Airspace Systems Program Newsletter

National Aeronautics and Space Administration

FY 2014 Quarter 4 July - September 2014

NASA's North Texas Research Station hosts NASA Administrator Bolden

On September 19, NASA's North Texas Research Station (NTX) in Fort Worth, hosted a visit from NASA's administrator, Charles Bolden, where he was provided with demonstrations and briefings of the Precision Departure Release Capability (PDRC) and Dynamic Weather Routes (DWR) technologies that NASA Ames Research Center has been developing in collaboration with the FAA's Fort Worth En Route Center and American Airlines. Mr. Bolden was accompanied by NASA Associate Administrator for Aeronautics, Dr. Jaiwon Shin, and Ames Deputy Center Director, Mr. Lewis Braxton III, as well as FAA Southwest Regional Administrator, Mr. Kelvin Solco. The administrator was given tours of the Fort Worth Center Traffic Management Unit and Dallas-Fort Worth (DFW) Airport Tower (where PDRC is operating), as well as the American Airlines Integrated Operations Center (IOC) (where DWR is currently undergoing operational evaluation). After the briefings and demonstrations, Mr. Bolden participated in a press conference that was hosted at American Airlines, moderated by DFW Airport's Executive Vice President for Operations, Mr. James Crites, and which included remarks by Mr. Solco, Mr. Sean Donohue (Chief Executive Officer of DFW Airport), and Mr. Robert Isom (Chief Operating Officer of American Airlines). All parties pledged to continue the strong partnerships that had already been exhibited by the successful technologies showcased during the administrator's visit. (POC: Shawn Engelland, Dave McNally)

American Airlines Dispatcher Airman and ATC Coordinator Mike Sterenchuck (seated right) demonstrates DWR to (standing left to right) David McNally, DWR Lead Engineer; Kimball Stone, Vice President of the American Airlines Integrated Operations Center; Lewis Braxton III, NASA Ames Deputy Center Director; Jaiwon Shin, Associate Administrator for the NASA Aeronautics Research Mission Directorate; (seated left to right) Kelvin Solco, FAA Southwest Regional Administrator and Charles Bolden, NASA Administrator

A Letter from the Director

As we wrap up fiscal year 2014, I'd like to take the opportunity to highlight some significant events from these past three months. I'm very proud of the efforts of our researchers, government and industry partners working together to deliver the Terminal Sequencing and Spacing to the FAA. The presence of the FAA Assistant Administrator for Next Gen, Ed Bolton, the FAA COO Terri Bristoll, of the Air Traffic Organization, and Tim Campbell, the Senior VP of Air Operations from American Airlines, at the TSS technology transfer ceremony in July demonstrated the value and importance of their partnership with NASA has been.   In another high power gathering, the NASA Administrator was hosted in Dallas this September by the FAA's Southwest Regional Administrator, Kelvin Solco, DFW Airport's Executive Vice President for Operations, James Crites, Sean Donohue, Chief Executive Officer of DFW Airport and Robert Isom, Chief Operating Officer of American Airlines. They, and others came together to recognize the significant contributions of ASP's Precision Departure Release Capability and Dynamic Weather Routing technologies.

Both of these events as well as recent efforts with partners US Airways and Charlotte-Douglas International Airport are evidence of our priority to grow our partnerships with airlines and airport operators. Expanding these partnerships is a key goal of NASA leadership to ensure that our research also supports the users and service providers in the system. Along this line, ASP is continuing efforts working with our partners to field test the Spot and Runway Departure Advisor in 2016.

These efforts and many others are in keeping with new ARMD strategy to focus on the three mega-drivers that will shape aeronautics research over the coming decades: Global Growth in Demand for High Speed Mobility, Global Climate Change, Sustainability, and Energy Use and Technology Convergence. To meet these challenges, we and our partners are driving towards providing safe and efficient global growth incorporating real-time system-wide safety assurance with an eye towards the future, beyond Next Gen, and the benefits available through increasing automation and growing elements of system autonomy. As we look and plan for the future, I hope you'll join ASP and our partners in providing the key technologies to get us there.

Dr. John Cavolowsky
Airspace Operations and Safety Program
NASA Aeronautics Research Mission Directorate

ASP Turns Over Next-Generation Air Traffic Management Tool to FAA, July 14, 2014

The Terminal Sequencing and Spacing (TSS) technology was presented to the FAA during a formal ceremony at FAA Headquarters. TSS will enable air traffic controllers to better manage spacing between aircraft as they fly more efficient approaches into airports, saving time and fuel, and reducing emissions, and is another step in NASA's support of NextGen development. "With TSS, NASA's aeronautics innovators have delivered to the FAA another valuable tool that will soon benefit our environment, our economy and every individual traveler," said Jaiwon Shin, NASA's Associate Administrator for Aeronautics Research. TSS enables the routine use of Performance Based Navigation (PBN) procedures, resulting in fewer course and altitude changes, while reducing the frequency of communications between controllers and pilots. The FAA is working to implement TSS, targeting an initial operating capability in 2018. (POC: Leighton Quon)

A picture of the CD used to represent the technology tran-sition from NASA to the FAA

Tim Campbell, American Airlines Senior VP of Air Operations, Jaiwon Shin, Associate Administrator for the NASA Aeronautics Research Mission Directorate; Terri Bristoll , FAA Chief Operating Officer, Air Traffic Organization, and Ed Bolton, FAA Assistant Administrator for NextGen, pose for a picture at the TSS Technology Transition Ceremony

Air Traffic Control Association President/CEO and Airspace Systems Program Director Reviews Air Traffic Management Research

On September 16th, 2014, Peter Dumont, President and CEO of the Air Traffic Control Association (ATCA) was hosted by Dr. John Cavolowsky, Director of NASA's Airspace Systems Program, for a review of the air traffic management research being conducted at NASA Ames. Research topics included Unmanned Aircraft System Traffic Management (UTM), Air Traffic Management Technology Demonstration – 1 (ATD-1), the Dynamic Weather Routes (DWR) tool, and a tour of Ames' Future Flight Central tower simulation facility used for airport surface management research. (POC: Katharine Lee)

Technical Interchange on Machine Learning for Automated Separation Assurance, July 18, 2014

A meeting was hosted at Ames Research Center (ARC) to discuss future directions for highly automated separation assurance systems. ASP researchers were joined by Professor Mykel Kochendorfer (Stanford University), and Professor Claire Tomlin (University of California at Berkeley). The discussions centered around how to improve the robustness and reliability of safety critical systems by using machine learning and historical data, and how to extend the current methods to handle different types of operations. Multiple different methods to extend and enhance the current research portfolio in these areas were presented, including using probabilistic inference, using hybrid systems in combination with system identification, and extending the methods used in developing the Airborne Collision Avoidance System-X (ACAS-X) to longer time horizons. The exchange was useful and informative as we prepare to chart the course for robust and efficient autonomous separation-assurance systems. (POC: Todd Lauderdale)

DLR Research Collaboration Continues in Airport Surface Research, July 28, 2014

Dr. Jörn Jakobi from the German Aerospace Agency (Deutsche Zentrum für Luft- und Raumfahrt, DLR) visited ARC to continue collaboration on a harmonized concept of operations of 4-D airport surface taxi operations. The team members further defined the scope of the concept and gained agreement on the high level concept elements. A draft of the concept is due by the end of December 2014. (POC: Yoon Jung)

RTCA SC-186 PLENARY AND WORKING GROUP 4 MEETING, July 15-17, 2014

Mike Koch and Bryan Barmore, attended an RTCA SC-186 (Automatic Dependent Surveillance-Broadcast [ADS-B]) Plenary Meeting and an SC-186 Working Group 4 meeting in Washington, DC. SC-186 Working Group 4 is currently developing the Minimum Operational Performance Standards (MOPS) for Flight Deck Interval Management (FIM). The Working Group 4 Meeting was scheduled to give an interim update between the last joint meeting with the parallel EUROCAE committee (early June) in Reykjavik, Iceland, and the next meeting in October to be hosted by NASA at the National Institute of Aerospace. The final version of the MOPS is expected to be released for final review and comment in January 2015. Several open issues were closed at this meeting. Data was presented from a recent ATM Technology Demonstration-1 (ATD-1) simulation to support requirements for limiting speed guidance based on current aircraft configuration. The SC-186 Group focused on status updates to several on-going activities. There was a comment from the Working Group 4 lead that future ADS-B applications would significantly benefit from additional information being made available over ADS-B and that he plans to recommend reopening the ADS-B link standards next year. (POCs: Mike Koch and Bryan Barmore)

CTD Participation at the International Conference on Human Computer Interaction in Aerospace (HCI Aero 2014), July 30 - August 1, 2014

Concepts and Technology Development Project (CTD) researchers participated in a conference held in Santa Clara, CA, which highlighted research and advancements in airspace operations. The HCI-Aero 2014 conference, which was sponsored by the Florida Institute of Technology, San Jose State University Research Foundation, and the University of Glasgow, was focused on advancements in integration and functional allocation, and also had a number of paper presentations focused on the concept and technologies supporting SPO and Unmanned Aerial Vehicles (UAV) (or Remotely-Piloted Airspace Systems). Participants presented technical work on SPO, Modeling and Simulation of Function Allocation concepts, and moderated a panel on the measurement of user workload in aviation and air traffic management research. The conference was attended by researchers from government, industry and academia from the US and Europe.

(POC: Katharine Lee)

Visit to American Airlines Operations, August 29, 2014

NASA researchers Banavar Sridhar and Kapil Sheth visited the American Airlines (AA) Operations Center, Fort Worth, TX on August 29, 2014. The purpose of their visit was to present an overview of the potential benefits of wind-optimal routes as compared to the current flight routes along the North Atlantic Track System to AA Flight Planning, Operations Coordinator/Dispatcher, Operations Planning and Decision Support and Operations Research departments. The audience included Mike Sterenchuck and Desmond Keany, key AA collaborators in NASA's Dynamic Weather Routing (DWR) research. Using examples of specific AA flights, the group discussed the influence of aircraft weight, airspace costs and winds on the generation of wind-optimal routes. The meeting provided NASA with an airline's view of non-fuel related costs associated with the generation of a good a flight plan. AA has promised to provide data about the AA transatlantic flights for better comparison of the benefits. AA also expressed interest in the analysis of the benefits of wind-optimal routes for flights within the United States.

(POC: Dr. Banavar Sridhar)

Meeting to Develop Future FAA research for Work Package 5, July 30, 2014

Representatives from the FAA's Advanced Methods program visited ARC to discuss their plans in the development of "Work Package 5." This group is responsible for defining the concept engineering work for functional enhancements to be fielded in support of the Traffic Flow Management System. The ASP and FAA teams discussed collaborations involving learning automation and post-operations training. The concept engineering and function/capability development will be completed between now and FY 2017. Deployment of this work package will likely be from FY2020-2024. This FAA group will continue to involve ASP in their development of Work Package 5.

(POC: William Chan)

Simulation Shakedown Runs Completed for Fully-Integrated ATD-1 Test (FIAT) #5, July 2014

During this past quarter, a series of shakedown simulations were completed in support of the Fully-Integrated ATD-1 Test (FIAT) #5 experiment. The first set of shakedown runs were conducted July 8-10, 2014. The objectives of FIAT-5 are to conduct Phoenix Airport arrival operations that have not been simulated in prior FIAT human-in-the-loop (HITL) simulations, including off-nominal events such as go-arounds and planned airport configuration changes. For these runs the Standard Terminal Automation Replacement System (STARS) software build and the NASA-enhanced Time-Based Flow Management (TBFM) release 3.12 were both utilized. This simulation of arrival operations will support the expected Operational Integration Assessment (OIA) requirements that are currently being defined. This simulation also represented the first time that the FIAT simulations included required navigation performance (RNP) radius-to-fix approach routes and independent and dependent (staggered) runway arrival operations to both West- and East-flow configurations. For this iteration of runs, the simulation team consolidated a list of reported and observed issues to prioritize corrective actions in preparation for the following series of runs. The second series of shakedown runs was conducted July 28-31, and focused on the Albuquerque Center (ZAB) airspace. The objectives of this series of runs were to validate the interoperability of Time-based Flow Management (TBFM) version 4.2 (upgraded from earlier version release 3.12) in the NASA Ames Research Center's air traffic control lab environment and to test the ground interval management for spacing (GIM-S) tool. GIM-S is a

new capability in TBFM 4.2 that provides speed advisories to Center controllers with the expectation that it will reduce the amount of radar vector instructions required. GIM-S started operational testing and evaluation (OT&E) simulations at the William J. Hughes Tech Center (WJHTC) in May 2014, and is planned to be operational in ZAB in September 2014. GIM-S is expected to provide the required meter-fix delivery accuracy needed for the Terminal Sequencing and Spacing (TSS) technologies. For FIAT-5, new user interfaces had to be developed for Center controllers' GIM-S displays. During the course of the shakedown, variations in operational concepts and phraseology were developed to accommodate GIM-S. By the end of the shakedown, a strategy was devised for GIM-S adaptation and usage to be tested in future FIAT-5 simulations. The third series of runs was completed during the week of September 8, 2014. Approximately 20 subjects participated during this session. The objectives of these runs were to validate the integration of the 4th STARS workstation in the Ames N210 ATC lab, examine procedures for a small set of off-nominal events, and examine some additional TSS functionality recently added in TBFM version 4.2. All objectives of the shakedown were met, with the fourth STARS workstation performing flawlessly. Multiple procedures for some off-nominal flights were explored to provide options for future TSS-operator participants who will manage off-nominal events as required. Data was captured from TBFM 4.2 to help prepare for the next shakedown that is scheduled to begin on the 29th of September. Prior to this next shakedown, Raytheon will deliver and demonstrate a new version of SCOUT (STARS CMS OpEval Upleveled Tools), the TSS-enhanced STARS prototype that will be used at the OIA in May 2015. (POC: Kevin Witzberger)

Analysis of FIAT simulation data

Workshop on Function Allocation for Separation Assurance and SPO, July 29, 2014

A half-day workshop was held at ARC to solicit community input on ASP's work in both Function Allocation for Separation Assurance and Single Pilot Operations (SPO) research. The Function Allocation for Separation Assurance session focused in obtaining feedback from the research community on which directions are important for determining the best allocation of separation assurance functions between humans and automation and between ground-based and airborne systems. The workshop had more than 90 participants with diverse backgrounds split fairly evenly between academia, industry, international organizations and NASA. A high-level overview of ASP research into function allocation for separation assurance was presented, the participants then were divided into groups to discuss various research areas and rank their importance to determine how functions should be allocated. The input gathered at this workshop will be used to guide ASP's Function Allocation research, which seeks to identify the separation assurance architecture that provides the best performance for the increased demand and diverse vehicle requirements of the future air traffic management system. The SPO session also included researchers from NASA, industry, and academia. Two important aspects of SPO were discussed: normal operation and non-normal (including off-nominal, abnormal, and emergency operations). The normal operations discussions centered around peak workload areas in current two-crew operations where both pilots are very busy – the closer the aircraft is to the terminal gate, the higher the workload, with preflight being the busiest period. In addition, social and human aspects were discussed such as Crew Resource Management with only one crewmember, loneliness and boredom, and biological needs. The non-normal session described the reallocation of duties and tasks between the single pilot and experts on the ground, the difficulties in ground personnel quickly getting up to speed on the situation in order to provide assistance to the single pilot, the need to provide clear and expressive interfaces regarding the problem, and lastly, the general vulnerability of the current FAA software and hardware systems that would greatly affect Uninhabited Aerial Vehicles – which the SPO flight would become in the case of pilot incapacitation. (POC: Todd Lauderdale and Paul Schutte)

Completion of 6-Month Review for SMART NAS Contracts, July 8, 2014

A 6-month review was completed for the Shadow Mode Assessments Using Realistic Technologies of the National Airspace System (SMART NAS) contracts by a multi-center review panel. The SMART NAS contracts are 2-year tasks. The awardees are each creating and delivering an architectural design for a framework that will provide a plug-and-play capability for distributed simulations with NASA, FAA, and industry partners. This framework will support a variety of use cases including fast-time and real-time operations, and will facilitate testing of technology concepts in a realistic scenario with live data streams, controller instructions, and Flight Operation Centers. The 6-month Progress Reports demonstrated significant technical progress by the SMART NAS teams during the first quarter of their contracts. (POC: Trisha Glaab and Mike Guminsky)

SMART NAS Workshop with Boeing Design Team, August 2014

On August 20-21st, engineers from Boeing visited Langley Research Center to participate in a 2-day workshop with NASA researchers and developers. Boeing is supporting a NASA NRA tasked with designing a potential architecture for SMART NAS test bed. During this workshop, Boeing presented their ideas and options for the SMART NAS design and solicited feedback from prospective users of the system to insure the design will meet LaRC research needs. The workshop began with a group presentation by Boeing and a general question and answer session. Boeing then interviewed individual teams in break-out sessions and visit Langley simulation and flight labs to gather more specific details from each set of potential users.
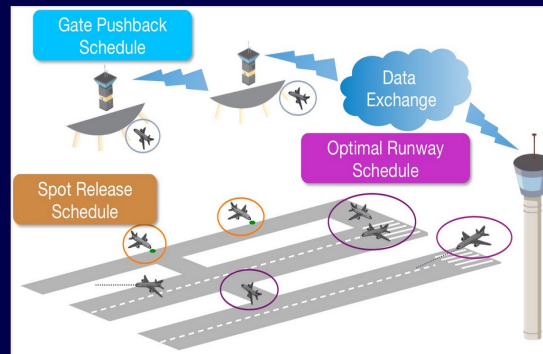
SARDA Field Testing, July– September, 2014

American Airlines and FAA Participate in SARDA Simulation Data Collection

The SARDA airport surface research team successfully completed a couple of simulations during the months of July and August this quarter in NASA Ames' FutureFlight Central (FFC) facility. The first simulation (July 28 – August 1, 2014) was the fourth in a series of six planned human-in-the-loop simulations to evaluate a surface scheduling technology, including ramp tower displays, using the Charlotte-Douglas International Airport (Charlotte, NC) (CLT) as the target airport in the simulation. American Airlines (formerly US Airways) personnel participated as ramp tower controllers in the experiment in which the team, for the first time, simulated the entire turnaround operation for a bank of flights from arrival to departure. FAA tower controllers from CLT also observed the simulation operations. The second simulation (also the fifth in the series of six planned human-in-the-loop simulations) further evaluated the surface scheduling technology. American Airlines personnel again participated as ramp tower controllers in the experiment in which the team simulated the new operational conditions added to scenarios previous simulated, including traffic flow management initiatives (e.g., Expected Departure Clearance Times and Miles-in-Trail restrictions). Also, a new feature for the scheduler function was added to advise ramp controllers of different taxiways to use in order to avoid congestion in the ramp area. Data was collected under "baseline" simulation conditions, representing current day operations with paper strips. An FAA tower controller and a supervisor from CLT also observed the simulation operations and provided valuable feedback. The next SARDA data collection human-in-the-loop simulation is scheduled for three weeks beginning the week of September 29. It is expected that the SARDA capability will eventually be tested in the American Airlines ramp tower at CLT within the next 2 years. (POC: Ty Hoang)

SARDA Researchers Meet with Airlines at Charlotte Airport, July 2014

Researchers from ASP's Spot and Runway Departure Advisor (SARDA) attended a couple of meetings with managers of US Airways Operations, Planning, and Performance (OPP) Airport ramp operations staff, and an ATC coordinator to discuss steps for field deployment and testing of SARDA at the US Airways ramp tower at Charlotte Douglas International Airport (CLT), July 1-2, 2014. During the meeting, the teams discussed scope/operational concept, installation and data connectivity, training, high level system architecture, and data requirements for integrating the SARDA tool in the ramp tower environment. A follow-on meeting was held July 29-30, to continue further technical discussions for identifying actions needed for integrating SARDA and American

Airlines (formerly US Airways) systems. The second meeting also included a representative from the FAA's surface operations office, Charlotte-Douglas International Airport (CLT) tower controllers, and American Airlines ramp tower and operations planning leads to further discuss their interest in supporting a field test of the SARDA capability at the American Airlines CLT ramp tower. Current surface automation technologies and surface operations at CLT were discussed. ASP provided an overview of its surface research and simulation efforts, and details on the core functions and user interface of SARDA. (POC: Yoon Jung)

SARDA creates metering advisories for runway usage, spot release into taxiways, and gate pushbacks

NASA and American Airlines meet to discuss SARDA Field Testing, September 18, 2014

On September 18, 2014, NASA managers and researchers met with the senior management team of American Airlines operations at American Airlines (AA) Headquarters in Fort Worth, Texas, to discuss the Spot and Runway Departure Advisor (SARDA) effort, and the plans to field test SARDA at the Charlotte-Douglas International Airport (CLT) American Airlines (AA) ramp tower. Meeting participants included Dr. John Cavolowsky, Program Director of Airspace Systems Program from NASA Headquarters, Dr. Thomas Edwards, Director of Aeronautics at NASA Ames Research Center, Mr. Tim Campbell, AA Senior Vice President of Air Operations, and Ms. Kerry Philipovich, AA Senior Vice President of Customer Experience. Dr. Yoon Jung, NASA's airport surface research lead, briefed the AA management team on the status of the SARDA project, including the ongoing human-in-the-loop simulations, requirements development, and the proposed schedule for field testing of the SARDA tool at the CLT ramp tower in 2016. Mr. Ilhan Ince, AA Managing Director of Operations Planning and Performance presented the AA perspectives on their participation thus far in the SARDA development and testing. The AA senior management team expressed strong endorsement for the SARDA project and recommended a more detailed assessment of the potential resource requirements, especially for IT resources from American Airlines, in order to install the SARDA tool at the CLT ramp tower for field testing. As a next step, NASA and American Airlines teams will meet in early November 2014 to continue this discussion. (POC: Yoon Jung)

Method to Enhance Scheduled Arrival Robustness (MESAR) Pilot Training and Data Collection Completed, September, 2014

The Method to Enhance Scheduled Arrival Robustness (MESAR) team completed two weeks of pseudo-pilot training with Subject Matter Experts (SMEs) and data collection with two different groups of participants from August 11-29, 2014. MESAR is an augmentation to the Traffic Management Advisor-Terminal Metering (TMA-TM) and Controller-Managed Spacing (CMS) tools, and includes an algorithm that is designed to handle perturbed schedule-based terminal area arrival operations. MESAR uses augmented displays with slot markers, timelines, and speed advisories to provide a graphical display of aircraft STAs (Scheduled Times of Arrival) and ETAs (Estimated Times of Arrival) to provide support for controllers to sequence, space, and merge aircraft and help controllers meet the schedule. During the data collection, three types of disturbances were tested to perturb the arrival schedule: missed approaches, pop-up VFR (visual flight rules) aircraft requiring emergency priority landing, and late arrivals that could not be speeded up to meet their schedule. Three ways of managing the perturbed schedule were tested: 1) automatically adjusted by the MESAR algorithm, 2) manually adjusted by the Traffic Management Coordinator (TMC), or 3) no schedule adjustment. The data will be used to evaluate the efficacy of tactical schedule adjustment in enhancing the robustness and resilience of schedule-based terminal area arrival operations. as well as compare characteristics of schedule adjustments performed by the MESAR algorithm and by the TMC. (POC: Jaewoo Jung and Savvy Verma)

Tactical Departure Scheduling Terminal Initial Shadow Evaluation Completed, July 2014

On July 31, NASA's Tactical Departure Scheduling – Terminal (TDS-T) team hosted FAA subject matter experts for an initial shadow evaluation at the North Texas Research Station (NTX) in Fort Worth, Texas. The TDS-T research activity addresses the challenge of simultaneously satisfying national, regional, and local departure constraints while accommodating traffic from both well-equipped and less-equipped airports. During the last year, the TDS-T team has: analyzed nationwide terminal departure operations to assess potential benefits and understand requirements, designed and evaluated a new terminal departure scheduling algorithm, and implemented the scheduling algorithm in a TDS-T prototype decision support tool. For this initial shadow evaluation, traffic management supervisors and front-line managers from Dallas/Fort Worth (DFW) TRACON and the air traffic control towers at DFW and Dallas Love airports interacted with the TDS-T prototype decision support tool in the NTX laboratory. The TDS-T prototype tool was running in shadow mode with live data feeds. Several TDS-T prototype user interfaces were configured to represent different terminal departure control environments: TRACON traffic management unit (TMU), large airport Tower, and small airport Tower. The FAA subject matter experts provided feedback on the TDS-T concept and the prototype tool. The TDS-T team will use this feedback to further refine the concept and technology in preparation for follow-on shadow evaluations in operational environments slated to begin later this year. (POC: Shawn Engelland)

NTX is utilized in all phases of NextGen research, beginning from early concept development through execution of operational field evaluations of advanced prototype systems

Tours of United Airlines Chicago Facilities, FAA Air Traffic Control Tower, and FAA TRACON, September 2014

On September 17 and 18, 2014, researchers from NASA Langley travelled to Chicago O'Hare International Airport (ORD) and met with Clay Hubbs (United Airlines, UAL) for briefings on and tours of United Airlines Chicago Facilities, the FAA Air Traffic Control Tower at ORD, and the FAA's Chicago O'Hare Terminal Radar Approach Control Facility (TRACON, C90) in Elgin, IL. The tours included UAL Pilot and Flight Attendant briefing and administrative/training areas, UAL System Operations Control (SOC) center, UAL Ramp Tower located at ORD, and FAA ORD City Tower. Captain Deron Johnson, UAL SOC Manager and Pilot, and Ms. Lee Taylor, Base Manager of Inflight Services, provided the briefings.

FAA Mini Global 1 Demonstration, September 2014

The Aviation Systems Division's Airspace Automation Technology Advisor, Mr. Tom Davis, attended the FAA's "Mini Global-1" Demonstration at the Daytona Beach, Florida NextGen testbed, September 16-18. The Mini Global Demonstration is an FAA international initiative to develop a concept of operations for electronically connecting disparate computer and messaging systems across the globe, through a defined, common interface that will be able to exchange System Wide Information Management (SWIM) data seamlessly. Currently, data is exchanged 'point-to-point' with separate interfaces for each country. The FAA has developed an Enterprise Messaging System (EMS) that serves as a central hub to share information utilizing standards for flight (FIXM), weather (WXXM) and aeronautical (AIXM) information. The Global data would automatically provide relevant information about individual flights, weather, and aviation resources (e.g., special use airspace) across international borders. International partners can either subscribe to the EMS system or create their own hub to interface with EMS, but in either case protocols are standardized. International partners for this demonstration included Canada, Australia, Asia-Pacific nations (Singapore, Japan, Korea, Thailand) and Portugal. The FAA will now initiate a Mini-Global-2 Demonstration project, to be completed in 2016, that will expand upon the current concept including messaging regarding traffic flow information utilizing the Traffic Flow Management (TMXM) standard. Some of the TMIXM messaging protocols and information were developed at NASA Ames Research Center and NASA was identified as a potential partner for developing "killer apps" for the overall concept. Mr. Davis also participated in an FAA demonstration of the Traffic Management Advisor for attendees from the Singapore Civil Aviation Authority. (POC: Tom Davis)

Recognitions

NASA's **Terminal Sequencing and Spacing** technology was featured in Sept. 8, 2014 Issue of Aviation Week & Space Technology.

Mr. William Johnson accepted invitation to join the Technical Program Committee (TPC) for the ENRI International Workshop on Air Traffic Management and Communication, Navigation, and Surveillance (EIWAC2015) – the 4th ENRI International Workshop on ATM/CNS – to be held in Ryogoku, Tokyo, Japan, Nov 17-19, 2015. As a TPC member, Mr. Johnson will participate in organizing technical sessions, reviewing papers and contributing to planning the technical program for the upcoming EIWAC2015. Mr. Johnson is the third international TPC member and the only member from the United States. He will be traveling to Tokyo twice next year in this role with all travel expenses graciously provided by ENRI.
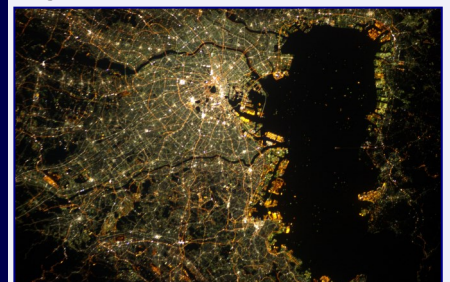
ASP in the News

Public Will Need To Trust Automation Before Used In Aviation

Aviation Week (8/11, Warwick) reports that in order for aviation to become more automated, the systems that would fly and manage air traffic will need to become more "trusted." Danette Allen, chief technologist for autonomy at the Langley Research Center, said, "Aviation has been very successful with a human-centric paradigm, the idea that it is humans that save the day," but now "there is a paradigm shift from automated to autonomous: automation is relegation; autonomy is delegation. … Autonomicity, or self-awareness, is a step beyond. The system can monitor its own state and self-configure, self-optimize, self-protect and self-heal." In order for people to trust all this to a machine, Allen believes there needs to be "new methods of verification and validation." Mark Moore, an aerospace engineer at the Langley Research Center, said, "Achieving high levels of trusted autonomy is a multibillion-dollar challenge that will take more than just aviation to achieve. … Aerospace will not lead this. It will take 20-30 years and by then there will be millions of driverless cars operating, collecting data the FAA will never get [from aviation]."

NASA Working On Traffic Control System for UAVs

The New York Times (9/1, Dougherty) reports that while there is "enthusiasm" in the industry for using UAVs for commercial ventures, there are still several technical challenges to overcome like how "to manage that menagerie of low-flying aircraft." Parimal H.

Kopardekar, who manages NASA's work toward developing the traffic control system for UAVs, said, "one at a time you can make them work and keep them safe. … but when you have a number of them in operation in the same airspace, there is no infrastructure to support it." The system NASA is developing is trying to autonomously determine "where [UAVs] can and cannot fly." Kopardekar said, "in agriculture, I'm hoping we will see some action inside of the next year," with the possibility of seeing UAVs deliver packages in rural

An experimental Google delivery drone in Queensland, Australia. Legal, social and financial hurdles for drone use remain. *Credit*: Google

areas maybe five years. However, according to the article, it may take longer to have UAVs making deliveries in cities. Kopardekar said, "there is the technology piece and then there is the public acceptance piece, and both have to evolve. … if they are taken over by some rogue elements, how do you manage them? How do you have them safely land and take off in the presence of a grandma doing landscaping and kids playing soccer?" SlashGear (9/1, Davies) cites the NYTimes piece in an article titled, "NASA's Drone Airspace Expert Clamps Down On Enthusiasm."Gizmodo (9/2) and The Verge (9/1, McCormick) also covered the story.

NASA Working On UAV Air Traffic Management System

Flight Global (9/18, Stevenson) reports on the unmanned air systems traffic management (UTM) system that NASA and Airware are creating together. The two groups will be able "to test and validate a wide range of scenario" that could one day allow for "safe low-altitude operations." The article notes that earlier this month, NASA sent out a solicitation inviting submissions from any organization interested in working with it on the UTM.