risk had increased.

The common thread in the work on proactive safety was the idea that *resilience* is a critical systems property when organizations are under pressure both to be highly productive and to achieve ultra-high levels of safety. Resilience refers to the art of managing the unexpected, or how a team or organization becomes prepared to cope with surprises. Resilience comes from the Latin *resilire* – “to leap back” – and denotes a system property characterized by the ability to recover from challenges or disrupting events. Resilience engineering assesses changes in the adaptive capacity of an organization as it confronts disruptions, change, and pressures.

Previously, organizations focused on improving their efficiency, productivity, and effectiveness – being “faster, better, cheaper,” to use the slogan of NASA senior management. The data on organizational accidents revealed how this strategy was incomplete. As NASA had discovered, a fourth parameter was needed that focused on anticipating changes in risk without waiting for accident or near-miss data to accumulate. At NASA’s Design for Safety meeting in 2000, I proposed that a system’s resilience in the face of disruptions could serve as that fourth parameter of high-performance organizations and that proactive safety management should help organizations achieve a dynamic balance across all four of these parameters.

Many tools already exist to model, measure, and improve the parameters of efficiency, productivity, and effectiveness. I went to my colleagues in safety engineering, organizational factors, and cognitive systems engineering and suggested that the time had come when we could develop tools for organizations to model, measure, and improve their resilience. With measures of resilience included, organizations would know how and when to rebalance safety against the continuing pressure to be faster, cheaper, and better. It turned out to be easy for people to recognize that most of

Resilience Engineering...

(continued from page 1)

the work on safety was pointing toward such a concept. The key event was the International Symposium on Resilience Engineering held in Sweden in late 2004. The result was consensus that this was a highly promising direction, and a book was published (Hollnagel et. al., 2006) that captured some of the initial ideas about the importance of resilience.

What related fields of study does resilience engineering build upon, and what new concepts or principles does it introduce?

Resilience engineering builds on advances in modeling and measuring complex adaptive systems, the insights gathered from observations of high-reliability organizations, and the results from studies of how people adapt to make systems work despite complexity in cognitive systems engineering.

The first basic concept is the adaptive capacity of an organization as it confronts disruptions, change, and pressures. Measures of adaptive capacity can be used to assess how the system is resilient in some ways and to some challenges but brittle in the face of others.

Second, focusing on resilience changes how one analyzes incident data and how one interprets indicators of organizational culture. The issue is what are the diagnostic signals that are revealed when the organization is edging closer to safety limits as it copes with faster, better, cheaper pressure *without the organization realizing it is operating more precariously*.

One of the key diagnostic signals is how people or groups in the organization make sacrifice judgments. Sacrifice judgments occur in particular situations when someone faces a trade-off in trying to decide if acute production- or efficiency-related goals should be temporarily relaxed (the sacrifice) in order to reduce risks of approaching too near safety boundaries.

Examples of sacrifice judgments include the decision about when to convert from laparoscopic surgery to an open surgical procedure and in the decision about when to break off an approach to an airport during weather that increases the risks of wind shear. If people and managers in these situations are very reluctant to sacrifice production (e.g., arrival delays) to invest extra resources in reducing possible future risks, then the organization is acting in

a much riskier manner than it wants and knows. If peers and managers react negatively when someone makes a sacrifice decision, then the organization is more brittle than management realizes.

Another key diagnostic signal about an organization's resilience can be seen in how cross-checks work. How well can people in one role – especially if that role has less status or authority in the organization – cross-check people in other roles to detect early signs of a possible misassessment or erroneous plan? If cross-checks are weak or ineffective (e.g., because they are seen as unnecessary distractions), the organization is brittle.

What do you see as the relationship between resilience and brittleness, and why is it significant?

The opposite of resilience is *brittleness*, referring to systems that break down rapidly when boundary conditions or underlying assumptions are challenged by new events. In other words, examining a system's resilience means one studies how the system in question performs when it is pushed near the boundaries of how it has been designed to operate. "Surprising" events are those that challenge the boundary conditions or a combination of events that push systems close to operational boundaries. Analyses of dramatic failures of complex systems, such as the *Columbia* space shuttle accident, have shown how organizations missed signals that operations had become more brittle as production pressure eroded various buffers and resources that had provided resilience.

Resilience is a parameter of a system that captures how well that system can adapt to handle events that challenge the boundary conditions for its operation. Such challenge events do occur (a) because plans and procedures have fundamental limits, (b) because the environment changes, and (c) because the system itself adapts given changing pressures and expectations for performance. The capacity to respond to challenge events resides partly in the expertise, strategies, and tools that people use to prepare for and respond to specific classes of challenge.

But management also monitors for signs that indicate whether the organization has the adaptive capacity to handle challenge events and how to target investments to increase adaptive capacity despite omnipresent pressures for productivity. Can the organization recharge resilience when buffers are depleted, margins are precarious, processes become stiff, and squeezes become tighter?

Which types of systems and organizations can benefit from the application of resilience engineering principles?

We are seeing the concept of resilience being picked up by organizations in the transportation and oil industries, in health care, and in business. For example, the Institute of Medicine just released a report that concluded that hospital emergency departments are the brittle point in the national health care system (Committee on the Future of Emergency Care, 2006).

What advice do you have for researchers interested in pursuing studies in resilience engineering?

The field is at that early stage of excitement when one can feel the possibility that new insights are just around the corner. I have been pleased with how many younger researchers have resonated with the idea of resilience and how it has inspired them to look at organizations and processes with a new kind of conceptual lens.



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When they do this, interesting findings result and promising new directions emerge. I am looking forward to very fast developments in this field, and I expect to be surprised by the results that emerge.

What advice do you have for organizations that are interested in implementing resilience engineering in their system design efforts?

Middle managers feel squeezed in today's organizations under faster, better, cheaper pressure. Resilience engineering can help identify when those pressures are squeezing out the buffers and other sources of resilience that are needed for ultra-high-quality performance in a changing and surprising environment. Resilience engineering can help make safety organizations more effective partners with line managers as they pursue ultra-high levels of safety.

But resilience engineering is young, so we are looking for organizations that recognize they are becoming more brittle to join with us as early adopters and codevelopers of the pragmatic tools for engineering resilience into organizational performance.

Where should people go to find out more about resilience engineering?

The following references are helpful.

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David D. Woods is a professor at the Institute for Ergonomics at Ohio State University. A pioneer in cognitive systems engineering in emergencies and resilience engineering for safety management, he is an HFES past president and Fellow. He may be reached at woods.2@osu.edu. ☒

ANNUAL MEETING

High School Students Attend 50th Annual Meeting

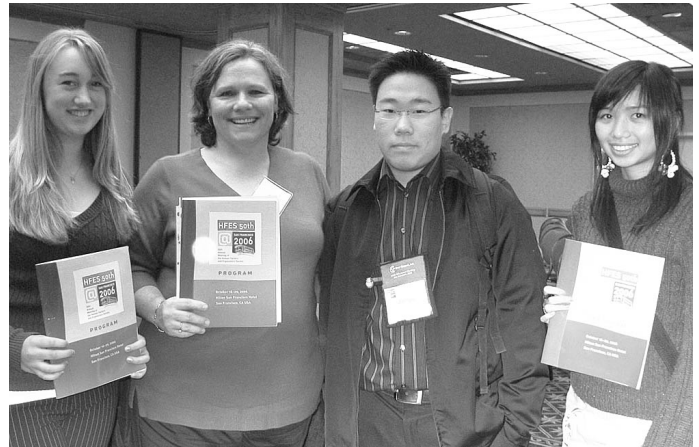
By Dana Nelson, Washington High School

On October 17, 2006, three of my students and I attended the 50th Annual Meeting at the Hilton San Francisco. This experience proved to be useful and informative for both me and my students.

"I enjoyed most of the seminars," said senior James Kim. "Some of the sessions were challenging but worthwhile."

Kim was also happy to see his youth science competition topic, "Postural Influences on Low Back Mechanics," on the day's agenda. "The presentation gave me some ideas to explore," said Kim.

Senior Michaela Devine and junior Ou Jin also enjoyed their time attending various sessions throughout the day. Devine agreed with Kim about the challenging sessions. "Some of the speakers, especially during the beginning, were hard to follow," she said. "But after the first few presentations, they were easier to understand."



Washington High School students and their teacher in attendance at the 50th Annual Meeting. Left to right: senior Michaela Devine, teacher Dana Nelson, senior James Kim, and junior Ou Jin.

We also attended Ron Shapiro's session, "Games to Explain Human Factors." Jin said, "We were able to directly apply the concepts we were learning in psychology class. Schema and scripts, for example. It was especially fun observing our teacher, Mrs. Nelson, participating in the activities."

My favorite seminar was "Human Factors and Ergonomics in the Courts," where guest speakers discussed the standards of determining an expert witness in human factors. A session on improving team-level communication in the hospital echoed my own interest in communication issues with my academic department as we communicate with students, parents, and the administration.

In the posters, we were able to see how psychology factors into the daily work force. For instance, the personality study applied to successful aviators was eye opening. Other interesting poster presentations included mapping of eye and brain waves, and even how effective different shapes are in warning drivers of upcoming hazards. We were able to see how human factors can touch the simplest parts of our lives.

The whole day not only enhanced the students' understanding of applied psychology but also provided opportunities for them to talk with college representatives. Meeting college students who shared similar interests was invaluable. We all enjoyed our time at the HFES 50th Annual Meeting, and we hope that more high school students will have the opportunity to explore human factors and ergonomics.

Seventeen-year veteran teacher Dana Nelson currently teaches AP and regular psychology for Washington High School in Fremont, California. She may be reached at dnelson@mail.fremont.k12.ca.us.

2006 HFES Fellows and Awardees

On October 17, the following award recipients and newly elected Fellows and Honorary Fellows were recognized during the Opening Plenary Session at the HFES 50th Annual Meeting.

The newly elected Fellows are **Mark M. Brauer**, Director of Safety at Amencie Consultants in Texas; **Pascale Carayon**, industrial engineering professor at the University of Wisconsin-Madison; and **Kathleen Mosier**, Psychology Department chair at San Francisco State University.

The 2006 Honorary Fellows are **Kathleen M. Robinette**, principal research anthropologist at the Air Force Research Laboratory in Ohio; **David Shinar**, human factors professor at Ben-Gurion University of the Negev in Israel; and **Mao-Jiun J. Wang**, industrial engineering professor and chair at the National Tsing Hua University in China.

The Arnold M. Small President's Distinguished Service Award was presented to **Hal W. Hendrick**, emeritus professor of human factors at the University of Southern California and principal of Hendrick & Associates. His conceptualization and initiation of the subdiscipline of macroergonomics have influenced many in the profession and the Society.

The recipients of the Jerome H. Ely *Human Factors* Article Award were **Mark St. John**, **Harvey S. Smallman**, and **Daniel I. Manes** of Pacific Science & Engineering Group, and **Bela A. Feher** and **Jeffrey G. Morrison** of Space and Naval Warfare System Center. Their article, "Heuristic Automation for Decluttering Tactical Displays," published in the Fall 2005 issue of *Human Factors*, focused on information overload in interface design.

The Best *Ergonomics in Design* Article Award was given to **Steven Estes**, **Oscar Almos**, **Cheryl Andrews**, **Anthony D. Andre**, **Susan T. Chrysler**, and **Daniel J. Hannon** for "Better Taxiway Surface Markings, Safer Airports." The article, published in the Spring 2005 issue, addressed preventable measures for runway incursions and ground aviation safety. The authors' work contributed to a new safety standard that will be required at major national airports beginning in 2008.

Laura K. Thompson was the recipient of the Alphonse Chapanis Student Paper Award for her paper titled "Using Glance Behavior to Evaluate ACC Driver Controls in a Driving Simulator." Thompson is a Ph.D. candidate in industrial engineering at the University of Toronto.

Klaus J. Zink of the University of Kaiserslautern in Germany received the Distinguished International Colleague Award. Zink, a strong presence in the International Ergonomics Association, has headed the Research Institute for Technology and Work at the university for more than a decade. His leadership, research, and guidance in the methodology of macroergonomics have been influential and successful for more than 25 years.

Peter M. Budnick, founder and president of Ergoweb, was recognized with the Jack A. Kraft Innovator Award. His Web site enables human factors/ergonomics professionals, engineers, designers, and students to regularly communicate and discuss ideas in an efficient, easily accessible public forum.

Raja Parasuraman, professor of psychology at George Mason



Mark M. Brauer



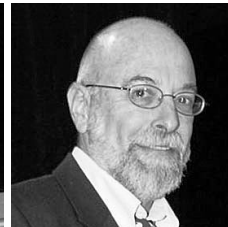
Pascale Carayon



Kathleen Mosier



Kathleen M. Robinette



David Shinar



Mao-Jiun J. Wang



Hal W. Hendrick



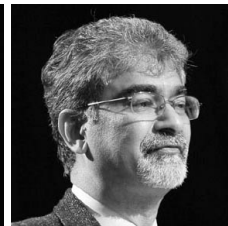
Laura K. Thompson



Klaus J. Zink



Peter M. Budnick



Raja Parasuraman



Michael Sivak

University, was given the Paul M. Fitts Education Award. He was recognized for his contributions to the education of human factors/ergonomics specialists, high-quality research and teaching, and student mentorship and motivation.

The A. R. Lauer Safety Award was presented to **Michael Sivak**, research scientist at the University of Michigan Transportation Research Institute. Perhaps best known for his inception of the rear-window brake light in vehicles, Sivak has made numerous contributions to driver safety and has raised many issues specifically associated with driver vision.

The Oliver Keith Hansen Outreach Award was given to **Nancy J. Cooke**, psychology professor at Arizona State University. She was honored for her successful efforts to educate and spread awareness of the benefits of human factors/ergonomics to those not in the HF/E community, especially at the congressional level. She is the first female editor of *Human Factors* and is coauthoring a book directed to the general public on the value of human factors.



Nancy J. Cooke

NEM 2006 Awards and Special Recognition

By *Haydee M. Cuevas, NEM Committee Chair*

On the evening of October 16, during the HFES 50th Annual Meeting, HFES President-Elect Waldemar Karwowski kicked off National Ergonomics Month 2006, inspiring a packed room with his vision for the future of our profession and highlighting the importance of the Society's mission to "help our members advance the science, philosophy, and practice of human-centered design." In his presentation, "Ergonomics Education and Requisite Literacy," Karwowski described the requisite ergonomics knowledge needs and requirements of all citizens.

Awards were also presented to the winners of two contests designed to increase student involvement in promoting HF/E in their communities. The NEM 2006 Best Action Plan Contest First Place Award, which included a plaque and \$100, went to the HFES Virginia Tech Student Chapter. Special recognition was given to the HFES student chapters at George Mason University, State University of New York at Buffalo, and University of Central Florida for their excellent action plans.

The NEM 2005 Best Action Plan Implementation Contest recognizes student chapters that successfully implemented the activities they proposed for last year's NEM. This year, two HFES student chapters were tied for first place: the University of Central Florida and State University of New York at Buffalo.

Throughout the NEM 2006 session, volunteers from the audience participated in several fun and educational activities, including HF/E versions of Trivial Pursuit and Pictionary. Special thanks to George Mason University students Matthew Pitone, Carl Smith, and David Cades for organizing these games. All attendees received a special HFES 50th Anniversary commemorative frisbee and were encouraged to take customized NEM stickers and bookmarks to distribute during their activities in October.

50th Anniversary Product Design Awardees

By *Stan Caplan and Dianne McMullin, Award Committee Chairs*

At the HFES 50th Annual Meeting in San Francisco, the HFES Product Design Technical Group recognized the winners of its fifth annual product design competition for innovative and user-centered approaches to human factors and industrial design. This year, the User-Centered Design Award was renamed the 50th Anniversary Product Design Award in honor of the Society's upcoming anniversary in September 2007.

Two awards were presented:

- Hospira, Inc., for the Symbiq™ Infusion System, a device that delivers intravenous fluids and medications to patients.
- Metaphase Design Group for the Medtronic Straightshot M4™

Microdebrider, a surgical handpiece used by ear, nose, and throat surgeons to remove tissue such as polyps.

A panel of seven judges selected two winning products from the 13 submissions. Ed Israelski and Ella Cozmi (Hospira) and Bryce Rutter (Metaphase) accepted the awards for their companies. Israelski and Rutter each presented a paper about the development of the winning products at a well-attended PDTG session.

Thanks go to Product Design Award judges Dave Aurelio, Steven Belz, Rich Buttiglieri, Harv Ebel, Ila Elson, Betty Sanders, and Rob Tannen.

And the Winners Are...

By *Anthony D. Andre, Student Affairs Committee Chair*

The Student Affairs Committee is pleased to announce the 2006 Student Members with Honors and Outstanding Student Chapter Awards, which were presented at the HFES 50th Annual Meeting in San Francisco.

Student Member with Honors recognizes students who have made an outstanding contribution to the discipline and/or HFES during their tenure as a student. Eight distinguished students received this designation in 2006: **Calvin Or**, University of Wisconsin-Madison; **Richard Holden**, University of Wisconsin-Madison; **Susan Kotowski**, University of Cincinnati; **James Beno**, San Jose State University; **Ernesto Bustamante**, Old Dominion University; **Samuel Alper**, University of Wisconsin-Madison; **Carl Smith**, George Mason University; and **Marita O'Brien**, Georgia Tech.

The Outstanding Student Chapter Awards honors student chapters that have made an outstanding contribution to the discipline, HFES, their campus, and/or their communities in a particular year. Three exemplary student chapters received the award in 2006: George Mason University, California State University at Long Beach, and Virginia Polytechnic Institute and State University. ☒

CHAPTERS

Puget Sound Chapter Wins Distinguished Service Award

The Puget Sound Local Chapter has been honored with the first annual HFES Local Chapter Distinguished Service Award. The chapter is recognized for its many outreach activities last year. Among the activities are the October 2005 Occupational Ergonomics Symposium, which drew more than 100 attendees from a variety of industries; and participation in a School-to-Work session at the Washington State Governor's Industrial Safety and Health Conference in Tacoma, Washington, during which members taught ergonomics principles to more than 80 high school students through hands-on activities. ☒

Call for Papers: Ergonomics in the Developing World

By *Joseph Giacomini*

I am seeking short articles (1,500 words or less) for a new and exciting *Ergonomics in Design* department that was introduced in the Summer 2006 issue. The new column, "Global Ergonomics," is dedicated to articles that describe design adaptations or inventions that are intended for use in the developing world, where ergonomics challenges can be dramatically multiplied because of a variety of factors, whether environmental, social, or technological.

The intention of this new showcase is to offer readers a glimpse of ergonomics practice in the wider world, with insights regarding the limits and extensions of traditional ergonomics practice in nontraditional settings. I welcome contributions from colleagues in industrial, academic, or governmental organizations who are working on interesting projects intended for use in the developing world and that contain significant theoretical or applied content. Please submit manuscripts electronically to the HFES Communications Department (shoshana@hfes.org). Questions may be directed to me at joseph.giacomini@brunel.ac.uk.

Joseph Giacomini is head of Design, School of Engineering and Design, Brunel University, Uxbridge, West London, UK.

mentioned in our final reports and publications. If you prefer, you can remove identifying information from the reports.

It is expected that this review will be of particular concern to parties interested in reducing MSDs in workplaces.

Please send your reports or any questions to Heather Widdrington (hwiddrington@iwh.on.ca) or Quenby Mahood (qmahood@iwh.on.ca). Thank you for your assistance.

Judy Village, C.P.E., has 24 years of experience in applied ergonomics research and practice in both the United States and Canada. She is an ergonomics professor at the University of British Columbia and author of the Canadian Standards Association's "Office Ergonomics" standard. Dwayne Van Eerd is a researcher at the Institute for Work and Health. He designs and implements rehabilitation and ergonomic programs for office workers and computer users.

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NEWS

Help Needed for Systematic Review of Participatory Ergonomics Interventions

By *Judy Village and Dwayne Van Eerd*

At the Institute for Work and Health in Toronto, Canada, we are conducting a systematic review of the process and implementation of participatory ergonomics interventions in workplaces. We want to synthesize the evidence in a transparent and meaningful way and provide recommendations about successful participatory ergonomics intervention processes as found in the literature.

A team of researchers and practitioners are reviewing journal publications. We suspect, however, that many ergonomists have conducted participatory ergonomics interventions that are not published in scientific journals. For this reason, we are extending our search to the "gray" literature, which consists of conference proceedings, case studies, and scientific reports. This is where we need your help.

If you have conducted participatory ergonomics interventions that have been documented in reports, case studies, or conference proceedings, we ask that you send them to the Institute for Work and Health so they can be part of the review. We abide by strict confidentiality guidelines, and no companies or names will be

The HFES 2007 Weekly Calendar

nicely complements the Society's upcoming 50th Anniversary by highlighting each HFES president pictured on a music album that was popular the year of his or her presidency. Each page includes a short biography noting major accomplishments and interests of each president. The calendars were designed, created and produced solely by HFES University of Central Florida Student Chapter students as a way to help document the history of the Society, use their skills and abilities, and help raise funds for student research grants.

2006, 110 pages, 5.5 x 8.5", spiral bound, \$25 members, \$30 nonmembers



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NC STATE UNIVERSITY

Head of the Edward P. Fitts Department of Industrial & Systems Engineering and The Edgar S. Woolard Professor

Nominations and applications are invited for the Head of the Edward P. Fitts Department of Industrial and Systems Engineering (ISE) at North Carolina State University (NCSU) in Raleigh, NC. This person will also hold The Edgar S. Woolard Professorship, which has an endowment of \$1 million. We are seeking an outstanding individual who will provide energetic and visionary leadership to a department with very high expectations and goals. The candidate is expected to have a strong commitment to academic and research excellence commensurate with the expectations of a major research university, as well as appropriate credentials of the highest quality. These credentials include a doctorate in industrial and/or systems engineering or a related field, and a demonstrated ability to work effectively with faculty, students, staff, administration, industry, departmental partners, and funding agencies. The candidates should also have a strong record of commitment to human and intellectual diversity.

The department is one of only five named Industrial and Systems Engineering departments in the U.S. Its goal is to be one of the top five ISE departments in the nation. The department is composed of 23 full-time faculty and 24 full-time staff. It has three named professorships with an additional five endowed chairs and at least three endowed junior faculty fellow positions created this year as a result of the naming of the department. The new endowed chairs are associated with the department's new strategic initiatives in Health Systems Engineering, Biomedical Manufacturing Systems Engineering, and Logistics Systems Engineering. The department also houses two state-funded centers, the Ergonomics Center of North Carolina and the Furniture Manufacturing and Management Center. The strategic initiatives and centers are extensions of the department's four core concentration areas: ergonomics, production systems, manufacturing, and systems analysis and optimization. These areas are supported by existing world-class laboratory facilities, including a manufacturing processes lab, an assembly lab, a metrology lab, a rapid prototyping lab, and physical and cognitive ergonomics labs.

NCSU's College of Engineering has recently received significant increases in private and public funding, faculty positions, and facilities that will also assist the Fitts ISE Department in attaining its goal. In addition to a departmental endowment exceeding \$12 million, the department is currently in the process of moving to renovated facilities on the main campus. The longer term plan is to move to a new building on the NC State Centennial campus (centennial.ncsu.edu), locating it at the hub of a dynamic and integrated network of university and industry research organizations, many of which are associated with companies in the nearby Research Triangle Park.

The Research Triangle Park (www.rtp.org) is located within the Research Triangle metropolitan area with Raleigh as a vertex. Raleigh is consistently rated as one of the best places in the country for business and quality of life. The area provides for excellent research and development opportunities. It has one of the most diverse industrial bases in the world, including two renowned medical schools and many large hospitals, pharmaceutical and medical device companies, aircraft engine production, heavy equipment production, PC and notebook computer production, semi-conductor production, networking hardware and software, computer game development, and many others. Raleigh is the capital of North Carolina and is two hours from the coast and four hours from the mountains. The city boasts two opera companies, two ballet companies, two symphony orchestras, many theatrical companies, and it is a major venue for performing arts. Its school system is first rate, with many of its high schools ranked among the nation's best.

Candidates can obtain further information about the department at its website (www.ise.ncsu.edu). Specific information about the advertised position can be obtained via e-mail (ISEHeadSearch@ncsu.edu). Nominations and applications should be made electronically via email to ISEHeadSearch@ncsu.edu or sent by mail to:

Chair of the ISE Head Search Committee
Campus Box 7904
North Carolina State University
Raleigh, NC 27695-7904

Review of the applications will begin February 15, 2007; however, the position will remain open until filled.

North Carolina State University is an equal opportunity and affirmative action employer. In addition, NC State University welcomes all persons without regard to sexual orientation. Individuals with disabilities desiring accommodation in the application process should contact Ms. April Jackson at (919) 515-9952.

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NEW IN 2007:

Journal of Cognitive Engineering and Decision Making

The Human Factors and Ergonomics Society is excited to launch a new publication in Spring 2007, *Journal of Cognitive Engineering and Decision Making*. *JCEDM* focuses on research that seeks to understand how people engage in cognitive work in real-world settings and the development of systems that support that work.

JCEDM differs from most journals by supporting research that grapples with the messy, hard-to-define, and difficult-to-study realities that confront humans as they attempt to interact effectively with complex environments. Emphasis is on descriptive models of decision making and macrocognition that consider people working alone or in conjunction with other individuals or intelligent systems, and the factors effecting decision making and cognition in realistic settings.

JCEDM embraces many aspects of human problem solving that have been largely neglected by experimental psychology, including situation awareness, problem definition, planning, attention and uncertainty management, mental projection and simulation, diagnosis, solution validation, adaptation, coordination and shared situation awareness in teams, and metacognition. *JCEDM* invites submissions for its three topical tracks: Cognition in Context, Studies in Simulations and Synthetic Environments, and Design of Complex and Joint Cognitive Systems. Details about the three topical tracks in *JCEDM* may be found on the Web:

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FLASH!

Congratulations to the following winners who completed their 50th Annual Meeting Surveys:

- Richard L. Horst won a free 2007 dues renewal.
- Gloria Calhoun and Sahika Korkmaz each won one free copy of *Handbook of Human Factors and Ergonomics, Third Edition*.

Happy Holidays and New Year from HFES!

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