



## AAR-100

### Human Factors Newsletter # 04-04

February 7, 2004 – February 20, 2004

**Technical Information:** Ahlstrom, V. & Panjwani, G. *Auditory Alarms in the Airway Facilities Environment*. William J. Hughes Technical Center.

#### Abstract

As the group responsible for the monitor, control, and maintenance of the National Airspace System (NAS), Airway Facilities (AF) specialists rely on auditory alarms to provide useful information on systems and equipment that are in need of their attention. New tools, systems, and equipment are continuously being added to the NAS. With these new systems and equipment often come new auditory alarms. Unfortunately, these alarms are often designed without consideration of existing systems and equipment or the maintenance environment. This can result in a number of negative consequences, such as masking, alarms causing annoyance, and alarms causing distraction from the primary task.

The first step toward improving the alarm situation for AF is to provide future designers with the larger auditory perspective that they previously lacked. This overview contains information on the acoustical environment in which the alarms will be present and the other alarms that are already present in that environment. This allows the designer to create alarms that are congruent with the acoustical environment and that do not mask or otherwise interfere with the existing alarms. The second step toward improving the alarm system for AF is to analyze the problems associated with auditory alarms today. This will allow designers to avoid these issues in future systems and to address them in current system upgrades.

To achieve these goals, a research team from the William J. Hughes Technical Center NAS Human Factors Group (ACB-220) visited AF operational field sites. At each field site, a member of the team captured layout and environmental information and had the AF specialists rate auditory alarms on the frequency of occurrence and criticality. A researcher catalogued and recorded auditory alarms present at the site. A member of the research team then asked the specialists at these sites to rank the severity of 15 common auditory alarm issues for relevance to their own operational area. Structured interviews with the specialists followed the rankings to further investigate areas where auditory alarms are problematic. The researchers took recorded

alarms from the field sites back to the Technical Center for analysis. Analysis entailed identifying the prevailing frequency and periodicity of the alarms.

This document describes auditory alarms found in AF field sites. It provides a baseline of the current AF acoustical environment by cataloging auditory alarms, measuring and mapping the environment in which they are present, and obtaining and providing criticality and frequency of occurrence estimates for each of the current auditory alarms. This document also provides the results of the specialists' rankings and their responses to the structured interviews.

The results of this study are two fold. First, it provides information on the existing AF operational environments, such as number and prevalent frequency of alarms, positioning of equipment, and ambient noise level. Up until this point, there was no clear picture of the existing AF acoustical environment for programs to use when making decisions about auditory alarms. In order to get this type of data, programs would have to conduct field studies that would cost time and money generally lacking in AF programs. Thus, the programs would take a piecemeal approach to development. Taking a stovepipe approach to development is not ideal, yet the financial and time cost of having each program conduct a field study is unrealistic. The data contained in this study will provide programs with a more integrated view of the existing AF environment. Among other benefits, this information will help future programs avoid creating alarms that are similar to existing alarms, avoid adding unnecessary alarms in places already inundated with alarms, and avoid placing alarms in locations prone to masking or difficult to localize. The criticality and frequency ratings of alarms provide important human factors and programmatic information. Alarms that indicate critical situations should be designed to subjectively convey the criticality (urgency) of the situation (Edworthy, 1994). Alarms that are not critical could be considered for visual alarm alone without the auditory portion. Frequency data are important in that, if an alarm only sounds rarely, the specialists may not remember what situation the alarm indicates.

The ratings of alarm issues by specialists provide information on current concerns with auditory alarms. The structured interviews further expanded these ratings. These data will allow for effective targeted improvements to AF operational areas and will allow future programs to avoid situations that are currently problematic, thereby refining requirements development. The researchers addressed the issues that the participants identified by the ratings and the structured interviews using human factors design criteria.

Based on these information-gathering techniques, researchers found that alarms are easily confused, alarms can be masked, and there were not auditory alarms for some systems that need them. In some cases, there were auditory alarms where they are not needed. Additionally, specialists said that there were too many alarms overall, there were too many nuisance alarms, too many simultaneous alarms, and alarms were difficult to localize. The structured interviews added detail to the ratings provided by the specialists and added some additional issues. Additional issues were that alarms are difficult to acknowledge, some alarms were difficult to test, and there was a lack of prioritization scheme for alarms. When asked what additional improvements they would suggest, specialists overwhelmingly said that they would like to see integrated monitoring and an easy way to acknowledge auditory alarms.

**Award:** Dr. Bob Helmreich, FAA Air Transportation Human Factors grant researcher at the University of Texas-Austin, will receive the 2004 Flight Safety Foundation Human Factors Award. The presentation will be in Barcelona on March 15<sup>th</sup>. The Flight Safety Foundation – Airbus Human Factors in Aviation Safety Award was established in 1999 to recognize “outstanding achievement in human factors contributions to aviation safety.” The award was instituted to encourage human factors research that would help reduce human error — one of the most common elements in aviation accidents. The award is presented to an individual, group or organization for a one-time contribution or sustained contributions in the field of human factors. Dr. Helmreich is investigating the relationships among flight crew error, operational complexity, and crew performance as it occurs in normal flight operations. He is currently involved in the development and refinement of two proactive data collection programs: the *Line Operations Safety Audit* (LOSA) and the *Aviation Safety Action Program* (ASAP). (E. Edens, AFS-230)

**Operator Distraction:** On February 25<sup>th</sup>, Dr. Dario Salvucci, an Assistant Professor of Computer Science at Drexel University, will present a briefing on Predicting Driver Distraction with Cognitive Models during a brown bag lunch at the William J. Hughes Technical Center. As drivers gain access to increasingly numerous and complex on-board devices for support (e.g., navigation) and "infotainment" (e.g., news and e-mail), many have raised concerns about the issue of driver distraction -- excessive attention to secondary devices rather than the primary driving task. In this presentation, Dr. Salvucci will discuss how we can better understand and alleviate driver distraction through cognitive modeling. He has developed a computational driver model in a cognitive architecture (ACT-R) that incorporates built-in, well-tested parameters and constraints for cognitive and perceptual-motor processes. By integrating the driver model with models of secondary-task behavior, researchers can generate *a priori* behavioral predictions about how secondary tasks affect driver performance. Such predictions can in turn be used to evaluate, compare, and rapidly develop new on-board devices. About the Speaker: Dr. Salvucci received a B.S.E. from Princeton University in 1994 and a Ph.D. from Carnegie Mellon University in 1999, both in computer science. His work spans various areas of human-computer interaction, computer science, and cognitive science, including automated analysis of human eye movements and computational models of driver behavior and distraction. He has also recently received an NSF Career Award, the Fred Burggraf Prize at the Transportation Research Board Annual Meeting, and the Siegel-Wolf Prize at the International Conference on Cognitive Modeling. (E. Stein, WJHTC)

**HFACS:** Representatives from the DoD safety chiefs (Army, Navy/Marine Corps, Air Force) and Coast Guard met with CAMI personnel the week of Feb. 2<sup>nd</sup> regarding implementation of the Human Factors Analysis and Classification System (HFACS) as a common taxonomy for human factors accident investigation in the Department of Defense. It was agreed that HFACS would be implemented by instruction within the DoD. Details will be worked out at a meeting later this month. (S. Shappell, CAMI)

**Remaining Risk JSAT:** Dr. Williams (CAMI) participated in the Remaining Risk Joint Safety Analysis Team meeting in San Diego, CA on Jan. 26-30. Dr. Williams is involved with the subteam looking at mid-air collisions and cargo aircraft accidents/incidents. A 1997 accident involving a Fine Airlines DC-8-61, N27UA, at Miami FL will be reviewed by the group. Potential interventions for preventing such accidents in the future were identified and that information will be passed to the implementation team to be formed later.

## **William J. Hughes Technical Center Activities:**

- Dr. Esa Rantanen is teaching a class on human factors in ATC at the University of Illinois. He indicates he will use the Technical Center's "Controller Memory Guide" and subsequent "Human Factors for Air Traffic Control Specialists" (DOT/FAA/AR-99/39) job aids as part of his course material
- The ACB-220 Human Factors Group provided telephone consulting to Mr. Jim Kean, New York Port Authority, concerning issues related to information displays currently being used by controllers operating a light rail system into and out of JFK Airport. Decision errors leading to misrouting of trains may or may not have been the result of display design and or personnel selection.

Point of contact: E. Stein, WJHTC

**ATC Displays:** Research psychologists from the NAS Human Factors Group (ACB-220) will provide a demonstration of two large screen displays, a 50" plasma and a 40" LCD, for the Traffic Management User Team (TUT). The TUT is considering the effectiveness of using large screen displays such as these in Traffic Management Units in the field. This will be a structured activity at the Research Development and Human Factors Laboratory. The team will evaluate display readability, color discrimination, and icon discrimination under varying lighting conditions and from different viewing positions. (E. Stein, WJHTC)

**News Article:** ACB-220 was notified that the Federal Laboratory Consortium for Technology Transfer published an article on December 11, 2003 about the William J. Hughes Technical Center's human factors laboratory. The article describes the facility and human factors research. It is appended to this newsletter. (E. Stein, WJHTC)

**Winter Issue of *R&D Review*:** The latest issue of *R&D Review* is now being distributed and soon will be posted on-line at <http://research.faa.gov/newsletters.asp>. This issue includes features on: FY 2003 R&D accomplishments; the Joint Planning and Development Office; Airborne Internet; Winter weather research; the Centers of Excellence Program; and a whole lot more. (T. Kraus, AAR-200)

*More information on human factors research can be found at  
the FAA Human Factors (AAR-100) web site: <http://www.hf.faa.gov>*

Mark D. Rodgers  
FAA (AAR-100)



**February, 2004** – Call for proposals (workshops, lecture papers, symposia, panels, debates, special-format sessions, and posters), Human Factors and Ergonomics Society 48<sup>th</sup> Annual Meeting to be held September 20-24, 2004, New Orleans, LA  
<http://www.hfes.org/meetings/2004menu.html>

**March 2-3, 2004** – REDAC Human Factors Subcommittee, Washington, DC  
<http://research.faa.gov/aar/redac.asp>

**March 3-4, 2004** – 5<sup>th</sup> European Technology Summit, Amsterdam Marriott Hotel, The Netherlands <http://www.eyefortransport.com/technology/brochure.shtml>

**March 4-5, 2004** - Divisions 19 and 21, in conjunction with the Potomac Chapter of the Human Factors and Ergonomics Society, will be hosting the Annual Mid-year Symposium March 4<sup>th</sup> and 5<sup>th</sup>, 2004 at the Fort Belvoir Officer's Club, Fort Belvoir, Virginia. [jruffner@dcscorp.com](mailto:jruffner@dcscorp.com)

**March 4-5, 2004** - American Psychological Association Divisions 19 and 21 Midyear Symposium, Fort Belvoir, VA <http://hfetag.dtic.mil/docs/APA-2004-Midyear-Symposium.pdf>

*March 5, 2004* – *Cognitive Science Society Virtual Colloquium Series will be presented live via the Internet. Further information about this talk, the colloquium series, a schedule of future talks, and an archive of previous talks are available at*  
<http://www.cognitivesciencesociety.org/colloquium>

**March 8-11, 2004** – SAE World Congress, Cobo Hall, Detroit, MI  
<http://www.sae.org/congress/index.htm>

**March 11-13, 2004** – International Women in Aviation Conference, Reno Hilton Hotel, Reno, NV <http://www.wai.org>

**March 15-17, 2004** – HAI Heli-Expo 2004, Las Vegas, NV <http://www.heliexpo.com>

**March 15-17, 2004** – 16<sup>th</sup> Annual European Aviation Safety Seminar, Barcelona, Spain  
[http://www.flightsafety.org/eass04\\_cfp.html](http://www.flightsafety.org/eass04_cfp.html)

**March 22-24, 2004** – Eye Tracking Research and Applications Symposium, Menger Hotel, San Antonio, TX <http://www.e-t-r-a.org/>

**March 22-25, 2004** – HPSAA II Conference, Human Performance, Situation Awareness, and Automation Technology, hosted by Embry-Riddle Aeronautical University and the University of Central Florida, Hilton Oceanfront Resort, Daytona Beach, FL  
<http://faculty.erau.edu/vincenzd/hpsaa>

**March 23-26, 2004** – 4<sup>th</sup> International Workshop on Smart Appliances and Wearable Computers, Tokyo, Japan <http://www.unl.im.dendai.ac.jp/TWSAWC/>

March 25-26, 2004 – FAA Aviation Forecast, Wash, DC <mailto:linda.baranovics@faa.gov>

**April, 2004** – SAE General Aviation Technology Conference and Exhibition, Century II Convention Center, Wichita, KS <http://www.sae.org/calendar/aeromtgs.htm>

**April 13-19, 2004** – Sun ‘n Fun, Lakeland Linder Regional Airport, Lakeland, FL  
<http://www.sun-n-fun.org/content/>

**April 18-21, 2004** – FAA Worldwide Airport Technology Transfer Conference, Hilton Atlantic City Hotel, Atlantic City, NJ <http://www.airtech.tc.faa.gov/att04/>

**April 20-22, 2004** – SAE General Aviation Technology Conference and Exhibition, Century 21 Convention Center, Wichita, KS <http://www.sae.org/calendar/aeromtgs.htm>

April 20-22, 2004 – Air Transport Association MRO Conference and Exhibition, Cobb Galleria, Atlanta, GA <http://www.AviationNow.com/conferences>

April 21-23, 2004 – Phoenix Sky harbor International Aviation Symposium 2004, J.W. Marriott Desert Ridge Resort, Phoenix, AZ <http://www.phxskyharbor.com>

April 22-23, 2004 – 4<sup>th</sup> Air Cargo Economics Conference, Prague, Czech Republic  
<http://euroavia.com>

**April 24-29, 2004** – CHI 2004, Conference on Human Factors in Computing Systems, Vienna, Austria <http://www.acm.org/sigchi/chi2004/>

**April 25-28, 2004** – SAE Cabin Safety Technical Committee Meeting, Oklahoma City, OK  
[mlemank@sae.org](mailto:mlemank@sae.org)

**April 27-29, 2004** – 49<sup>th</sup> Annual Corporate Aviation Safety Seminar, Tucson, AZ  
[http://www.flightsafety.org/cass04\\_cfp.html](http://www.flightsafety.org/cass04_cfp.html)

**May 3-6, 2004** – SAE Aircraft Oxygen Equipment Committee, Anchorage, AK  
[mlemank@sae.org](mailto:mlemank@sae.org)

**May 3-6, 2004** – 75<sup>th</sup> Annual Scientific Meeting of the Aerospace Medical Association, Egan Convention Center, Anchorage, AK <http://www.asma.org/>

**May 6-8, 2004** - AHS International 60th Annual Forum and Technology Display, Virginia Beach, VA. Contact [Staff@vtol.org](mailto:Staff@vtol.org)

**May 10-12, 2004** – Royal Aeronautical Society 10<sup>th</sup> AIAA CEAS Aeroacoustics Conference, Manchester Town Hall, UK <http://www.aerosociety.com/homepage.asp>

May 10-13, 2004 – DOD TAG-51, Atlantic City, NJ <http://hfetag.dtic.mil/meetschl.html>

**May 11-13, 2004** – SAE SEAT – Aircraft Seat Committee, Savannah, GA  
[mlemank@sae.org](mailto:mlemank@sae.org)

*May 17-18, 2004 - The Technical Cooperation Program, Human Resources and Performance Group (HUM)-TP9, Human Systems Integration Workshop, Ottawa, Ontario, Canada*  
<http://hfetag.dtic.mil/news.html>

*May 18-20, 2004 – Aviation Industry Week, Las Vegas Convention Center, Las Vegas, NV*  
<http://www.AviationIndustryWeek.com>

**May 23-26, 2004** – Tenth International Conference on Mobility and Transport for Elderly and Disabled People, Hamamatsu, Japan <http://trb.org/calendar/>

**May 25, 2004** - Human Factors Integration Symposium, MoD, Abbey Wood, Bristol, UK  
<http://hfetag.dtic.mil/docs/HFI-Symposium-Flyer.doc>

**May 26-27, 2004** – Royal Aeronautical Society Conference – Flight Simulation 1929-2029, A Centennial Perspective, London, UK <http://www.aerosociety.com/homepage.asp>

**June 7-11, 2004** – 2004 US/Europe International Aviation Safety Conference (FAA/JAA), Philadelphia, PA <http://www.jaa.nl/conference/20th/closing.html>

**June 15-17, 2004** – SAE Digital Human Modeling for Design and Engineering Meeting, Oakland University, Rochester, Michigan <http://www.sae.org/calendar/aeromtgs.htm>

**July 8, 2004** - Human Factors Tool Symposium, Orlando, Florida  
<http://hfetag.dtic.mil/docs/NASA-Tools-Workshop.doc>

**July 19-25, 2004** – Farnborough International 2004, Farnborough Aerodrome, England  
<http://www.farnborough.com/>

**July 27-August 2, 2004** – 52nd Annual AirVenture, Oshkosh, WI <http://airventure.org/>

**July 28 – August 1, 2004** – 112<sup>th</sup> Convention of the American Psychological Association. Honolulu, Hawaii <http://www.apa.org/convention>

**August 1-4, 2004** – Designing Interactive Systems, Cambridge, MA  
<http://www.sigchi.org/DIS2004/>

**September 8-9, 2004** – Civil Aviation Safety Symposium 2004, Westin Hotel Galleria, Dallas, TX <http://www.asdnet.org/cass/default.htm>

**September 20-24, 2004** – Human Factors and Ergonomics Society 48<sup>th</sup> Annual Meeting, Sheraton New Orleans Hotel, New Orleans, LA <http://www.hfes.org/>

**September 27-29, 2004** – SAFE Association 42<sup>nd</sup> Annual Symposium, Grand America Hotel, Salt Lake City, UT <http://www.safeassociation.com/symposium.htm>

**September 29 – October 1, 2004** – 2004 International Conference on Human Computer Interaction (HCI-Aero), Toulouse, France  
<http://www.eurisco-international.com/hci-aero2004>.

**October, 2004** – 18<sup>th</sup> Airbus/JetBlue Human Factors Symposium, New York City, NY  
<http://www.airbus.com/customer/events.asp>

**October 4-7, 2004** – SAE SEAT – Aircraft Seat Committee Meeting, Albuquerque, NM  
[mlemank@sae.org](mailto:mlemank@sae.org)

**October 12-14, 2004** – 57<sup>th</sup> Annual Business Aviation Association Meeting and Convention, Las Vegas County Convention Center, Las Vegas, NV <http://web.nbaa.org/public/cs/amc/>

**October 18-19, 2004** – National Academies Institute of Medicine Annual Meeting, National Academy of Sciences, Washington, DC <http://wwwsearch.nationalacademies.org/>

**October 21-23, 2004** – Aircraft Owners and Pilots Association Expo 2004, Long Beach Convention and Entertainment Center, Long Beach, CA <http://www.aopa.org/expo/2003/virtual/>

**October 23-27, 2004** – NordiCHI 2004, Tampere, Finland <http://www.cs.uta.fi/nordichi2004/>

**October 25-28, 2004** – SAE S-9 Cabin Safety Technical Committee Meeting, San Diego, CA  
[mlemank@sae.org](mailto:mlemank@sae.org)

**October 25-28, 2004** – DoD Maintenance Seminar and Exhibition, Hilton Americas, Houston, TX <http://www.sae.org/calendar/aeromtgs.htm>

**January 9-13, 2005** – TRB 84<sup>th</sup> Annual Meeting, Washington, DC <http://trb.org/calendar/>

**April 11-15, 2005** – SAE 100<sup>th</sup> Anniversary World Congress, Cobo Hall, Detroit, MI  
<http://www.sae.org/congress/about/news/congressdates.htm>

**May 9-12, 2005** - 76<sup>th</sup> Annual Scientific Meeting of the Aerospace Medical Association, Kansas City, MO <http://www.asma.org/>

**August 18-21, 2005** - 113<sup>th</sup> Convention of the American Psychological Association, Wash, DC  
<http://www.apa.org/convention>

**September 26-30, 2005** – Human Factors and Ergonomics Society 49<sup>th</sup> Annual Meeting, Royal Pacific Resort at Universal Orlando, Orlando, FL <http://hfes.org/meetings/menu.html>

**October 24-25, 2005** – National Academies Institute of Medicine Annual Meeting, National Academy of Sciences, Washington, DC <http://wwwsearch.nationalacademies.org/>

January 22-26, 2006 – TRB 85<sup>th</sup> Annual Meeting, Washington, DC <http://trb.org/calendar/>

*Note: Calendar events in Italics are new since the last Newsletter*



Comments or questions regarding this newsletter?  
Please contact Bill Berger at (334) 271-2928  
or via e-mail at [bill.ctr.berger@faa.gov](mailto:bill.ctr.berger@faa.gov)

---

---

## Federal Laboratory Consortium Article

---

---

### Human Factors in Human Aviation

12/11/2003

Exciting new research is taking place to achieve a better understanding of the integral role human factors plays in both current and future aviation systems.



The FAA's RDHFL, located at the William J. Hughes Technical Center in Atlantic City, N.J, is a state-of-the-art research facility designed specifically to support research in aviation human factors.

It is happening in the **Research Development and Human Factors Laboratory (RDHFL)** at the **Federal Aviation Administration (FAA) William J. Hughes Technical Center**, near Atlantic City, N.J.

This unique research environment is specifically designed to enable scientists to measure and assess human performance and workload. Specialists also investigate how new technologies should be integrated into air traffic control and airway facilities systems in the laboratory.

The Aviation Safety Research Act of 1988 mandated the FAA to focus a special emphasis on human factors in civil aviation. In response to this mandate, the FAA established the RDHFL at the Technical Center.

The RDHFL, which became operational on November 2, 1992, is a state-of-the-art complex where aviation-related human factors issues are studied in a controlled scientific environment.

### Facilities

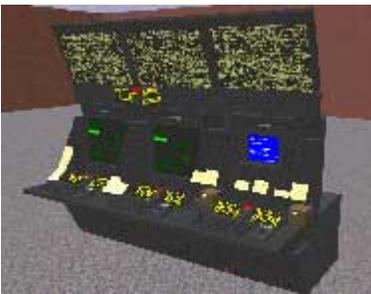
The human factors laboratory is a multipurpose facility staffed with highly experienced and skilled engineers, computer scientists, and psychologists. The laboratory encompasses approximately 10,000 square feet of laboratory space and 6,000 square feet of office space, including a briefing room. The laboratory space includes four experiment rooms that can be used separately or together. This unique

testing facility is designed to be flexible and expandable. Most physical structures (e.g., movable walls), voice and electronic communications, computers, and system peripherals are modifiable and reconfigurable.

The laboratory also contains specialty areas. A black room with an audiometric booth provides scientists with the capability to conduct perceptual and display evaluation studies that require precisely controlled lighting and acoustic environments. A virtual reality laboratory allows users to dynamically interact with three-dimensional graphical representations of concepts, designs, and data sets that might otherwise be too complex to visualize. A general purpose engineering area provides specialized engineering and integration support for experiments and simulations. Experienced in-house engineers and scientists routinely develop customized hardware and software, and continually integrate new systems and capabilities into the facility. They have developed in-house simulation capabilities for both en route and terminal operations. The simulator can be reconfigured to reflect future features not available in current systems.



**RDHFL's cyber glove system provides tactile feedback and high-accuracy joint measurements of the human hand that can be used to interact with virtual environments.**



**Virtual reality techniques were used to design, visualize and evaluate proposed new designs of the next-generation air traffic control display consoles. During the evaluation process, a multidisciplinary team was able to navigate anywhere in the virtual air traffic control rooms to view the various consoles from any vantage point. Movable parts of the consoles were animated to illustrate some of the proposed features, such as tablespots lowering and raising, displays tilting back and forth, and printers sliding to different positions. This approach enabled end users and designers to quickly and inexpensively identify and correct design flaws early in the process.**

## Research

The laboratory features three primary human factors research capabilities: computer-human-interface rapid prototyping; the ability to perform real-time simulations; and sophisticated human performance data collection and analysis capabilities. Computer-human-interface rapid prototyping is a cost-effective, iterative approach whereby a user interface can be developed quickly, then evaluated, modified, and reevaluated. The laboratory uses both commercially available and custom-built prototyping tools that can simulate the look and feel of an interface prior to actual software development.

Laboratory scientists have performed numerous experiments to study human factors issues affecting the performance of pilots, air traffic controllers, and airway facilities maintenance workforces. These experiments included field studies, laboratory experiments, and human-in-the-loop simulations. Additionally, engineering research psychologists at the laboratory performed usability analyses and developed system specifications, performance metrics, and design standards.

Recently, the RDHFL released "The Human Factors Design Standard," an important work in the field of human factors. It is a comprehensive compilation of human factors standards, principles, and guidelines integral to the procurement, design, development, and testing of FAA systems, facilities, and equipment. The standard also provides a single

easy-to-use source of human factors design criteria oriented to the needs of the FAA mission and systems.

"Bravo for your excellent new Human Factors Design Standards document," said Dr. Ben Shneiderman, computer science professor and founding director (1983-2000) of the Human-Computer Interaction Laboratory at the University of Maryland at College Park. "I found your analysis thoughtful and more complete than other sources. I like your courageous statement of standards, rather than guidelines. Readability of the six level hierarchy is tough, but the tight organization makes this a valuable and different kind of document that complements other instructional materials."

**For more information:**

Web site: <http://rdhfl.tc.faa.gov/index.htm>.



**FLC  
NEWSLINK**

**Return to the  
[November 2003  
FLC NewsLink](#)  
Table of Contents**



[Go Back](#)