ATO-P R&D

Human Factors Research and Engineering Group

Human Factors Newsletter # 06-14

July 8 – July 21, 2006

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Articles in this newsletter:

Technical Note: Human Factors Research Meeting

From June 24 to July 2, 2006, Civil Aerospace Medical Institute (CAMI) researcher Dr. Julia Pounds visited the Civil Aviation University of China (CAUC) in Tianjin, Peoples Republic of China (PRC). Dr. Pounds was invited to discuss human factors in general and also her research. Operational personnel from several center and terminal facilities attended. They represented several operational Air Traffic Management functions, including incident reporting, controller training, and facility automation systems. Professors and students from several areas of aviation studies at CAUC also participated, e.g., controller selection, initial and recurrent controller training, pilot training, aviation medicine research, aircraft maintenance and industrial engineering.

Dr. Pounds supplied overviews for several areas of FAA research, and followed with question and answer periods. She also facilitated group discussions about the topics. Possibilities for

future lectures by other FAA scientists were discussed, and each organization will coordinate the potential for more information exchange through the appropriate offices in each organization.

Discussion topics included CAMI's role as aerospace research institution, the research performed by its human factors scientists, the role of human factors relative to incident reporting and classification, human factors and runway incursions, the JANUS technique for incident data collection, and the National Air Traffic Professionalism Project skills training program. A brief outline follows:

- *CAMI's Human Factors Research* – A review of the human factors research conducted by scientists in the Aerospace Human Factors Research Division (AAM-500) and videos depicting CAMI's research. The division's two branches conduct research of interest to both air traffic controllers and pilots using a variety of scientific methods in both laboratory and field studies. Areas of research include advanced ATC systems; ATC selection and validation; ATC training and performance measurement; behavioral stressors; effects of traffic complexity; controller to controller and pilot-controller communications; flight crew performance assessment; organizational effectiveness; analysis of accident and incident reports; causal factors analysis; training for general aviation pilots; the effects of advanced cockpit displays, flight-deck alerting systems, and multi-function displays and controls on pilot performance; and pilot performance when primary flight instruments are lost.
- *FAA ATC Incident Reporting Processes* – an overview of the reporting process with an emphasis on operational error (OE) reporting. Discussions included the importance of incident reporting and its role in improving ATC processes, how incidents are detected, the role of human factors data, and interpreting patterns in reported data. Differences between voluntary versus mandatory reporting requirements were also discussed.

- *Indexing the Severity (SI) of Airborne Air Traffic Operational Errors* – a description of the first severity index developed as a classification method for OEs and its utility of classification for human factors investigations of OE causal factors.. Examples of SI calculations were provided with charts illustrating the results. The strengths and weaknesses of the method were discussed, as well as the use of the index and chart as tools for analysis and communication about OEs. Of interest was whether the SI might be adaptable to other airspace systems.

- *Human Factors & Runway Safety* – a summary and discussion of ATC and pilot factors which have been identified as influential in runway incursions. Discussion linked the topics to factors in the JANUS taxonomy and potential mitigation strategies such as NATPRO. Re-creations of the Linate accident were shown. The discussion illustrated how human performance can become a channel through which pre-existing contextual and contributing conditions lead to runway incursions and accidents.

- *JANUS for ATC* – a general overview of the JANUS framework, categories of factors included in the framework, and the method of a structured, self-paced interview to collect data about human-centered and contextual factors in operational errors (OEs). The JANUS (ATC) technique permits users to identify specific factors in the following categories: mental processes (perception and vigilance, memory, planning and decision-making, response

execution); the task being performed; non-compliance situations; traffic; airspace/surface; weather; pilot-controller communications; pilot actions; procedures; documents/materials; environment/distractions; teamwork; individual/personal factors; interpersonal/social relations; training/experience; human-machine interface and equipment; supervision; management; and, organizational factors. The FAA video "Collision Course" was shown to illustrate how an incident can result from a chain of events over time. This event and the Linate accident were discussed in terms of human factors and contextual conditions.

- *National Air Traffic Professionalism Program. (NATPRO) for ATC Skills Training* – an overview of the NATPRO seminar's knowledge-based materials, the practicum's skills exercises, and a video about the NATPRO program. The first NATPRO program (Series 1: Pay Attention!) focuses on mental processes, concentration, multitasking, and factors that affect attention processes. The first program is currently used in FAA air route traffic control centers. A second program prototype (Series 2: Listen Up!) has been developed to focus on auditory skills related to readback/hearback errors, and an operational test is being planned.

- *Summary of Topics* – a synthesis of the presentations. Discussions integrated the other presentation topics with an emphasis on how adding human factors concepts can benefit existing processes. The discussion highlighted relationships between the quality of incident data collected and the need for informative data for development of intervention strategies.

This activity supports the Administrator's Flight Plan Goal for International Leadership, Objective 1: Promote improved safety and regulatory oversight in cooperation with bilateral, regional, and multilateral aviation partners.

Point of Contact: J. Pounds, CA*MI*

Technical Note: Allendoerfer, K., Willems, B., Zingale, C., Pai, S. (2006). *Methods for Examining Possible Effects of En Route Automation Modernization (ERAM) on Controller Performance* (DOT/FAA/TC-TN06/14). Atlantic City International Airport, NJ: Federal Aviation Administration, William J. Hughes Technical Center.

Abstract: The FAA is developing the En Route Automation Modernization (ERAM) system to replace the legacy en route air traffic control automation system consisting of the Host Computer System, the Display System Replacement (DSR), and the User Request Evaluation Tool (URET). This technical note provides an analysis of major areas where new ERAM features may affect how controllers do their jobs. We describe test methodologies for examining these effects and corresponding metrics. Our analysis examines the following categories of ERAM changes: (a) backup and redundancy capabilities; (b) Areas of Interest that increase flight data capabilities in ERAM; (c) differences between the legacy system and ERAM user interfaces; (d) the ERAM tracker; and (e) safety alerts. We also discuss two recommended test activities: a usage characteristics assessment and human-in-the-loop baseline simulations.

The above research activity supports the Administrator's Flight Plan Goal for Greater Capacity, Objective 3: Increase on-time performance of scheduled carriers.

Point of Contact: K. Allendoerfer

Training Effectiveness Seminar: A seminar entitled "Training Effectiveness" sponsored by ATO-P Human Factors Research and Engineering Group, will be presented by Dr. David Baker (American Institutes for Research), on Tuesday, September 5, 2006, from 9:00 to 11:00 A.M. in the Bessie Coleman Conference Center, HQ FAA (Orville Wright Bldg), 2nd Floor, 800 Independence Ave. S.W., Washington, D.C. 20591 There is no tuition cost to FAA employees. Travel expenses, if applicable, are the responsibility of the participant's organization. This two-hour seminar will provide an overview of theoretical and practical considerations related to determining the effectiveness of a training intervention. Areas covered will include: how to measure training effectiveness; standards, guidelines, and criteria for measuring effectiveness; requirements for a successful training intervention (including an organization's culture, policies, and reward system); and examples of how various approaches have been successfully employed. Enrollment is limited to 40 participants. To register, Learning Coordinators should e-mail the following information to Kelly W. Coachman: *Name;* (FAA EMPLOYEES); *Organization Name/Symbol;* (CONTRACTORS) *Company Name/Supported Organization Symbol; Phone; E-mail Address.*

This activity supports the Administrator's Flight Plan Goal for Organizational Effectiveness, Objective 1: Make the organization more effective with stronger leadership, increased commitment of individual workers to fulfill organization-wide goals, and a better prepared, better trained, safer, diverse workforce.

Point of Contact: Glen Hewitt, ATO-P R&D

William "Kip" Krebs Leaving the FAA: After spending nearly six years with the FAA**,** Kip Krebs has accepted a position at the Office of Naval Research (ONR). His last day at the FAA is Friday, August 4th. At the ONR, he will be responsible for the Human Systems Integration R&D program for the US Navy and Marine Corps. In the interim, Tom McCloy will manage day-to-day operations of the Aviation Maintenance, General Aviation, Vertical Flight, and Unmanned Aerospace Vehicle Human Factors Programs. We wish Kip the very best in his new position with ONR. (T. McCloy, ATO-P R&D)

Capstone Phase III Human Factors Assessment: Human factors representatives conducted a review of risks, costs, and benefits associated with the Capstone Phase III program development, and provided an updated Human Factors Assessment (HFA) to the program office. The HFA was prepared using the FAA guidelines for "Human Factors Assessments in Investment Analysis." The HFA becomes part of the program documentation and is summarized in the Investment Analysis Report prior to program review by the JRC. *This research activity supports the Administrator's Flight Plan Goal for Organizational Excellence, Objective 3: Make decisions based on reliable data to improve our overall performance and customer satisfaction.* (Glen Hewitt, ATO-P R&D)

Data Communication Human Factors Assessment: Human factors representatives conducted a review of risks, costs, and benefits associated with FAA Data Communications in support of Next Generation Air Transport System concepts. The Preliminary Human Factors Assessment was prepared using the FAA guidelines for "Human Factors Assessments in Investment

Analysis" to support the data communications Initial Investment Analysis Decision this August. The human factors assessment indicates that risks increase throughout the three segments of the Data Communications Program. Establishment of a data communications test bed and Human Factors Working Group are priority recommendations to mitigate these risks. As the initial data communications concepts develop into an emerging program, the test bed and associated analyses will generate the data required to base critical design decisions on factual data. *This research activity supports the Administrator's Flight Plan Goal for Organizational Excellence, Objective 3: Make decisions based on reliable data to improve our overall performance and customer satisfaction.* (G. Hewitt, ATO-P R&D)

NOTAMS Distribution Program (NDP) Human Factors Assessment: Human factors representatives conducted a review of risks, costs, and benefits associated with the Notices to Airman (NOTAMS) Distribution Program. The Human Factors Assessment was prepared using FAA guidelines for "Human Factors Assessments in Investment Analysis." Results indicate that the NDP human-to-system interfaces should undergo a more traditional design and development process for the program to realize its maximum benefits and be operationally suitable and acceptable to users. A human factors program can serve to mitigate risks and support the NDP in attaining benefit objectives. It is recommended that, as part of this program, a data collection and analysis plan be designed and implemented to quantify user performance prior to (for a baseline) and after NDS installation at operational sites representative of each class of users (Automated Flight Service Station, Air Route Traffic Control Center, Terminal Radar Approach Control, Air Traffic Control Tower). In addition, usability and suitability assessments should be conducted at these sites, using appropriate pre-tested survey instruments. *This research activity supports the Administrator's Flight Plan Goal for Organizational Excellence, Objective 3: Make decisions based on reliable data to improve our overall performance and customer satisfaction.* (Rebecca Gray, Glen Hewitt, ATO-P R&E)

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

Paul Krois
FAA (ATO-P R&D Human Factors)

August 1, 2006 - The International Journal of Aviation Psychology, Special Issue on Air Traffic Control Human Factors, CALL FOR PAPERS. Please contact Jim Hitt at hitt_james@bah.com <mailto:hitt_james@bah.com> or Mike McAnulty at mike.mcanulty@faa.gov <mailto:mike.mcanulty@faa.gov> with any queries, or to submit papers.

August 2, 2006 – Annual ATCA Golf Outing, Waldorf, MD *http://www.atca.org/home.asp*

August 1-3, 2006 – 27th National Aerospace FOD Prevention Conference, Seattle, WA www.nafpi.com

August 7-10, 2006 – SAE G-10 Aerospace Behavioral Engineering Technology Committee, Town & Country Hotel, San Diego, CA customerservice@sae.org

August 10-12, 2006 – LABACE, Sao Paulo, Brazil www.labace.aero

August 10-13, 2006 – American Psychological Association Annual Meeting, New Orleans, LA http://www.apa.org/convention05/future.html

August 21-24, 2006 - AIAA Modeling and Simulation Technologies Conference and Exhibit. Keystone Resort and Conference Center, Keystone, CO http://www.aiaa.org/content.cfm?pageid=1

August 21-24, 2006 - AIAA Guidance, Navigation, and Control Conference and Exhibit, Keystone Resort and Conference Center, Keystone, CO http://www.aiaa.org/content.cfm?pageid=1

August 29-31, 2006 – General Aviation Technology Conference & Exhibition, Wichita Hyatt, Wichita, KS http://www.sae.org/events/gat/

August 31 – September 3, 2006 - 2006 Biennial Meeting of the International Society for Comparative Psychology, Christchurch, New Zealand www.psyc.canterbury.ac.nz

September 6-8, 2006 - 11th AIAA/ISSMO Multidisciplinary Analysis and Optimization Conference, Renaissance Portsmouth, Portsmouth, VA, http://www.aiaa.org/content.cfm?pageid=1

September 6-7, 2006 - FAA-ATA 18th Annual International Symposium for Human Factors in Maintenance and Ramp Safety, Orlando, FL. www.airlines.org

September 8-13, 2006 – 75th NASAO Convention, New Orleans, LA www.nasao.org

September 10-14, 2006 - 54th International Congress of Aviation and Space Medicine, Bangalore, India. A preliminary registration form may be found at http://www.isam-india.org/conference44/newreg.php.

September 12-14, 2006 – 23rd International Air Cargo Forum and Exposition, Calgary, Ontario, Canada http://www.tiaca.org

September 19-21, 2006 – Space 2006, San Jose, CA www.aiaa.org

September 19-21, 2006 - 2006 Conference on Risk Analysis and Safety Performance in Aviation, Taj Mahal Hotel, Atlantic City, NJ
http://aar400.tc.faa.gov/flightsafety/conference2006.htm

September 20-22, 2006 – HCI-Aero 2006, Seattle, WA http://www.eurisco.org/hci-aero2006

September 21-22, 2006 – Aviation Training Asia 2006, Hong, Kong
http://www.centreforaviation.com/aviation/Conferences/Upcoming/Aviation_Training_Asia_2006/

September 26-27, 2006 – AIAA Aviation Technology, Integration and Operations Conference, Hyatt Regency, Wichita, KS http://www.aiaa.org/content.cfm?pageid=1

September 27-30, 2006 - 8th International Congress on the Study of Behavior, Santiago de Compostela, Spain http://www.ciec2006.com

October 8-11, 2006 - IEEE International Conference on Systems, Man, and Cybernetics, The Grand Hotel, Taipei, Taiwan http://ins.cn.nctu.edu.tw/smc2006/
March 1, 2006: Deadline for submission of papers (full papers only)

October 15-19, 2006 – Digital Avionics Systems Conference, 25th DASC Network Centric Environment: The Impact on Avionics and Systems, Hilton Portland and Executive Tower, Portland, OR www.dasconline.org
February 19, 2006 – Deadline for submitting abstracts of 1000 words

October 15-20, 2006 – 2nd Annual Augmented Cognition International Conference, Hilton San Francisco, San Francisco, CA www.augmentedcognition.org

October 16-20, 2006 – Human Factors and Ergonomics Society Annual Meeting, San Francisco Hilton, San Francisco, CA http://www.hfes.org/web/HFESMeetings/meetings.html
Key Date: September 8, 2006 – Early registration deadline

October 16-19, 2006 – ATA 49th Annual Non-Destructive Testing Forum, Ft. Worth, TX
www.airlines.org

October 17-19, 2006 – NBAA 59th Annual Meeting and Convention, Orlando, FL
http://web.nbaa.org/public/cs/amc/futuresites.php

October 23-25, 2006 – 44th Annual SAFE Symposium, Reno Hilton Hotel, Reno, NV
http://www.safeassociation.org/symposium.htm

October 23-26, 2006 - DoD Maintenance Symposium & Exhibition, Reno Hilton, Reno, Nevada
http://www.sae.org/events/conferences/aerospace/

October 23-26, 2006 – ADEAC2006, Atlanta, GA http://www.adeac2006.org/

October 25-27, 2006 – Cargo Facts 2006, Miami, FL ashoemaker@cargofacts.com

October 25-29, 2006 - Society for Physiology Research, 46th Annual Meeting Vancouver, BC, Canada www.sprweb.org/meeting/index.html

October 29, 2006 – 51st Annual ATCA Conference & Exposition, Marriott Wardman Park, Wash., DC *http://www.atca.org/home.asp*

November 9-11, 2006 – AOPA Expo 2006, Palm Springs, CA http://www.aopa.org/expo/2005/virtual/

November 13-14, 2006 ASTM F38 Unmanned Aircraft Systems Committee Workshop, Hyatt Regency, Atlanta, GA http://www.astm.org/

November 14-16, 2006 – Aerospace Testing Expo, Anaheim, CA www.aerospacetesting-expo.com

November 16-19, 2006 - Psychonomic Society Annual Meeting, Houston, Texas, USA www.psychonomic.org/meet.htm

November 17-19, 2006 – NBAA Annual Meeting and Convention, Orlando, FL www.nbaa.org

November 18-20, 2006 - Annual Meeting Society for Judgment and Decision-Making Houston, Texas, USA http://sql.sjdm.org

November 20-21, 2006 - Third International Conference on Enactive Interfaces Montpellier, France www.enactive2006.org

January 8-11, 2007 - 45th AIAA Aerospace Sciences Meeting and Exhibit, Reno Hilton, Reno, NV http://www.aiaa.org/content.cfm?pageid=1

January 9-10, 2007: FAA/AFS New Technologies Workshop II, Sheraton National Hotel, Arlington, VA. http://www.faa.gov/news/conferences/new_tech_2007/

January 27-31, 2007 - ASHRAE Winter Meeting**,** Dallas, TX jyoung@ashrae.org, or www.ashrae.org.

February 6-7, 2007 – ABACE, Hong Kong http://www.abace.aero/

February 13-15, 2007 – US Air Force T&E Days, Hilton San Destin Beach, Destin, FL http://www.aiaa.org/content.cfm?pageid=230&lumeetingid=1474&viewcon=submit

February 27, 2007 – CMAC 2007, Bangkok, Thailand *http://www.atca.org/home.asp*

March 1-3, 2007 – Heli-Expo, Orlando, FL http://www.heliexpo.com/

March 3-10, 2007 – IEEE Aerospace Conference, Big Sky, Montana http://www.aiaa.org/content.cfm?pageid=1&show=All

March 7-8, 2007 – Avionics 07 Expo XXI, Amsterdam http://www.avionics-event.com/avionics06/why_exhibit.html

March 9-11, 2007 - Human-Robot Interaction Conference 2007Washington, DC: http://www.hri2007.org/

March 19-21, 2007 – HSIS 2007, Lowe's Annapolis Hotel, Annapolis, MD. Note: Abstract deadline is July 31, 2006. Extensions may be approved by contacting: Adrian.Salinas@brooks.af.mil http://www.navalengineers.org/Events/HSIS2007

March 20-22, 2007 – PAMA 36th Annual Aviation Maintenance Symposium, Orlando, FL http://www.sae.org/events/conferences/aerospace/

April 17-23, 2007 – Sun 'n Fun, Lakeland, FL http://www.sun-n-fun.org/content/

April 22-26, 2007 – 2007 International Symposium on Aviation Psychology, Dayton, OH www.wright.edu/isap

May 9-12, 2007 - European Congress of Work and Organizational Psychology Stockholm, Sweden www.eawop2007.org

May 9-13, 2007 - 5th Biennial Conference of the International Academy for Intercultural Research http://www.interculturalacademy.org

May 21-22, 2007 - ASTM F38 Unmanned Aircraft Systems Committee Workshop, Waterside Convention Center, Norfolk, VA http://www.astm.org/

May 22-24, 2007 – EBACE, Geneva, Switzerland http://www.ebace.aero/

June 12-14, 2007 – WATS/RATS, Rosen Shingle Creek Resort in Orlando, Florida http://www.halldale.com/WRATS.aspx

June 18-24, 2007 - 47th International Paris Air Show Le Bourget http://www.paris-air-show.com/

June 23-27, 2007 – ASHRAE Annual Meeting, Long Beach, CA jyoung@ashrae.org, www.ashrae.org

July 23-29, 2007 – EAA AirVenture, Oshkosh, WI http://www.airventure.org/

July 22-27, 2007 – 12th HCI International, Beijing, China http://www.hcii2007.org/

August 16-19, 2007 - 112th Annual Convention of the American Psychological Association, San Francisco, California www.apa.org/convention

August 1-4, 2007 – CogSci 2007, Gaylord Opryland, Nashville, TN
http://www.cognitivesciencesociety.org/cogsci.html

August 23-26, 2007 - 2007 World Conference of Stress, Budapest, Hungary www.stress07.com

September 17-20, 2007 – SAE AeroTech Congress & Exhibition, Los Angeles, CA
http://www.sae.org/events/conferences/aerospace/

September 25-27, 2007 - NBAA 60th Annual Meeting and Convention, Atlanta, GA
http://web.nbaa.org/public/cs/amc/futuresites.php

October 1-5, 2007 – Human Factors and Ergonomics Society Annual Meeting, Baltimore Waterfront Marriott Hotel, Baltimore, MD
http://www.hfes.org/web/HFESMeetings/meetings.html

October 17-21, 2007 - Society for Physiology Research, 47th Annual Meeting
Savannah, Georgia http://www.sprweb.org

October 28, 2007 – 52nd Annual ATCA Conference & Exposition, Marriott Wardman Park, Wash., DC *http://www.atca.org/home.asp*

November 13-16, 2007 – DoD Maintenance Symposium and Exhibition, Rosen Shingle Creek, Orlando, FL http://www.sae.org/events/conferences/aerospace/

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

Comments or questions regarding this newsletter?
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or via e-mail at bill.ctr.berger @faa.gov