



AAR-100

Human Factors Newsletter # 04-21

October 16, 2004 – October 29, 2004

Technical Note: *Review of Airplane Simulator Qualification Guidelines.* Judith Bürki-Cohen, John A. Volpe National Transportation Systems Center, Cambridge, MA 02142, and Tiauw H. Go, Massachusetts Institute of Technology, Cambridge, MA 02139

Executive Summary: This report presents a review of the current guidelines for qualifying ground-based simulators used for total training and evaluation of airline pilots as well as recommendations for improvement. The purpose of the review is to complement the current international effort to improve simulator standards and to support the Federal Aviation Administration's effort to consolidate its simulator qualification guidance currently contained in several Advisory Circulars into a new Federal Aviation Regulation Part 60.

To achieve that purpose, the guidelines were first summarized. Then, based on the existing literature, the guidelines were reviewed in terms of how they impact the effectiveness of the simulator as a pilot-training and evaluation tool. Recommendations for revision or elaboration of the guidelines and suggestions for future research to improve the guidelines were given as appropriate.

The guidelines contained seven categories: (1) general cockpit configuration, (2) simulator programming, (3) equipment operation, (4) instructor/evaluator facilities, (5) motion system, (6) visual system, and (7) sound system. Except for general cockpit configuration, the review presents suggestions for improvement in all categories. The suggestions address issues of both sufficiency and necessity. In many areas, an improvement is contingent upon a coordinated effort to generate additional empirical data clarifying the relationship between specific simulator qualities and training/evaluation effectiveness.

Point of Contact: E. Edens, AFS-230

Technical Note: Divya Chandra of the Volpe Center presented research on Electronic Flight Bags (EFBs) and Flight Symbolology at the International Conference on Human-Computer Interaction in Aeronautics (HCI-Aero 2004) held in Toulouse, France September 29 to October 1, 2004. The conference was attended by approximately 100 international specialists in aviation

human factors, including attendees from government, industry, and academia in the United States and Europe.

- "Designing and Testing a Tool for Evaluating Electronic Flight Bags," Divya. Chandra and Michelle Yeh, Volpe Center, and Vic Riley of User Interaction Research and Design. The paper presents research on developing a tool that could be used by FAA field evaluators to help them assess the usability of EFBs.

Abstract: The FAA, system designers, and customers all recognize that EFBs are sophisticated devices whose use could affect pilot performance. As a result, human factors issues have received considerable attention from the EFB community. In addition, the FAA's Advisory Circular (AC) on EFBs (AC 120-76A) identifies a need for evaluating EFBs from a human factors perspective and contains a list of human factors considerations for review. However, the AC does not specify exactly how to do the field human factors evaluation. Our research is directed at developing tools and procedures that could be used by FAA field evaluators in conducting structured and comprehensive, yet practical, EFB usability evaluations. The tools and methods were developed and refined over the course of several tests with real EFB systems. In this paper, we describe the evolution of one promising tool into its latest, relatively mature, format. We also present our test procedure and methods of processing the resulting data into feedback for the manufacturer. Our next step is to expose more potential users, especially those in the FAA, to the tools and methods to determine if these products are useful in practice.

- "An Approach for Designing Flight Symbolology," (poster) Michelle Yeh and Divya. Chandra. The poster is on their flight symbolology research, and discusses their approach to the design of symbolology for electronic displays of aeronautical navigation information. There was also a short presentation on the poster to the full audience, and researchers were available to answer questions regarding this research.

Abstract: The goals of this effort are to identify features of navigation symbolology that are problematic when presented on electronic displays, and to develop a method to design and evaluate good symbolology that takes into account the different platforms on which it will be displayed. Background findings and a proposed experiment to explore some of the higher-level issues related to the design of effective symbolology are described.

In addition, Dr. Chandra co-chaired a half-day workshop with Yvonne Barnard of Eurisco, a research organization based in Toulouse, as part of the conference (September 29th). The topic of the workshop was electronic documents in aviation. The workshop was attended by 12 researchers from organizations in the United States and Europe. It began with short presentations from five organizations (Volpe, Boeing/Jeppesen, Airbus, Centre d' Etudes de la Navigation Aérienne, and Eurisco) on their work with electronic documents. After the presentations, the group held brain-storming sessions on research questions related to electronic documents.

Point of Contact: T. McCloy, ATOP-R&D

TMA: Traffic Management Advisor (TMA) is a computerized tool that helps controllers manage air traffic more efficiently in airspace around some of the nation's busiest airports. TMA enables controllers in en route centers to precisely sequence/meter aircraft as they move from high-altitude airspace into the more crowded terminal area. This more precise planning makes maximum use of the airport's available capacity, reduces delays and saves significant amounts of fuel. Human factors researchers at the William J. Hughes Technical Center are conducting a TMA simulation which will continue through Nov 19, 2004. Each controller will have one day of training and one day of testing. There are five metering conditions: current Miles in Trail, metering data in the TMA list only with delay time in minutes, TMA list only with delay time in minutes plus tens of seconds, TMA list plus in the Range Data Block (RDB) with delay time in minutes, TMA list plus in the RDB with delay time in minutes plus tens of seconds. The objective is to determine which display method optimizes metering while minimizing disruption of the controllers visual scan. (M. McAnulty, WJHTC)

Web Site Activity: The William J. Hughes Technical Center's NAS Human Factors Group website has been very active. The Human Factors Design Standard continues to be a very popular download. Others include:

dot-faa-ct-tn99-17.pdf - Hadley, et al.
Air Traffic Control Specialist Performance Measurement Database

dot-faa-ct-tn98-02.pdf - Snyder, et al.
Human Factors Technical Writer's Guide

dot-faa-ct-tn03-18.pdf - Ahlstrom & Della Rocco
TRACON Controller Weather Information Needs: 1. Literature Review

dot-faa-ct-tn04-23.pdf - Ahlstrom & Allendoerfer
Web-Based Portal Computer-Human Interface Guidelines

dot-faa-ct-tn02-12.pdf - Ahlstrom & Muldoon
A Catalog of Graphic Symbols used at Maintenance Control Centers: Toward a Symbol Standardization Process (note: this was the most popular download in September 2004)

Point of Contact: K. Allendoerfer, WHJTC)

FEW: Ben Willems, an engineering research psychologist with the William J. Hughes Technical Center's NAS Human Factors Group served as guest speaker in the Office of Knowledge Management speaker series. Mr. Willems described his thinking related to the Future En Route Workstation (FEW) which is an ongoing research and development project. The FEW platform integrates data from automation tools and a Display System Replacement (DSR)/HOST emulation onto two radar displays, one for the radar controller and one for the radar associate controller. The FEW platform capabilities include a conflict probe integrated in the DSR simulator, alternative interactivity with display elements, alternative use of data already available in the National Airspace System, and an early prototype of electronic flight progress strips. (E. Stein, WJHTC)

EUROCONTROL: The mission of the EUROCONTROL Experimental Centre (EEC) is to carry out research and development in order to improve Air Traffic Management in Europe. Several recent EEC reports are available:

- September 2004 EEC report #394 on controller working methods in the US <http://www.eurocontrol.int/eec/publications/eecreports/2004/394.pdf>
The report briefly addresses operational errors in the executive summary (it is rather general in nature).
- There is also an EEC Note on root causes of accidents due to design http://www.eurocontrol.int/eec/publications/eecnotes/2004/14_04.pdf
The forward states: "Overall, the results show 50% of all accidents or incidents having a root cause in design. The proportions for the aviation and nuclear industries (51% and 46% respectively) are remarkably similar. In most cases, causes other than design also contributed to the accident or incident."

Other EEC publications can be found at: <http://www.eurocontrol.fr/>

Point of Contact: P. Krois, ATOP-R&D

Laboratory Visit: On October 20th, Technical Center personnel provided a briefing to the Associate Administrator for Commercial Space Transportation concerning current projects and structure in aviation human factors. Included was an explanation of overall goals and recent accomplishments of the NAS Human Factors Group and the Laboratory Support Group. There were several questions about risk perception and methods of developing a complete understanding in the form of informed consent on the part of commercial space passengers. Since human factors researchers have some experience with informed consent as it applies to Institutional Review Boards, there was discussion about studying the issue as it applies to commercial space passengers. (E. Stein, A. Macias, WJHTC)

Air Transportation Human Factors: On October 12-14, 2004, FAA Flight Standards held a conference in San Diego, CA titled "Shared Vision of Aviation Safety Conference - The Current Status and Future of Voluntary Flight Safety Programs". The meeting provided a forum for learning about and sharing information about FAA Voluntary Safety Programs. The event was open to global aviation, and 410 participants from all over the world attended. ATOP was represented by Eleana Edens. Several Air Transportation Human Factors research grant projects were on the agenda. Florian Jentch, University of Central Florida, presented the latest research on training for unexpected events. This session drew a standing-room only audience, with many air carriers interested in instituting training guidelines from these studies. Susan Mangold and David Nuemeister, Battelle Memorial Institute, presented a future view of employing the Model Advanced Qualification Program with voluntary safety data. This is a large issue for air carriers and the interest is strong on having a database that incorporates information from several safety sources. Peder Johnson, Timothy Goldsmith and John Moulton, University of New Mexico, presented methods to calibrate air carrier training instructors and evaluators. This too is a large issue for air carriers, and the attendees were most receptive to the research provided by the FAA.

This international audience provided the opportunity for Air Transportation Human Factors research to reach air carriers not routinely attuned to our research activities. (E. Edens, AFS-230)

Aviation Symposium: On October 26th, Dennis Beringer participated in a planning meeting at Wright State University in Dayton, OH, for the 13th International Symposium on Aviation Psychology to be held at the Civil Aerospace Medical Institute in Oklahoma City, April 18-21, 2005. As site chair and a member of the program committee, he helped review submissions and categorize them for screening and organization into sessions. Details of the notification process were finalized and some aspects of other administrative arrangements were discussed. For information about the symposium, point to: <http://www.cami.jccbi.gov/>, <http://www.wright.edu/isap/> (D. Beringer, CAMI)

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

Mark D. Rodgers
FAA (ATOP-R&D)



November 1-4, 2004 – DOD Human Factors Engineering Technical Advisory Group Meeting, Holiday Inn Select, Alexandria, VA <http://hfetag.dtic.mil/meetschl.html>

November 2-4, 2004 – World Aviation Conference, Hilton Hotel, Reno, NV
<http://www.sae.org/events/wac/>

November 3-4, 2004 - Second ICAO-IATA LOSA & TEM Conference, Seattle, Wash
dmaurino@icao.int , curt.graeber@boeing.com

November 3-5, 2004 - AVSEC World 2004, The Westin Bayshore Resort and Marina, Vancouver, British Columbia, Canada. www.iata.org/ps/events/aw2004.htm

November 4-5, 2004 – Royal Aeronautical Society Seminar - Human Factors Training in Aviation Maintenance, RAF Bentley Priory, Stanmore, near Watford, North London
<http://www.raes-hfg.com/xmhftraining.htm>

November 7-9, 2004 – Aviation Maintenance Software Technology & Resource Symposium, Pointe South Mountain Resort, Phoenix, AZ <http://www.STARSymposium.com>

November 8-9, 2004 – European Aviation Training Symposium, Vienna, [Austria](http://www.at-events.com/eats/conference.asp)
<http://www.at-events.com/eats/conference.asp>

November 12-17, 2004 – American Society for Information Science and Technology Annual Meeting, Providence, RI asis@asis.org

November 13-14, 2004 – Aviation Nation, Nellis AFB, NV www.nellisairshow.com

November 15-18, 2004 – 57th Annual International Air Safety Seminar (“Sharing Knowledge to Improve Safety”), Pudong Shangri-La Hotel, Shanghai, China
<http://www.flightsafety.org/seminars.html>

November 15-18, 2004 – Fire and Cabin Safety Research Conference, Lisbon, Portugal
www.caa.co.uk/srg/intsd/event.asp?groupid=73

November 16, 2004 - FY04 General Aviation, Vertical Flight, and Aviation Maintenance Human Factors Program Review, FAA Headquarters Bessie Coleman Training Center, Wash, DC <mailto:william.krebs@faa.gov>.

November 18-19, 2004 – IT World Expo, Toronto, Canada richardp@WowGao.com

November 18-21, 2004 – 45th Annual Meeting of the Psychonomic Society, Hyatt Regency and Millenium Hotels, Minneapolis, MN [45th Annual Meeting of the Psychonomic Society](#)

November 22-24, 2004 - ICRAAT 2004 - International Conference on Research in Air Transportation, University of Zilina , Zilina, Slovakia. www.icrat.org

December 1-2, 2004 – Future of Air Transport, le Meridian Piccadilly, London, England
<http://www.marketforce.uk.com/airtransport2004>

December 9-10, 2004 – Annual EUROCONTROL Experimental Centre Innovative Research Workshop, Brétigny-sur-Orge, France <http://www.eurocontrol.fr/>

January 9-12, 2005 – International Conference on Intelligent User Interfaces, San Diego, CA
<http://www.catamaranresort.com/>

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

January 10-13, 2005 - 43rd AIAA Aerospace Sciences Meeting and Exhibit, Reno Hilton, Reno, NV <http://www.aiaa.org/>

January 19-21, 2005 – Air Cargo Symposium, Ritz-Carlton New Orleans, New Orleans, LA
<http://www.aci-na.org>

January 25-27, 2005 – AE-2 Aerospace Lighting Committee Meeting, New Orleans, LA
elizd@sae.org

January 28, 2005 – Deadline for papers - 6th USA/Europe ATM Seminar, Baltimore, MD, June 2005 <http://atmseminar.eurocontrol.fr/>

February 1-3, 2005 - ATC Maastricht (EUROCONTROL), Maastricht, Netherlands
<http://www.atcmaastricht.com/>

February 9-11, 2005 – 6th Annual Aviation Security Summit Expo, US Grant Hotel, San Diego, CA <http://www.worldrg.com/AW500/wrg.asp>

February 16-17, 2005 – World Aerospace Symposium, Pierre Baudis Toulouse Congress Center, Toulouse, France http://www.aviationweek.com/conferences/meu_e3.htm

March 6-8, 2005 – Air Cargo 2005, Hotel del Coronado, San Diego, CA
<http://www.aircargoconference.com>

March 17-18, 2005 – Aviation and Environment Summit, Crowne Plaza, Geneva, Switzerland
<http://www.iata.org>

April 2-7, 2005 – CHI 2005, Portland, OR chi2005-chair@acm.org.

April 5-7, 2005 – Aviation Testing Expo 2005: Scientific Conference and Technology Forum, Europe, Messe Hamburg, Germany <http://www.aerospacetesting-expo.com/northamerica/conf+forum.html>

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

April 12-18, 2005 – Sun ‘n Fun 2005, Lakeland, FL <http://www.sun-n-fun.org/>

April 17-22, 2005 – International Federation of Air Traffic Controller’s Associations, Melbourne, Australia http://www.ifatca.org/conferences/annual_conference.htm

April 18-21, 2005 – 13th International Symposium on Aviation Psychology (ISAP), Civil Aerospace Medical Institute (CAMI), Oklahoma City, OK (note: call for papers deadline is September 30, 2004). <http://www.cami.jccbi.gov/>, <http://www.wright.edu/isap/>

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

June 2005 – 6th USA/Europe ATM Seminar, Baltimore, MD (note: call for papers deadline is January 28, 2005) <http://atmseminar.eurocontrol.fr/>

June 13-19, 2005 - Paris Air Show 2005, Parc des expositions de Paris Nord - Le Bourget, 93350, France. www.paris-air-show.com

July 22-28, 2005 – HCI International 2005, 11th International Conference on Human-Computer Interaction, Caesars Palace, Las Vegas, NV hci2005@ecn.purdue.edu

July 25-31, 2005 – EAA AirVenture Oshkosh 2005, Oshkosh, WI <http://www.airventure.org>

August 15-18, 2005 - 43rd AIAA Aerospace Sciences Meeting and Exhibit, Hyatt Regency San Francisco at Embarcadero Center, San Francisco, CA <http://www.aiaa.org/>

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

September 12-16, 2005 – Interact 2005, Tenth IFIP TC13 International Conference on Human-Computer Interaction, Rome, Italy <http://www.interact2005.org/>

September 19-23, 2005 – ANA 2005 Aviation Conference and Exhibition, Connecticut Convention Center, Hartford, CN <http://www.aerospace-na.com/ace2005.asp>

September 25-28, 2005 - 11th Ka and Broadband Communications Conference and 23rd AIAA International Communications Satellite Systems Conference 2005 (organized by IIC), Aurelia Convention Center, Rome, Italy <http://www.aiaa.org/>

September 26-28, 2005 - AIAA 5th Aviation, Technology, Integration, and Operations Forum (ATIO), Hyatt Regency Crystal City, Arlington, VA <http://www.aiaa.org/>

September 26-28, 2005 - AIAA 2nd Intelligent Systems Conference (IS), Hyatt Regency Crystal City, Arlington, VA <http://www.aiaa.org/>

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

October 3-6, 2005 – SAE 2005 AeroTech Congress and Exhibition, Gaylord Texan Resort and Convention Center, Dallas/Fort Worth Airport Area, Texas <http://www.sae.org/events/conferences/aerospace/>

October 6-9, 2005 – Aviation North Expo Conference, Fairbanks Princess Riverside Lodge, Fairbanks, AK www.AviationNorth.org

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

November 6-9, 2005 - ACI World / Pacific Conference and Exhibition, Auckland, New Zealand. www.auckland-airport.co.nz

November 8-10, 2005 – Aerospace Testing Expo, North America: Scientific Conference and Technology Forum, Long Beach Convention Center, Long Beach, CA <http://www.aerospacetesting-expo.com/northamerica/conf+forum.html>

January 9-12, 2006 - 44th AIAA Aerospace Sciences Meeting and Exhibit, Reno Hilton, Reno, NV <http://www.aiaa.org/>

January 22-26, 2006 – TRB 85th 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

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