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OSHA Releases Final Ergo Standard


On November 14, the U.S. Occupational Safety and Health Administration released its final Ergonomics Program Standard to the public. A comprehensive Web site (<http://www.osha.gov>) contains the standard and a number of supporting documents, such as frequently asked questions, a flowchart of procedures, tools for determining injury risk, tips for arranging work spaces to prevent injury, and highlights of changes since the proposed standard was released last year. Although OSHA anticipates that employers will spend \$4.5 billion annually to comply with the standard, benefits are estimated at \$9.1 billion each year.

According to the chronology in the Federal Register Notice, OSHA actively solicited input on an early-stage draft beginning in 1997. Between November 1999, when the proposed rule was distributed, and August 2000, the agency received “nearly 11,000 comments and briefs consisting of nearly 50,000 pages” (Federal Register #65: 68261-68870, p. 68264), in addition to hearing more than 700 testimonies from witnesses. The Federal Register Notice contains summaries of numerous comments from individuals and institutions and presents OSHA’s response and rationale for incorporating (or not incorporating) changes in the final version.

Notable among the changes from the 1999 draft are the following. First, more employers may be eligible adopt the “Quick Fix Option,” which applies if, within an 18-month period, there is not more than one MSD incident in a job and no more than 2 MSDs in the establishment. Second, a simple screening tool can be used to determine if the MSD symptom or sign is related to the employee’s job; the 1999 draft required complex criteria for making that determination. Third, a two-page checklist is now included for use in identifying risk factors that can lead to an MSD hazard (e.g., force, repetition, vibration, awkward postures).

Fourth, the standard now contains specific tools for analyzing job hazards; these include the Job Strain Index, Revised NIOSH Lifting Equation, Snook push/pull hazard tables, Rapid Upper Limb Assessment (RULA), Rapid Entire Body Assessment (REBA), ACGHI Hand/Arm (Segmental) Vibration TLV, GM-UAW Risk Factor Checklist, Washington State Appendix B (“Criteria for Analyzing and Preventing WMSD Hazards for Employers Who Choose the Specific Performance Approach,” Washington State Department of Labor and Industries), and OSHA’s VDT Workstation Checklist.

Finally, and in response to extensive input from stakeholders, OSHA revised the grandfather clause for implementing ergonomics intervention programs, which applies for employers with existing ergonomics programs. “OSHA has concluded that it is reasonable for the Agency to include in the final rule a grandfather clause that is less prescriptive than the one proposed and is more closely focused on the effectiveness of existing programs.... These changes will enable more employers’ programs to qualify for the grandfather clause but will also ensure that only effective existing programs are recognized. The changes also shift the focus from compliance with the rule to effectiveness in preventing MSDs” (page 68289).

OSHA’s Ergonomics Program Standard takes effect on January 16, 2001. The regulatory text is available at <http://www.osha-slc.gov/ergonomics-standard/regulatory/regtext.html>. 

INSIDE HFES

HFES on the Florida Ballot Issue

by *William C. Howell*,
HFES President

The national flap over the ballot format used by Palm Beach County, Florida, in the recent presidential election clearly involves a number of human factors/ergonomics (HF/E) issues and, thus, an opportunity to showcase the discipline. So inspired, many HFES members have suggested or demanded that the Society seize the moment – and a spot in the limelight – by jumping head-first into the fray. Others, while equally cognizant of HF/E’s relevance, have viewed it as an opportunity to make a genuine social contribution rather than just headlines, and have advocated more deliberate strategies – doing research and offering design guidance aimed at future elections, for example. Caution is

continued on page 3

45th Annual Meeting Submission Process: An Update

by *Mark W. Scerbo, Chair,*
Technical Program Committee

Many of us in the human factors profession pride ourselves on addressing the needs of users who interact with cutting-edge technology. The members of the Technical Program Committee and the Human Factors and Ergonomics Society staff feel the same about participants at the annual meeting. We look for ways to take advantage of new technology to facilitate participation at the annual meeting.

Two years ago, we adopted a new method for proposal submissions. We gave our users the opportunity to submit their proposals electronically with a system developed by Bob Beaton. The team that produces the annual meeting quickly learned that we had a much wider variety of users than could be accommodated by the design and intent of the original system. Authors, program chairs, reviewers, session chairs, and the staff each had their own unique requirements for the system. The initial attempt at electronic submission in 1999 resulted in many improvements for the combined IEA/HFES meeting last year, and yet the needs of many users could not be fully accommodated. It became clear that no simple solution would suffice in addressing the complexities of producing our annual meeting.

Accordingly, HFES studied the possibility of adopting a commercial product specifically designed to facilitate the production of technical programs and proceedings for professional meetings. Several products were identified, and members of the HFES staff and TPC recently evaluated two of them. Unfortunately, neither product was deemed suitable for producing the 2001 meeting.

We are committed to solving this problem. We believe that in the near future, the submission, review, and production processes of the annual meeting technical program will be computerized. Hence, we will continue to search for a product that will not only accommodate the complexities and subtleties that make the HFES annual meeting special, but will also allow us the freedom to grow and accommodate the ever-changing needs of our users. Until that time, however, electronic submission of proposals will be limited in scope. Please bear with us. We're heading in the right direction. We're just not there yet. Comments and suggestions can be sent to me at mscrbo@odu.edu or Lois Smith at lois@hfes.org.

Call for Proposals: Better Ballot Design

by *Mark W. Scerbo, Chair,*
Technical Program Committee

The outcome of the 2000 presidential election will be remembered as the closest contest in U.S. history. The closeness of the race brought the entire voting process under national scrutiny, with politicians, lawyers, and the media trying to understand the factors that contribute to an accurate and fair election.

Adding to the drama were concerns over the design of the ballot used in Palm Beach County, Florida. Some voters complained that the ballot was confusing and caused them to vote for the wrong candidate. Others claimed that the ballot was unambiguous.

Although human factors issues behind the voting process are just now receiving national attention, they are not new. In 1980, HFES member Keith Hansen chaired a session at an HFES annual meeting that addressed a wide range of psychological and ergonomics issues surrounding the voting process. [See Keith's recent perspective on pages 4–5.] In his April 2000 *HFES Bulletin* article, Past HFES President Peter Hancock raised the need for human factors involvement in voting issues.

Given the recent prominence of this issue, the Technical Program Committee will hold a special session at the 2001 Annual Meeting aimed at improving the voting process. Proposals are sought which address the current problems with ballots, voting apparatus designs, and/or the voting process and also demonstrate human factors solutions to these problems. Proposals are invited from academic and industrial organizations, and we strongly encourage students to submit proposals. The most promising solutions will be presented at the annual meeting. Specific details regarding this special session will be appear in the Call for Proposals (to be mailed in early January 2001).

Never before in the history of our profession has the role of human factors been thrust so prominently into both the national and international spotlight. I believe we have an unprecedented opportunity to showcase the virtues of our profession and the expertise and talent needed to help restore confidence in the voting process. I hope that you will consider participating in this special session. ☉

Bulletin

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warranted, they argue, because of the risk of appearing self-serving, opportunistic, and politically motivated, and also because pontificating on a matter that the average citizen would consider obvious would reinforce HF/E's image as a "pseudoscience." In short, elbowing our way into so intense a spotlight could singe rather than illuminate the HF/E banner.

After considering both perspectives, the HFES Executive Council and current president decided not to rush into print with a corporate position statement on this particular ballot – although some EC members favored doing so – in favor of the more deliberate approach. Of course, individual members have volunteered opinions and responded to media inquiries as everyone, including the EC, agrees is appropriate.

Comments from members on ballot design...

"From a HF point of view, the age distribution by county would be an interesting covariate to see whether a perceptual challenge disproportionately disadvantages older people.... HF only comes into prominence when things are tight. An arbitrarily poor system of balloting will suffice when the results are clear-cut, but the knife-edge of this election meant that even a fairly low error rate becomes important. The system is not error-tolerant when it is this close." – *Colin Drury*

"As individuals or as a professional society, [we can] offer our services to assist in the design and evaluation of ballots for the existing technologies." – *Barry Goettl*

"The problem is amenable to a direct experimental measure of error rate, using the actual design versus a more standard design.... Also one could compare statistically the spoiled-ballot rate between counties in Florida that used different forms." – *Colin Drury, Ann Bisantz, and Victor Paquet*

"This seems like an especially grand opportunity for those with a focus on age-sensitive design, given that many of the voters who had trouble with the ballot were older adults. Age-related changes in perception, attention, decision-making, etc., may be especially relevant." – *Daniel G. Morrow*

"As the election drama unfolds, I am wondering whether any HF consultants from the Society have stepped in to provide any impartial expert comments in relation to:

1. Design deficiencies in the ballot cards
2. The aged and design deficiencies
3. The allocation issues between people and the counting machines to explain the differences and errors. . ."

– *Ravindra Goonetilleke*

"A special challenge: How does one design a ballot that favors no candidate by position on the list?" – *Walter Makous*

Membership Renewal – Calendar Year 2001

The HFES membership renewal deadline is January 15, 2001. If you have not received an invoice for your 2001 dues in the mail, you may download the renewal package (PDF format) at <http://hfes.org>. The renewal form may be faxed or mailed to HFES. You may also contact Membership Services at 310/394-1811, and the staff will be happy to process your renewal over the phone.

Update Your Directory Listing

Please take a moment now to review the information in your membership file, and update it if necessary. Go to the On-Line Member Directory at <http://hfes.org>. Enter your member number (above your name on the mailing label for this *Bulletin*) and name to log in, then click on the link to update your listing.

The deadline for updated entries for the *2001–2002 HFES Directory and Yearbook* is January 30, 2001. Even if you do not submit a correction, you will receive a proof of your directory listing in the mail by the end of January, and corrections for the printed directory will be accepted until mid-February.

Last Call: Nominations for Fellow

by *David L. Post, Past Chair,
Fellows Selection Committee*

The HFES Fellows Selection Committee hereby issues this final call for nominations for Fellow and Honorary Fellow of the Society for 2001. "Honorary Fellow" is a newly created membership class for full members of the Society in good standing who meet all the eligibility criteria for Fellow except that concerning service to HFES.

Another important change this year concerns the HFES service criterion for Fellow candidates, which now requires three years of service instead of one and emphasizes the resulting contributions to HFES. The revised Operating Rule on this subject reads:

A candidate for Fellow must have made sustained, significant contributions to the Society over a period totaling three (3) years or more. Examples of Society involvement that might result in such contributions include, but are not limited to:

- Elected or appointed offices, including Technical Group or local chapter offices
- Committee or task force service

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- Editor, Editorial Board member, or reviewer for Society publications

Merely holding Society positions such as those listed above is not, however, a qualifying activity; rather, it is the *contributions to the Society* that are important and will be evaluated. The nomination package must describe the contributions and their significance to HFES for the candidate to satisfy this criterion.

Fellow and Honorary Fellow candidates must have outstanding achievements in one of four possible specialties: (1) Academic; (2) Research and Development; (3) Applications and Practice; and (4) Management and Supervision. Candidates may be nominated for achievements in only one specialty and must satisfy the criteria for that specialty completely – substandard achievements in multiple specialties cannot be combined in an attempt to create an acceptable whole.

Any full Member of the Society in good standing (except members of the Fellows Selection Committee) may submit nominations for Fellow and Honorary Fellow. The new Fellows Selection Committee chair is Marilyn Sue Bogner (msbogner@erols.com). Nomination kits, consisting of instructions and forms, may be obtained from Membership Services Manager Diane de Mailly (diane@hfes.org). The completed package (nomination and recommendation forms, nominee résumé or vitae, and supporting documents) must be received at the HFES central office by February 1, 2001.

Pioneers in Human Factors Video Series

by *Dennis B. Beringer*,
Series Editor

The Pioneers in Human Factors series is an effort to preserve a historical record of some of the key contributors to the founding and subsequent development of both the field of human factors and the professional organization (HFES). Three interviews have already been taped (Alphonse Chapanis, Earl Wiener, and Neville Moray). The editor of the series is seeking nominations of additional candidates who have made substantial contributions and who would be willing to sit for a videotaped interview. The nominator will, in some cases, also serve as the interviewer.

Members wishing to nominate an individual should prepare a brief paragraph outlining the contributions of the individual to both the field and HFES, and should name a proposed interviewer. Nominators should check with the nominee and interviewer to gain their approval of the proposal before submitting a nomination. Nominees should be willing to travel to the annual meeting for the taping. Special arrangements may be possible when this is not practical or possible. A list of general topics for the interview and specific questions will be required for review by the editor prior to the taping, as well as identification of any graphical items (photos, charts, graphs, video footage, film) that will be used in

support of the oral interview or that can be inserted into the presentation during the postproduction editing.

There is no deadline for submissions, and nominations will be considered in the order in which they are received. At present, two nominees are expected to be interviewed each calendar year. Nominations that cannot be attended to in a given year will be placed in the queue for consideration in subsequent years. Nominations should be sent to the editor, Dennis Beringer, via e-mail (dennis_beringer@mmacmail.jccbi.gov), fax (405/954-4852), or by postal mail to Dennis Beringer (AAM-510), FAA/CAMI, P.O. Box 25082, Oklahoma City, OK 73125. ☒

NEWS

HF/E and Election Ballots: Could We Have Made a Difference?

By *Keith Hansen*

On the morning of November 9, I began receiving phone calls and e-mail about the balloting problems in Florida. Obviously, someone remembered, or had otherwise been informed of, my efforts of the early 1980s to start a national program of human factors in election technology. Most of the contacts were from *HFES Bulletin* readers, but a few were from the press and other people interested in the respective roles of human error and failed technology as causal factors in the fulminating Florida fiasco. At the invitation of the central office staff, I prepared this article, the title of which defines the most frequently asked question from those phone conversations and e-mail notes.

If the human factors/ergonomics (HF/E) profession had been included in the design and planning of the “election system,” would we have made a positive difference? Would the voters have made fewer errors? Would the mechanized ballot tallies have been less suspect? Might the electorate be less incensed and polarized over the botched butterfly balloting? Might there even have been a larger turnout? (Might there be fewer November neonates named Chad?) Well, I declined answering such questions for the press, and I’ll not presume to answer them here. Rather, I will report, to the best of my patchy memory, the more substantive things that came to light through my interaction with election officials and experts during the period 1979 through 1984.

A Brief History

In 1979, I was on the committee preparing for the HFS Annual Meeting at the Los Angeles Hilton. As chair pro tem for the Forum sessions, my job was to explore new and controversial arenas for HF/E applications and to spotlight those venues with a series of open forums featuring interactions among our membership and guest experts in each venue. The forum concept, which came from general meeting chair John Holly, represented a daring departure from the standard meeting fare.

During the search for Forum topics, we found news items about low election turnout, voter confusion, and complaints about complex voting equipment, materials, and procedures. There was a definite connection between voter behavior and election system

design. Clearly, this was a natural area for human factors and an obvious choice for a forum topic. Meetings were held with various officials, four of whom agreed to be panelists: the director of the Federal Election Commission (FEC) Clearing House, the registrars of voters for Los Angeles County and Orange County, and the chief of the Election Division for the California Secretary of State's office. They discussed problems in election systems and challenges posed by technology. Their involvement at such a critical time - the final weeks before a presidential election - reflected both their sense of the importance of the issues at hand and their respect for our profession as a source of solutions. Tom Sheridan of MIT filled out the panel and identified issues related to electronic voting systems.

Problems Identified

During the forum, a broad range of problems were identified for human factors study and possible remediation, including several that have been highlighted in the Florida experience. Among the more noteworthy issues relating directly to HF/E interests were these:

1. Vulnerability of ballot design, tally procedures, and printed instructions to misperception and related errors.
2. Voter confusion and aversion (technophobic responses) caused by new voting machines and complex innovations.
3. Ambiguity and inadvertent bias in ballot formats and instructions to voters.
4. Sundry design features of the polling places and tally centers (lighting, booth geometry, signage, etc.).

In subsequent sessions at the FEC, it was concluded that more subtle issues might also benefit from our professional attention, including relationships between voter turnout and ballot design, problems of "regulation overload," literacy and foreign language considerations, and the selection, training, motivation, and management of volunteer election personnel.

Barriers and Hurdles

After the FEC meetings, it became clear that the history of election technology was replete with failed fixes and misspent equipment budgets. Complex procedures were often cited as sources of human error, among both voters and election system workers. Moreover, in some precincts, officials had become so inured to the problems that scapegoating the technology was a common practice. It was concluded that human factors fixes, even if they could be made foolproof, would not be uniformly welcomed.

A sobering realization was emerging. Evidently the primary human factors at work in this arena are those of political passion, voter suspicion, and party partisanship. Consequently, attempts to apply "proven human engineering solutions" to these problems would likely founder unless the involved parties (election professionals and HF/E specialists) took great care to coordinate and cross-educate one another on pertinent social, managerial, and applied science matters. Even then, the prospects for significant improvement could be problematic. There would be the usual lack of funding, resistance from current equipment and materials suppliers, impedance from local authorities who are satisfied with the status quo, and potential legal challenges to the scientific soundness of any prescribed solution.

In 1982, responding to a joint request from the FEC and California Secretary of State's office, we formed a small team of HFS volunteers and prepared to conduct a field study of election-day activities, materials, equipment, and procedures. The project was canceled at the last moment because of schedule conflicts and illnesses.

Would It Have Mattered?

What if the study had continued and we reported results to federal and state election officials? How would the issues cited earlier have been affected? Doubtless we would have proposed the application of established human factors guidelines such as were popular at the time. *The Human Engineering Guide to Equipment Design* (Van Cott & Kinkade, 1972) would have been a likely choice. Standards for legibility, readability, and interpretability would have been recommended as well. These applications might have been accepted, at least in part and at least in some districts. If they had, the problems with the "butterfly ballot" format might have been averted. However, my preferences were for larger, more inclusive measures starting with an end-to-end systems study focused on accurate and expedient transfer of information to, from, and among voters and among election system workers. This was less likely to be accepted and much less likely to succeed for some of the reasons mentioned earlier.


Keith Hansen is an HFES Life Fellow and was chair of the Public Relations Committee from 1989 to 1995.

Human Factors in Medicine Course

A new graduate-level course on medical human factors was recently offered through the George Mason University Psychology Department's Human Factors and Applied Cognitive program. The seminar, which is one of the first to be offered on this topic, addresses issues pertaining to the impact of sophisticated technology and automation on the provision of health care from a systems perspective and was taught by HFES member Marilyn Sue Bogner.

This is the latest in a yearly series of "distinguished practitioner" courses offered by GMU. Recent topics have included usability evaluation methods for human-computer interaction (Fred Conrad, Bureau of Labor Statistics) and applications of cognitive science (Gregory Trafton, Naval Research Laboratory). For more information about the series, contact Wayne Gray, gray@gmu.edu.

AAAS Fellowships

The American Association for the Advancement of Science is accepting applications for its fellowship program involving domestic and international science policy issues in the Congress and several Executive Branch agencies, which begin September 1, 2001. Applicants must possess a Ph.D. or equivalent doctoral-level degree in any physical, biological, or social science; any field of engineering; or any relevant interdisciplinary field. Application deadline is *January 10, 2001*. For more information, contact AAAS Science and Technology Policy Fellowship Program, 1200 New York Ave., NW, Washington, DC 20005; 202/326-6700, fax 202/289-4950; science_policy@aaas.org, <http://www.fellowships.aaas.org>. 

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Opinions expressed in BULLETIN articles are those of the authors and should not be considered as expressions of official policy by the Human Factors and Ergonomics Society.

FLASH!

HAPPY HOLIDAYS!

2001 Dates to Note:

January 12

**2001 Annual Meeting Call
for Proposals Mailed**

February 1

Fellow Nominations Due

March 19

**45th Annual Meeting
Proposals Due**



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