



**AAR-100**

**Human Factors Newsletter # 02-17**

**September 14, 2002 – September 27, 2002**

**Air Turbulence:** Scientists from the National Aeronautics and Space Administration (NASA) and the Federal Aviation Administration (FAA) will attempt to estimate how long it takes to secure the passenger cabin of a wide-body airliner in advance of oncoming air turbulence during a three-day joint experiment at the FAA's Mike Monroney Aeronautical Center in Oklahoma City. The Oct. 1 – 3 experiment will provide critical information to improve in-flight safety for turbulence encounters, the largest cause of in-flight injuries.

Sponsored by the joint FAA – NASA Aviation Safety Program, tests will be conducted by crews from three major air carriers -- United, Delta and USAir -- one airline each day. In addition, American Airlines, Jet Blue Airways and Southwest Airlines are supporting the work with equipment and staff, and two flight attendant unions -- the Association of Flight Attendants and the Association of Professional Flight Attendants -- are providing support through planning and technical consultation.

Experimenters will use some 70 hired test subjects in the Civil Aerospace Medical Institute's (CAMI) Boeing-747 research craft on Aeronautical Center ramps at Will Rogers World Airport in Oklahoma City. A team of human factors researchers from the FAA, NASA, industry and interested employee organizations will conduct the tests at CAMI using several scenarios each day, including one alert during food and beverage service.

Test results will provide warning time benchmarks for manufacturers of turbulence detection equipment, and for aviation industry certification activities required prior to installation and use of the equipment in operational aircraft. New technology developed under the Aviation Safety Program, one version of which is based on modified weather radar technology, has been recently demonstrated that provides over one minute of encounter warning and a low false alarm rate. Realistic warning time estimates from this series of trials will provide useful guidance to these activities.

"The aim here is to reduce passenger and crew injuries in turbulence encounters," said Robert Shaftstall of the CAMI staff. "These results will provide a valuable benchmark against which future developments will be measured."

“The lack of a reliable turbulence warning has been one reason that commercial aircraft cabin crews have not been able to effectively prepare for turbulence encounters,” added Rod Bogue, Aviation Safety Program and turbulence technology project manager at NASA’s Dryden Flight Research Center, Edwards AFB, California. “Current turbulence warning announcements and seat belt advisories have a high false alarm rate, and it is not surprising that passengers and flight attendants place little confidence in these in-flight warnings. Quite often, they are out of their seats or in their seats without belts fastened when turbulence encounters occur”.

"This experiment is an excellent example of how government agencies can work together using their individual strengths to provide a useful benefit to the traveling public, reducing turbulence injuries," Bogue continued. "These trials demonstrate the FAA – NASA collaboration to bring turbulence warning technology to practical application in commercial airliners."

CAMI's Boeing747 wide-body research vehicle is used for cabin evacuation testing, cabin airflow analysis and other studies. It was recently used in an accident scenario during Will Rogers World Airport's triennial disaster preparedness exercise. The Civil Aerospace Medical Institute conducts human factors research for the FAA in all areas of aviation. (J. Whinnery, CAMI)

**Research Report: *Collaborative Decision-Making.*** Frequently, ATCSCC provides reroute advisories to a number of groups to inform them of the need to consider a reroute in order to avoid a weather or traffic constraint. This is done by the issuance of a Traffic Management Reroute Advisory. The current process is very cumbersome because:

- All of the advisories are sent to all of the user groups (airline dispatchers and FAA traffic managers), instead of being routed to only those users for whom a particular advisory is relevant.
- The advisories are often challenging for the recipients to interpret because of ambiguities and poor mappings between the way that the advisories specify the included flights and the way flight information can be retrieved from airline databases.
- The advisories are not machine readable, so a great deal of manual work has to be done by airline dispatchers, FAA traffic managers and other system users in order to evaluate and file the assigned reroutes.

Under funding from the FAA Office of the Chief Scientist for Human Factors (AAR-100) in December 2000, researchers delivered a proposal to the FAA Collaborative Decision Making (CDM) Program to develop a new procedure and supporting software for the creation, dissemination, processing and display of ATCSCC Reroute Advisories. This proposal to develop the Reroute Advisory Tool (RAT), and to make associated changes in the terminology used in such advisories, was recommended for implementation by the CDM Program, and a RAT Team was formed to guide its development. The team consisted of Mike Murphy (ATCSCC), Roger Beatty (AAL), Keith Campbell (MITRE), Rick Oiesen (Volpe) and Phil Smith (Ohio State University). Under the supervision of the CDM leadership (Jim Wetherly, Deborah Johannes, Mark Libby and Bill Cranor), and FAA operational and AAR-100 staff (Paul Krois, Dana Broach and John White), the proposal has been adopted with a target for developing an operational version of the Reroute Advisory Tool in ETMS Release 7.6 for Spring 2003.

Implementation of the Reroute Advisory Tool proceeded through a series of steps, including development of a requirements document (by Volpe staff with input from all members of the RAT Team), development of a prototype system for the creation of such advisories (by MITRE with input from all members of the RAT Team), and evaluation of the prototype. Using support from AAR-100, staff from Ohio State University provided human factors input in the development of the requirements document, in the design of the prototype, and in conducting an analytical and empirical evaluation of the prototype design. This resulted in a set of design recommendations and a revised requirements document for the Reroute Advisory Tool, which is now being implemented by Volpe for the Spring 2003 update of ETMS.

**Prototype testing.** A summary of the methods used and findings from prototype testing (Spring, 2002) to help evaluate design concepts and features for the Reroute Advisory Tool (RAT) has been prepared. The goal of this test was to provide preliminary input to help guide decisions during the implementation of the operational version of RAT.

In order to conduct this evaluation of RAT prototype, staff from a number of different organizations worked collaboratively. This included staff from ATCSCC, MITRE, VOLPE, Ohio State University, traffic managers at different ARTCCs, and dispatchers at the AOCs at a number of airlines. It also included participants in the Collaborative Routing Group of the CDM Program.

The analysis consisted of two parts. First, an analytical evaluation was completed by staff at Ohio State University to try to identify areas where enhancements in the interface or the underlying functionality could be made prior to empirical testing. Then, four one-day tests were run where an ATCSCC Specialist used the RAT prototype to generate reroute advisories. These advisories were then used to generate an ETMS query that produced a list of flights “considered” by ETMS to be covered by that advisory. The advisory and associated flight lists were then sent to participating airlines, which provided feedback about the accuracy of the flight lists and the usefulness and usability of the information as displayed in the RAT-generated advisory. The feedback from the participating ATCSCC Specialist and airlines for this formative evaluation tended to be qualitative in nature because of the time and resource constraints of the participants.

A number of recommendations were generated based on analytical and empirical evaluations of the RAT concept using the MITRE RAT prototype, and are explicitly stated in the summary document. In addition, the questionnaire responses of the participating ATCSCC Specialist are provided, and are strongly supportive of the potential usefulness and usability of the design approach that guided design of the prototype.

When interpreting these recommendations to make final implementation decisions, however, it will be important to consider the context of the broader systems environment in which RAT will ultimately be embedded. Issues of consistency with this broader environment may require modification of some of these recommendations, as this study was conducted looking at the RAT prototype in isolation. For more information on this research, contact <mailto:smith.131@osu.edu> or <mailto:paul.krois@faa.gov>

**Electronic Flight Bag (EFB):** On September 10, 2002, a researcher from the Volpe Center presented an update on EFB human factors considerations to a meeting of the Air Transport Association Digital Data Working Group in Atlanta, GA. The updated draft document was provided to the group, and comments will be reviewed by teleconference later in September. Material from the July 2002 EFB Advisory Circular was incorporated into the latest draft, and the chapter on Electronic Charts was fleshed out. The results of a formal issues and requirements analysis were also incorporated into the Electronic Charts chapter. The Volpe document is cited as a reference in the draft Advisory Circular on EFBs. (D. Chandra, VNTSC)

*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)



**September 29- October 4, 2002** – Human Factors and Ergonomics Society 46<sup>th</sup> Annual Meeting, Baltimore Waterfront Marriott Hotel, Baltimore, MD <http://www.hfes.org/>

**September 30 – October 1, 2002-** FAA R,E&D Advisory Committee (REDAC) Meeting, Holiday Inn Westpark, Rosslyn, VA [http://research.faa.gov/aar/redac\\_meetings.asp](http://research.faa.gov/aar/redac_meetings.asp)

**October 1-3, 2002** – SAE S-7 Flight Deck and Handling Quality Standards for Transport Aircraft, Prague, Czech Republic <mailto:elizd@sae.org>

**October 7-11, 2002** – SAE S-18 Airplane Safety Assessment Committee, Reno, NV <mailto:lemon@sae.org>

**October 8-9, 2002** – SAE S-9 Cabin Safety Provisions Committee, Reno, NV <mailto:elizd@sae.org>

**October 9-10, 2002** – SAE AE-8B1 Protective Devices Committee, Tampa, FL <mailto:elizd@sae.org>

**October 10-19, 2002** – The World Space Conference, Houston, TX [www.aiaa.org/wsc2002](http://www.aiaa.org/wsc2002)

**October 14-16, 2002** – Third LOSA Week, Dubai, United Arab Emirates <mailto:dmaurino@icao.int>

**October 14-16, 2002** – SAE A-10 Aircraft Oxygen Committee, Dayton, OH  
<mailto:elizd@sae.org>

**October 21-24, 2002** – 2<sup>nd</sup> Annual FAA Centers of Excellence Meeting, Wichita, KS  
<http://www.niar.twsu.edu/faacoe>

**October 23-25, 2002** – International Conference on Human-Computer Interaction in Aeronautics, Massachusetts Institute of Technology, Cambridge, MA <http://www-eurisco.oncert.fr/events/hci-aero2002.html/>

**October 23-25, 2002** – SAE AC-9 Aircraft Environmental Systems Committee, Albuquerque, NM <mailto:elizd@sae.org>

**October 27-31, 2002** – 21<sup>st</sup> Digital Avionics Systems Conference, Hyatt Regency Hotel, Irvine, CA <http://www.dasconline.org/>

**November 4-7, 2002** – 55<sup>th</sup> Annual Air Safety Seminar “Keeping Safety a Worldwide Priority”, a Joint Meeting of the Flight Safety Foundation, International Federation of Airworthiness, and International Air Transport Association, Citywest Hotel, Dublin, Ireland  
[wahdan@flightsafety.org](mailto:wahdan@flightsafety.org).

**November 5-7, 2002** – SAE World Aviation Congress and Display, Sheraton Crescent Hotel, Phoenix, AZ <http://www.sae.org/calendar/aeromtgs.htm>

**November 21-24, 2002** – 43<sup>rd</sup> Annual Meeting of the Psychonomic Society, Hyatt and Westin Hotels, Kansas City, MO <mailto:psp@psychonomic.org>

**December 10-14, 2002** – Neural Information Processing Systems 2002, Vancouver, Canada  
<http://www.nips.cc/>

**January 13-17, 2003** – SAE S-18 Airplane Safety Assessment Committee, Salt Lake City, UT  
<mailto:lemon@sae.org>

**January 14-16, 2003** – SAE Aircraft Seat Committee, San Diego, CA <mailto:elizd@sae.org>

**January 27-31, 2003** – SAE G-10 Aerospace Behavioral Engineering Technology Committee, Melbourne, FL <mailto:lemon@sae.org>

**February 4-6, 2003** – SAE North American Aviation Safety Conference, Atlanta, GA  
<http://www/sae.org/calendar/aeromtgs.htm>

**March 3-6, 2003** – SAE 2003 World Congress, Cobo Center, Detroit, MI  
<http://www/sae.org/congress/index.htm>

**March 17-19, 2003** – 15<sup>th</sup> Annual European Aviation Safety Seminar presented by the Flight Safety Foundation and European Regions Airlines Association, Hotel Intercontinental Geneva, Geneva, Switzerland <http://www.flightsafety.org/seminars.html>

**March 24-28, 2003** – SAE Airplane Safety Assessment Committee, Lisbon, Portugal  
<mailto:lemon@sae.org>

**April 2-8, 2003** – Sun ‘n Fun EAA Fly In, Lakeland, FL <http://www.sun-n-fun.org>

**April 5-10, 2003** – CHI 2003 Conference on Human Factors in Computing Systems, Broward Convention Center, Ft. Lauderdale, FL <http://www.chi2003.org/>

**April 7-27, 2003** – Aviation World’s Fair, Newport News/Williamsburg, VA  
<http://www.worlds-fair.com/> or <http://aviation-worlds-fair.com/>

**April 9-11, 2003** – SAE Aircraft Environmental Systems Committee, Dayton, OH  
<mailto:elizd@sae.org>

**April 22-23, 2003** – 48<sup>th</sup> Annual Corporate Aviation Safety Seminar, presented by the Flight Safety Foundation and the National Business Aviation Association, Westin Diplomat Resort and Spa, Hollywood, FL <http://www.flightsafety.org/seminars.html>

**April 27-30, 2003** – Symposium on Interactive 3D Graphics, Monterey Marriott, Monterey, CA  
<mailto:Pausch@cmu.edu>

**May 3-10, 2003** – International Conference on Software Engineering, Hilton Portland, Portland, OR <mailto:ldillon@cse.msu.edu>

**May 4-9, 2003** – 74<sup>th</sup> Annual Scientific Meeting of the Aerospace Medical Association, Convention Center, San Antonio, TX <http://www.asma.org/>

**May 12-17, 2003** - 2003 IEEE International Conference on Robotics and Automation, The Grand Hotel, Taipei, Taiwan <http://www.icra2003.org/>

**June, 2003** – SAE Digital Human Modeling for Design and Engineering, Location TDB  
<http://www/sae.org/calendar/aeromtgs.htm>

**June 15-22, 2003** – 45<sup>th</sup> Paris Air Show le bourget <http://www.paris-air-show.com/index3.htm>

**June 22-27, 2003** – 10<sup>th</sup> International Conference on Human-Computer Interaction, Institute of Computer Science Foundation, Research and Technology, Science and Technology Park of Crete, Heraklion, Crete, Greece <mailto:info@hci2003.gr>

**June 24-26, 2003** – Human Systems Integration Symposium “Enhancing Human Performance in Naval and Joint Environments”, Sheraton Premier Hotel, Tyson’s Corner, VA  
<http://www.navalengineers.org/>

**July 7-10, 2003** – SAE 33<sup>rd</sup> International Conference on Environmental Systems, The Westin Bayshore Resort and Marina, Vancouver, Canada <http://www/sae.org/calendar/aeromtgs.htm>

**July 14-17, 2003** – AIAA/ICAS International Air & Space Symposium and Exposition, Dayton Convention Center, Dayton, OH <http://www.flight100.org/>

**July 29-August 4, 2003** – 51<sup>st</sup> Annual AirVenture, Oshkosh, WI <http://airventure.org/>

**August 7-10, 2003** – 111<sup>th</sup> Convention of the American Psychological Association, Toronto, Ontario, Canada <http://www.apa.org/convention>

**September 9-11, 2003** – SAE Aerospace Congress and Exhibition, Palais des Congrès, Montreal, Quebec, Canada <http://www.sae.org/calendar/aeromtgs.htm>

**October 13-17, 2003** – Human Factors and Ergonomics Society 47<sup>th</sup> Annual Meeting, Adams Mark Denver Hotel, Denver, CO <http://www.hfes.org/>

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

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

**May 2-7, 2004** – 75<sup>th</sup> Annual Scientific Meeting of the Aerospace Medical Association, Egan Convention Center, Anchorage, AK <http://www.asma.org/>

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

**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/>

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



Comments or questions regarding this newsletter?

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