



AAR-100

Human Factors Newsletter # 04-08

April 10, 2004 – April 23, 2004

Technical Information: *Effects of Collocation and Reduced Lateral Separation Standards in the New York Integrated Control Complex.* Todd R. Truitt, Ph.D., D. Michael McAnulty, Ph.D., Ben Willems, M.A. William J. Hughes Technical Center.

Executive Summary: The National Airspace System (NAS) is under increasing pressure due to congested airspace in the northeast United States. The Federal Aviation Administration (FAA) does not expect this congestion to resolve itself due to the prediction of increasing air traffic and the lack of plans to construct new airways. Furthermore, the FAA has not updated the airspace design and procedures that certified professional controllers use quickly enough to keep pace with the increasing levels of air traffic. The New York Airspace Redesign Team has developed a concept of operations called the New York Integrated Control Complex (NYICC) to address the congested NAS. In addition to redesigning the structure of the airspace, there are two basic elements of the NYICC. First, it would collocate the New York terminal and en route facilities to improve communication and coordination between them. Second, it would expand the terminal airspace to reduce the number of transfer of control points and to move these points further from the airports to improve overall traffic flow. The expanded terminal airspace also would allow traffic sequencing, spacing, and holding to occur closer to the arrival airports.

The purpose of the present experiments was to test two components of the NYICC concept using a high fidelity, human-in-the-loop simulation. Engineering research psychologists conducted two experiments at the FAA William J. Hughes Technical Center's Research, Development, and Human Factors Laboratory. The first experiment examined the potential effects of collocation alone and collocation along with expanded terminal separation standards on the arrival traffic flow into Newark International Airport (EWR). The second experiment examined the same effects on the departure traffic flows primarily from EWR and LaGuardia Airport (LGA), but included other airports within the same airspace. Each experiment examined and compared three different conditions. The *normal* condition served as a baseline. In this condition, the participants controlled traffic as they normally would. A removable wall physically separated the terminal and en route sectors during the *normal* condition. During the *collocated* condition, we removed the wall separating the terminal and en route sectors, and the participants were allowed to engage in face-to-face (FTF) communication. The participants could also look at

each others' radar displays during this condition. During the *terminalized* condition, we collocated the terminal and en route sectors, and we reduced the separation standard for one or both en route sectors from five nautical miles (nm) to three nm. Throughout the experiments, we collected numerous measures including system performance, subjective ratings of workload, subject matter expert ratings of performance, communication behaviors, and participant opinion.

Overall, both experiments provided support for the NYICC concept of operations. In particular, the *terminalized* condition, (i.e., collocation of the terminal and en route facilities, along with expanded terminal separation standards) provided the greatest benefits compared to the *normal* condition. In the *terminalized* condition, the participants were able to increase the number of arrivals they could provide and the number of departures they could accept. They reduced the number and duration of holds, the number and duration of departure stops, and the time between departures. The participants also were able to reduce the number of landline communications while compensating with the use of FTF communication. The participants capitalized further on their *collocated* situation by looking at each other's radar displays and, thereby, improving their situation awareness of the air traffic situation. The *terminalized* condition caused some slight increases in the participants' taskload and workload; however, these increases did not exceed moderate levels. There were no negative effects on safety. The participants reported overall improvements in the ease of communication and coordination and in the use of airspace and traffic flow.

The experiment was limited in scope to the sectors, conditions, and air traffic scenarios that we used, but the overall result was positive for the NYICC concepts. We recommend further studies to examine the impact of the NYICC on other adjacent facilities such as air traffic control towers, ground control, adjacent air route traffic control centers, and traffic management units. Furthermore, researchers should further examine the concept of collocation to determine how best to arrange the terminal and en route sector positions to maximize the effectiveness of their communication and coordination. Finally, we anticipate that further benefits can be achieved through improved procedures and training to exploit the advantages of collocation and reduced separation standards.

Point of Contact: E. Stein, WJHTC

EUROCONTROL Experimental Centre News: The mission of the EUROCONTROL Experimental Centre (EEC) is to carry out research and development in order to improve Air Traffic Management (ATM) in Europe. A report is available from the EEC News that includes recent notes associated with safety assessment methods and a literature review on cognitive complexity in Air Traffic Control. To see the EEC News via your web-browser, please click on the following link: <http://www.eurocontrol.fr/Newsletter/2004/April>

In this issue you'll find:

- * Reduction in Delay Forecast for this summer
- * Future ATFM Measures: The Solution to Airspace Congestion?
- * What does the public know about ATM?
- * Sustainable Development: Oxymoron, Industry Buzzword?

- * Maastricht ATC Fair
- * CoSpace - Getting Down to Final Approach with ASAS
- * Preliminary ACAS/ASAS Interaction Analysis completed
- * Learning safety from other industries
- * TALIS 1 project finished successfully

Point of Contact: Paul Krois, AAR-100

Award: On July 5, 2004, FAA grant researcher Bob Helmreich (University of Texas) will receive the Royal Aeronautical Society's Roger Green Medal for a significant and lasting contribution to the theory or practical development of human factors as applied in aerospace. Congratulations! (E. Edens, AFS-230) <http://www.raes-hfg.com/>

Education: On April 7, 2004, an Engineering Research Psychologist from the NAS Human Factors Group served on a panel of judges for the Student Inventions through Education (SITE) regional competition. The National Talent Network which is a gifted and talented service of the Educational Information Resource Center (www.eirc.org) hosts the competition, held annually at the Ocean Life Center in Atlantic City, NJ. This year, 33 students in 5 age categories submitted either inventions or innovations for judging. The judges selected first and second place winners in each age category. (E. Stein, WJHTC)

ETMS: A Human Factors researcher from the NAS Human Factors Group (ACB-220) attended the Design Review of Version 7.9 of the Enhanced Traffic Management System (ETMS). Software engineers from the Volpe National Transportation Systems Center presented architectural as well as user interface designs planned for implementation in that release. User interface designs were presented for a Reroute Monitor capability that will allow Traffic Management Specialists to monitor the compliance status of rerouted flights, and a Domestic Reduced Vertical Separation Minimum (DRVSM) capability that will allow the Specialists to identify and monitor DRVSM non-compliant flights. (E. Stein, WJHTC)

Ground/Airborne Surveillance: A representative from the NAS Human Factors Group at the William J. Hughes Technical Center participated in the US-European Requirements Focus Group Application Definition Subgroup meeting at MITRE (McLean, VA) March 29 - Apr 1. The purpose of the subgroup is to develop the initial package of new ground and airborne surveillance operational applications. The ground applications include the use of Automatic Dependent Surveillance-Broadcast (ADS-B) data to supplement current en route and terminal radars, and to provide surveillance coverage in non-radar airspace. The airborne applications include using ADS-B and Traffic Information Service-Broadcast data for enhanced traffic situation awareness on the airport surface and in the air; enhancements to visual acquisition for see and avoid, successive visual approaches, sequencing and merging operations, and crossing and passing operations; and in-trail procedures in oceanic airspace. Approximately 20 representatives from government and industry reviewed and refined the draft applications. On April 1, the subgroup met with the Safety and Performance Requirements (SPR) Subgroup to brief them on the revised applications, the proposed work plan, and to receive a briefing on the SPR methodology. (E. Stein, WJHTC)

KSN: The FAA Knowledge Services Network (KSN) was highlighted in a dedicated session at the e-Gov 5th Annual Knowledge Management Conference (April 12-14, 2004). Ron Simmons moderated over speakers from AVR and ATO organizations who discussed KSN implementation and success in their organizations. For more information, point to the following links:

e-Gov = <http://www.e-gov.com>

e-Gov KM Conference= <http://www.e-gov.com/events/2004/km/>

FAA Session = <http://www.e-gov.com/events/2004/km/session.asp?show=60&sessType=1>]

Point of Contact: R. Simmons, AAR-100

HFAWG Meeting: The Human Factors (HF) Acquisition Working Group (HFAWG) meeting was conducted on April 15, 2004 at FAA HQ. The meeting was preceded by an informal gathering of AIR and AFS HF practitioners, in addition to those involved in systems acquisitions. The importance and challenges of developing the HF infrastructure in the new ATO were addressed. A preliminary staffing outline for the ATO was offered. The role of the annual HF Reviews, the HF Review process, the schedule for the reviews, and coordination to date with service area Vice President was summarized. The scheduling of HF Reviews is on-going in support of the FY04 ARA Performance Plan Objectives/Activity. The importance of HF requirements, the likely changes in the requirements process in the new ATO service areas, and some deficiencies in past HF requirements were discussed. There was a valuable discussion about the means by which HF makes its case in a strong "business case" environment. This area may deserve coordinated support from AAR-100 in the future. Some of the primary means of making the business case were enumerated. Volpe researcher Dr. Kim Cardosi presented her findings and conclusions about "Categorizing the Severity of Runway Incursions: Why, How, and Future Model." Some applications of the work were discussed, especially in terms of demonstrating "HF value-added" and enhancing terminal systems such as Airport Surface Detection Equipment/ASDE-X and the Airport Movement Area Safety System/AMASS. The next HFAWG meeting is scheduled for June 10, 9-11 a.m., Room 932, FOB10A. (G. Hewitt, AAR-100)

Weather Information Display: Research Triangle Institute (RTI), currently conducting a cockpit weather information display study for FAA and NASA, invites FAA and NASA aerospace researchers and other support personnel to learn more about its work developing an advanced cockpit weather information system consisting of decision-aiding and other innovations. Interested parties will receive the same briefings and will "fly" the same familiarization flights in the cockpit simulator that test pilots flew for a recently completed data collection effort. The briefings and familiarization flights will be conducted April 26 through May 7 in RTI's cockpit simulator in Hampton, VA. To schedule a time period to experience this simulation familiarization flight, interested persons should contact the Dr. Ray McAdaragh, at:

FAA R&D Field Office
NASA Langley Research Center
Phone: (757) 864-1941

Cell: (757) 503 2396
Raymon.mcadaragh@nasa.gov

*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)



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

April 27-29, 2004 – 49th Annual Corporate Aviation Safety Seminar, Tucson, AZ http://www.flightsafety.org/cass04_cfp.html

May 3-6, 2004 – SAE Aircraft Oxygen Equipment Committee, Anchorage, AK mlemank@sae.org

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

May 4, 2004 – *Research, Engineering and Development Advisory Committee (REDAC) meeting, Bessie Coleman Room, FAA Headquarters, Wash., DC* gloria_dunderman@faa.gov

May 6-8, 2004 - AHS International 60th Annual Forum and Technology Display, Virginia Beach, VA. Contact Staff@vtol.org

May 10-12, 2004 – Royal Aeronautical Society 10th 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

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 9-11, 2004 – FAA Human Factors Acquisition Working Group Meeting, Room 932, FOB10A, Wash., DC <mailto:glen.hewitt@faa.gov>

June 15-17, 2004 – SAE Digital Human Modeling for Design and Engineering Meeting, Oakland University, Rochester, Michigan <http://www.sae.org/calendar/aeromtg.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 22-August 2, 2004 – 52nd Annual EAA AirVenture Fly-In, Wittman Field, Oshkosh, WI
[EAA AirVenture Oshkosh 2004](http://www.eaa.org/airventure/oshkosh2004)

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

July 28 – August 1, 2004 – 112th 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/>

August 8-12, 2004 – 31st International Conference on Computer Graphics and Interactive Techniques, Los Angeles Convention Center, Los Angeles, CA
<http://www.vr.clemson.edu/eyetracking/etra/2004/>

August 23-27, 2004 - SAE G-10 Human Behavioral Performance Committee Semiannual Meeting, Seattle, WA <http://www.sae.org/standardsdev/aerospace/g10tag.htm>

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 48th Annual Meeting, Sheraton New Orleans Hotel, New Orleans, LA <http://www.hfes.org/>

September 27-29, 2004 – SAFE Association 42nd 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 – 18th 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

October 10-16, 2004 – ACM Multi-Media 2004, New York, NY <http://www.mm2004.org/>

October 12-14, 2004 – Shared Vision of Aviation Safety Conference, San Diego, CA
<http://www.aviationsafetyconference.com/index2.html>

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

October 13-15, 2004 – Sixth International Conference on Multimodal Interfaces, Penn State University, State College, PA <http://www.icmiplace.org/>

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 24-27, 2004 – UIST 2004, 17th Annual ACM Symposium on User Interface Software and Technology, Santa Fe, NM <http://www.acm.org/uist/>

October 25-28, 2004 – SAE S-9 Cabin Safety Technical Committee Meeting, San Diego, CA
mlemank@sae.org

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

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

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

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

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