

CREATING THE FUTURE OF AVIATION

TECHNICAL & PROFESSIONAL ACTIVITIES · 2016



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MITRE

Creating the Future of Aviation

**Technical and Professional Activities
2016**

**The MITRE Corporation
Center for Advanced Aviation System Development
www.mitre.org**

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INTRODUCTION

I am pleased to introduce our seventeenth annual compendium of technical and professional accomplishments from MITRE's Center for Advanced Aviation System Development (CAASD). This booklet documents the many significant outreach and collaboration actions of MITRE staff in support of CAASD's mission: serving the public interest by advancing the safety, security, effectiveness, and efficiency of aviation in the United States and around the world.

This continues to be an exciting time for the aviation and aerospace communities. Unmanned aircraft and commercial space vehicles are inspiring innovative new business opportunities, but bring new operational and technical challenges in preserving the high level of safety and efficiency in today's system. New technologies, such as autonomy, mobile computing, data analytics, machine learning, and advanced sensors, will play a part in this evolving landscape, but also present research challenges. As the FAA deploys NextGen capabilities, which are now being widely used in daily air traffic management operations, new procedures and technologies offer airspace users opportunities for significant operational improvement and safety enhancement.

This is a highly collaborative community—one which relies on the free exchange of ideas and full consideration of all stakeholder viewpoints. In that spirit, CAASD staff publish and present extensively in order to share our ideas, obtain community feedback, and understand new perspectives. The papers, patents, awards, and other technical contributions documented here are testaments to the collaborative spirit of our staff.

We also thrive on intellectual challenges and opportunities to innovate. Through analytic and human-in-the-loop simulation, our staff bring future concepts and capabilities to life in our laboratories to explore the opportunities offered by these advancements, but also to understand their associated risks. Such advancement requires significant research, analysis, and understanding. Our staff's spirit of innovation and passion for advancing system operations are evidenced here. In order to ensure that our innovations have impact we actively manage the transition of our research and technology to government, industry, and other community stakeholders.

Also reflected in these pages is our diversity. Our work requires a broad range of operational experience and technical depth. Our staff include engineers, scientists, economists, pilots, controllers, traffic managers, former airline and military personnel, and more. They provide operational expertise in air traffic control, traffic flow management, and space operations, and technical expertise in systems engineering, computer science, operations research, human factors, economics, communications, navigation, surveillance, and other essential disciplines. We could not accomplish all that we do without this rich diversity of experience and thought.

Our staff inspire us by envisioning innovative ideas for future capabilities and by performing rigorous technical and operational analysis to ensure the viability of those ideas. The contributions and achievements documented here highlight the critical role CAASD and other MITRE staff are playing in making new ideas in aviation and aerospace operations a reality.



Lillian Z. Ryals
Senior Vice President, The MITRE Corporation
General Manager & Director,
Center for Advanced Aviation System Development



BOOKS, JOURNALS, AND PERIODICALS

Airline Consolidation: Monopoly Power or Mature Industry?” **Thomas P. Berry Jr., Katherine T. Harback, Simon Tsao, and Stephen K. Welman**, *TR News*, No. 304, pp. 46–51, July–August 2016, Transportation Research Board.

“Big Strides in Air Control,” John Reed, Uday Shankar, and **Lesley A. Weitz**, *Aerospace America*, Vol. 54, No. 11, p. 20, December 2016, American Institute of Aeronautics and Astronautics.

“Can Aircraft and Space Traffic Coexist?” **Lillian Z. Ryals**, *Aviation Week & Space Technology*, July 18, 2016, Aviation Week Network.

“End-to-End Time-Based Scheduling and Management: The Vision, The Progress,” **Marlis McCollum, Elida C. Smith**, *Managing the Skies*, Vol. 14, No. 6, pp. 20–25, November/December 2016, FAA Managers Association, Inc.

“MITRE/NASA Collaboration on Development of Terminal Sequencing and Spacing,” **Kathleen A. McGarry Peterson, Marlis McCollum**, and John E. Robinson III, *Managing the Skies*, Vol. 14, No. 4, pp. 16–21, July/August 2016, FAA Managers Association, Inc.

Books, Journals, and Periodicals

“Preparing for the Rise in Commercial Space Operations,” **Dean E. Fulmer** and **Marlis McCollum**, *Managing the Skies*, Vol. 14, No. 2, pp. 14-17, March/April 2016, FAA Managers Association, Inc.

“Safety on the Surface: A Low-Cost System for Runway Awareness,” **Marlis McCollum** and **Emily K. Stelzer**, *Managing the Skies*, Vol. 14, No. 3, pp. 18-20, May/June 2016, FAA Managers Association, Inc.

“Sense and Avoid for Unmanned Aircraft Systems,” Giancarmine Fasano, Domenico Accardo, Antonio Moccia, and **David R. Maroney**, *Aerospace and Electronic Systems Magazine—Tutorial X*, Vol. 31, No. 11, Part II of II, pp. 82–110, November 2016, Institute of Electrical and Electronics Engineers.

“Special Issue on Sense and Avoid for Unmanned Aircraft Systems: Part I,” **David R. Maroney** and Giancarmine Fasano, Co-Editors, *Aerospace and Electronic Systems Magazine*, Vol. 31, No. 7, July 2016, Institute of Electrical and Electronics Engineers, Aerospace and Electronic Systems Society.

“Special Issue on Sense and Avoid for Unmanned Aircraft Systems: Part II,” **David R. Maroney** and Giancarmine Fasano, Co-Editors, *Aerospace and Electronic Systems Magazine*, Vol. 31, No. 9, September 2016, Institute of Electrical and Electronics Engineers, Aerospace and Electronic Systems Society.

“Stochastic Optimal Control for Ground-Based Metering Operations,” **Travis L. Gaydos**, Worth Kirkman, and **Lesley A. Weitz**, *Journal of Air Transportation*, Vol. 24, No. 2, (2016), pp. 29–40, May 2016, American Institute of Aeronautics and Astronautics.

“Streamlining the IFR Clearance and Release Process,” **Paul A. Diffenderfer**, **Kevin M. Long**, and **Marlis McCollum**, *Managing the Skies*, Vol. 14, No. 1, pp. 18-21, January/February 2016, FAA Managers Association, Inc.

“The Solo Pilot Gets a Second Set of Eyes,” **Marlis McCollum**, **John R. Helleberg**, **Kevin M. Long**, **Matthew E. Pollack**, and **Jeffrey L. Stein**, *Managing the Skies*, Vol. 14, No. 5, pp. 14–19, September/October 2016, FAA Managers Association, Inc.

“Transforming Safety Decisions through Big Data Analytics,” **Saam Ahmadi**, *TR News*, No. 304, pp. 22–23, July–August 2016, Transportation Research Board.

“Verifying Required Communication Performance in Air Traffic Management,” **John C. Gonda III** and **Dongsong Zeng**, *Journal of Air Transportation*, Vol. 24, No. 1, pp. 9–17, January 2016, American Institute of Aeronautics and Astronautics.

Web Site Articles/Featured Opinion

“Applying Safety Science to Child Welfare,” **Christopher M. Teixeira**, **Mark D. Thomas**, and **Edward B. Walsh**, The Chronicle of Social Change Website, November 28, 2016.



CONFERENCE PARTICIPATION

Conferences are an important part of CAASD's outreach to the global aviation community. CAASD staff participate in numerous ways: as presenters, moderators, panelists, chairs, and attendees in order to share their work, learn from other experts, make connections, and inform the aviation community about our unique FFRDC role.

CAASD has Conference Coordinators whose role is to champion and manage staff participation where we will have a significant presence or exhibition. The conferences for which CAASD has designated Conference Coordinators are listed below, along with the assigned Conference Coordinators.

Conference	Coordinator
Air Line Pilots Association (ALPA) Air Safety Forum	Wallace N. Feerrar
Air Traffic Control Association (ATCA) Annual Conference and Exposition	David G. Hamrick
Air Traffic Control Association (ATCA) Aviation Cyber Security Day	Joseph M. Veoni
Air Transport and Operations Symposium (ATOS)	David R. Maroney
AirTOp User Conference	John A. Kuchenbrod

Conference Participation

Conference	Coordinator
American Association of Airport Executives (AAAE) <ul style="list-style-type: none"> • Aviation Security Summit • Conference and Exposition • Issues Conference 	Douglas L. Molin
American Institute of Aeronautics and Astronautics (AIAA) Aviation Conference	David R. Maroney
American Institute of Aeronautics and Astronautics (AIAA) SciTech Conference	Lesley A. Weitz
American Meteorological Society (AMS) Annual Meeting	Matthew J. Fronzak
Association for Unmanned Vehicle Systems International (AUVSI) Xponential Conference	Andrew R. Lacher
Avionics for NextGen	Sean F. McCourt
Civil Air Navigation Services Organization (CANSO) Asia-Pacific Conference	Miyoun L. (Mimi) Dobbs
Civil Air Navigation Services Organization (CANSO) World ATM Congress	Miyoun L. (Mimi) Dobbs
Congress of the International Ergonomics Association	Valerie Gawron
Digital Avionics Systems Conference (DASC)	Hilton Bateman
Embry-Riddle Aeronautical University's Space Traffic Management Conference	Dean E. Fulmer
FAA Commercial Space Transportation Conference	Dean E. Fulmer

Conference Participation

Conference	Coordinator
FAA/EUROCONTROL ATM R&D Conference	Craig R. Wanke
FAA Managers Association (FAAMA) Annual Gathering of Eagles Conference	Michael L. Klinker
FAA UAS Symposium	Hassan Shahidi
Human Factors and Ergonomics Society Annual Meeting	Valerie Gawron
Institute of Electrical and Electronics Engineers (IEEE) Conference on Intelligent Data Understanding	Andrew R. Lacher
Institute of Electrical and Electronics Engineers (IEEE) International Systems Conference	Glenn F. Roberts
Institute of Navigation (ION): <ul style="list-style-type: none"> • GNSS+ • International Technical Meeting • Joint Navigation Conference • Pacific PNT Conference • ION/IEEE Position, Location, and Navigation Symposium (PLANS) 	Christopher J. Hegarty
Integrated Communications, Navigation, and Surveillance (ICNS)	Amal Srivastava
International Conference on Applied Human Factors and Ergonomics	Valerie Gawron
International Symposium on Aviation Psychology	Valerie Gawron
MIT Lincoln Laboratory Air Traffic Control Workshop	David G. Hamrick
Munich Satellite Navigation Summit	Christopher J. Hegarty

Conference Participation

Conference	Coordinator
National Air Traffic Controllers Association (NATCA) Communicating for Safety Conference	Douglas L. Molin
National Business Aviation Association (NBAA) Friends and Partners of Aviation Weather	Matthew J. Fronzak
RTCA Annual Symposium	Deborah A. Kirkman
Space Foundation's Space Symposium	Dean E. Fulmer
Transportation Research Board (TRB) Annual Meeting	Laurence F. Audenaerd
University of New Mexico's UAS Technical Analysis and Applications Center (TAAC) Conference	Andrew R. Lacher
U.S. Chamber of Commerce's Annual Aviation Summit	Cheryl A. Croft
Women in Aviation International (WAI) Conference	Elida C. Smith
Worldwide TAAM User Group Meeting	Jonathan H. Hoffman

“2016 Federal Mobile Computing Summit Report,” White Paper, **R. Patrick Benito**, MITRE–Advanced Technology Academic Research Center (MITRE–ATARC) Mobile Collaboration Symposium, April 6, 2016, Washington, DC.

“ADS-B Surveillance in High Density SUAS Applications at Low Altitudes,” **R. Michael Guterres**, **Stanley R. Jones**, **Sebastian V. Massimini**, and **Robert C. Strain**, *Proceedings of the International Symposium on Enhanced Solutions for Aircraft and Vehicle Surveillance Applications Conference*, April 7–8, 2016, Berlin, Germany.

“Advancing the Trustworthiness of Automated Driving,” **Andrew R. Lacher**, presented at the Transportation Research Board 95th Annual Meeting, January 10–14, 2016, Washington, DC.

“AeroMACS Spectrum: Ready for Use,” **Dean F. Lamiano**, presented at the Avionics for NextGen Conference, September 28–29, 2016, Chantilly, VA.

“Agile Acquisition: FAA Incentives to Change their Acquisition Policies,” **Hugh G. Goodwin**, **Michael E. Liggan**, **Avinash Pinto**, **Siroos Sekhavat-Tafti**, **Amanda M. Staley**, and **Nadya K. Subowo**, presented at the Systems Engineering in DC (SEDC) 2016 Conference, March 31–April 2, 2016, Chantilly, VA.

Conference Participation

“Air Traffic Controller Utilization of Voice and Data Link Communications During Interval Management,”

Randall S. Bone and **Kevin M. Long**, *Proceedings of the 2016 Integrated Communications, Navigation, and Surveillance (ICNS) Conference*, April 19–21, 2016, Herndon, VA.

“Air Traffic Management Simulation and Environmental Modeling,” **Jonathan H. Hoffman**, presented at the Transportation Research Board 95th Annual Meeting, January 10–14, Washington, DC.

“Analyses and Simulations for Aeronautical Mobile Airport Communications System,” **Donald S. Arnstein**, **Francis Box**, **Izabela L. Gheorghisor**, **Leonid Globus**, and **Vinay Lakshminarayan**, *Proceedings of the 2016 Integrated Communications, Navigation, and Surveillance (ICNS) Conference*, April 19–21, 2016, Herndon, VA.

“Analyzing the Validity of Selective Mutation with Dominator Mutants,” **Mariet S. Kurtz**, Paul Ammann, Márcio E. Delamaro, Nida Gökçe, Bob Kurtz, and Jeff Offutt, *Proceedings of the 2016 24th ACM SIGSOFT International Symposium on Foundations of Software Engineering*, November 13–18, 2016, Seattle, WA.

“Applicability of Lessons Learned from Aviation Safety Management System for Automated Vehicles,” **Andrew R. Lacher**, presented at the AUVSI Automated Vehicles Symposium, July 19–21, 2016, San Francisco, CA.

“Are We There Yet? How Redundant and Equivalent Mutants Affect Determination of Test Completeness,” **Mariet S. Kurtz**, Paul Ammann, Bob Kurtz, and Jeff Offutt, presented at The IEEE International Conference on Software Testing, Verification and Validation (ICST) 11th International Workshop on Mutation Analysis, April 10, 2016, Chicago, IL.

“Assessing Factors that Affect the Safety of Space Launch and Re-entry Operations in the National Airspace System,” **Jonathan L. Schwartz**, **Jon L. Semanek**, **Zheng Tao**, **Ganghuai Wang**, and **Ashley G. Williams**, presented at the American Institute of Aeronautics and Astronautics (AIAA) Space 2016 Conference, September 13–15, 2016, Long Beach, CA.

“Assessing Surveillance Performance Requirements for Air Traffic Control During Space Launch and Re-entry Operations,” **Zheng Tao** and **Ashley G. Williams**, presented at National Space & Missile Materials Symposium / Commercial and Government Responsive Access to Space Technology Exchange, June 20–23, 2016, Westminster, CO.

“Assessment of Delivery Accuracy in an Operational Like Environment,” Shivanjli Sharma and **Mitchel Wynnyk**, *Proceedings of the American Institute of Aeronautics and Astronautics (AIAA) Aviation 2016 Conference*, June 13–17, 2016, Washington, DC.

Conference Participation

“ATM-Weather Integration (AWI) Gap Analysis of the NAS Segment Implementation Plan (NSIP),”

Matthew J. Fronzak and **Claudia V. McKnight**,
Proceedings of the 2016 Integrated Communications, Navigation, and Surveillance (ICNS) Conference,
April 19–21, 2016, Herndon, VA.

“Capacity of Spectrum Available for Unmanned-Aircraft Command and Control Links,” **Francis Box**,
Leonid Globus, and **Richard E. Snow**, *Proceedings of the 2016 Integrated Communications, Navigation, and Surveillance (ICNS) Conference*, April 19–21, 2016, Herndon, VA.

“Challenges in Developing an Aviation Operational Performance Dashboard,” **Wayne W. Cooper Jr.**,
Ehsan Esmaeilzadeh, **Robert C. Flynn**, and
Phillip D. Schrader *Proceedings of the 2016 Integrated Communications, Navigation, and Surveillance (ICNS) Conference*, April 19–21, 2016, Herndon, VA.

“Closing The Loop: Testing for IM Avionics Certification,”
D. Stuart Bowman, **David J. Elliott**, Brenda Perez, and
Don Walker, *Proceedings of the American Institute of Aeronautics and Astronautics Science and Technology Forum and Exposition 2016*, January 4–8, 2016, San Diego, CA.

“Collaborative Aviation Weather Statement (CAWS), Supporting Air Traffic Management (ATM) with Aviation Weather Constraint Forecasts,” **John J. Huhn** and Kevin Johnston, *Proceedings of the American Meteorological Society 96th Annual Meeting*, January 10–14, 2016, New Orleans, LA.

“Concept Maturity Framework,” **Christopher T. DeSenti** and **Constance E. Morgan**, presented at the FAA 11th Annual Verification and Validation Summit, September 14–15, 2016, Atlantic City, NJ.

“On Consumer-Driven Innovation,” Engineering Innovation Panel: Creating Disruptive Interdisciplinary Innovation in Engineering, **Glenn F. Roberts**, Panelist, 10th Annual School of Engineering and Applied Science Student R&D Showcase, George Washington University, February 22, 2016, Washington, DC.

“Continuous Mobile Integration,” **Jeffrey L. Stein**, Session Lead, Federal Mobile Computing Summit, The MITRE Corporation and the Advanced Technology Research Center, April 6, 2016, Washington, DC.

“Counter Drone Technology: Counteracting UAS for Safety’s Sake,” **Andrew R. Lacher**, Panel Moderator, Drone World Expo, AUVSI XPONENTIAL, November 14–16, 2016, San Jose, CA.

Conference Participation

“Counter UAS Challenges & Technologies,”

Andrew R. Lacher, presented at the Technology Training Corporation’s Civil and Commercial Drone Systems and Counter Drone Technologies Symposium, June 23–24, 2016, Arlington, VA.

“Counter-UAS Concepts and Technologies,”

Andrew R. Lacher, Panelist, NASA’s Unmanned Aircraft System Traffic Management (UTM) Convention 2016, November 8–10, 2016, Syracuse, NY.

“A Cross-Generational Industry Perspective,”

Lillian Z. Ryals, Panel Moderator, 61st Air Traffic Control Association (ATCA) Conference and Exhibit 2016, October 16–19, 2016, National Harbor, MD.

“Current Topics in Air Carrier Competition,”

Katherine T. Harback, Session Chair, Transportation Research Board 95th Annual Meeting, January 10–14, 2016, Washington, DC.

“Cyber-Resiliency in Transportation,” **Andrew R. Lacher**, *Proceedings of the 2016 Integrated Communications, Navigation, and Surveillance (ICNS) Conference*, April 19–21, 2016, Herndon, VA.

“Deep Learning for Extracting Word-level Meaning from Safety Report Narratives,” **David Chanen**, *Proceedings of the 2016 Integrated Communications, Navigation, and Surveillance (ICNS) Conference*, April 19–21, 2016, Herndon, VA.

“Defining an Error Budget for Required Interval Management Performance,” **Lesley A. Weitz**, Ian Levitt, and Johan Martensson, *Proceedings of the American Institute of Aeronautics and Astronautics Science and Technology Forum and Exposition 2016*, January 4–8, 2016, San Diego, CA.

“Designing Stochastic Optimal Control Laws for Interval Management,” **Travis L. Gaydos** and **Lesley A. Weitz**, *Proceedings of the American Institute of Aeronautics and Astronautics Science and Technology Forum and Exposition 2016*, January 4–8, 2016, San Diego, CA.

“Developing a Real-Time Monitoring and Alerting Capability for Traffic Flow Management,” **Hilton Bateman**, **James S. DeArmon**, and **Shin-Lai Tien**, *Proceedings of the 35th Digital Avionics Systems Conference (DASC)*, September 25–29, 2016, Sacramento, CA.

“Digital Copilot,” **Matthew E. Pollack** and **Jeffrey L. Stein**, presented at the National Business Aviation Association - Business Aviation Convention and Exhibition (NBAA-BACE), November 1–3, 2016, Orlando, FL.

Conference Participation

“Digital Copilot: Cognitive Assistance for Pilots,” **Kevin J. Burns, Steven L. Estes, John R. Helleberg, Kevin M. Long, Matthew E. Pollack,** and **Jeffrey L. Stein**, *Proceedings of the Association for the Advancement of Artificial Intelligence Fall Symposium*, November 17–19, 2016, Arlington, VA.

“Emerging Autonomy Operations: Defense and Security,” **Andrew R. Lacher**, presented at the American Institute of Aeronautics and Astronautics (AIAA) Intelligent Systems Workshop, August 3–5, 2016, Hampton, VA.

“Enhancing GTAP with Tourism Flows and Domestic Transportation Margins,” **Shane L. Martin** and Everett Peterson, presented at the Global Trade Analysis Project’s 19th Annual Conference on Global Economic Analysis, June 15–17, 2016, Washington, DC.

“Estimating Mode Choice for Freight Shipments Using the Confidential Commodity Flow Survey,” **Daniel T. Brown** and **Shane L. Martin**, presented at the Southern Economic Association 86th Annual Conference, November 19–21, 2016, Washington, DC.

“Estimating Over-Conservatism in Airspace Constraint Management,” **Hilton Bateman, John Conroy,** **James S. DeArmon,** and **Simon H. Heitin**, *Proceedings of the American Institute of Aeronautics and Astronautics (AIAA) Aviation 2016 Conference*, June 13–17, 2016, Washington, DC.

“Evaluating the Impact of Estimated Time of Arrival Accuracy on Interval Management Performance,”
Xiaoli Bai, **Stephanie A. Priess**, and **Lesley A. Weitz**,
Proceedings of the American Institute of Aeronautics and Astronautics (AIAA) SciTech 2016 Conference,
January 4–8, 2016, San Diego, CA.

“Evaluating the Safety of Launch and Reentry Operations in the National Airspace System,” **Jonathan L. Schwartz**,
Jon L. Semanek, **Zheng Tao**, **Ganghuai Wang**, and
Ashley G. Williams, FAA Center of Excellence for
Commercial Space Transportation Sixth Annual Technical
Meeting, October 11–14, 2016, Las Cruces, NM.

“Evaluation of Flight Deck Procedures Used in the Designation of Traffic for Tailored Collision Avoidance Logic,” **Steven L. Estes**, **John R. Helleberg**, and
Jennifer A. McLachlan, *Proceedings of the Human Factors and Ergonomics Society Annual Meeting*,
September 19–23, 2016, Washington, DC.

“Examining the Effectiveness of a Traffic Flow Management Course for Air Traffic Control Students,”
Valerie Gawron, **Roberta L. Zimmerman**, Vernol
Battiste, Jillian Keeler, Adriana Miramontes, Thomas
Z. Strybel, and Kim-Phuong L. Vu, *Proceedings of the Human Factors and Ergonomics Society Annual Meeting*,
September 19–23, 2016, Washington, DC.

Conference Participation

“Examining Time to Evacuate Dynamically Activated Aircraft Hazard Areas,” **Jonathan L. Schwartz, Jon L. Semanek, Zheng Tao, Ganghuai Wang, and Ashley G. Williams**, *Proceedings of the Embry-Riddle Space Traffic Management Conference 2016*, November 16–18, 2016, Daytona Beach, FL.

“Exploring Necessary Altitude Awareness and Response Times for Air Traffic Control during Space Launch and Reentry Vehicle Operations,” **Jonathan L. Schwartz, Jon L. Semanek, Zheng Tao, Ganghuai Wang, Paul D. Wilde, and Ashley G. Williams**, *Proceedings of the 8th International Association for the Advancement of Space Safety (IAASS)*, May 18–20, 2016, Melbourne, FL.

“FAA Air Traffic Flow Management: Why, How, & the Future,” **Marcus Smith**, presented at the University of Massachusetts Transportation Center, April 28, 2016, Amherst, MA.

“GAJSC and GA ASIAS,” **Jeffrey P. Mittelman** and Corey Stephens, presented at the Embraer Jet Operators Association Phenom Conference & Embraer Executive Operators Conference (EEOC2016), May 18–21, 2016, Santa Fe, NM.

“GPS Receiver Performance Degradation in the Presence of Faded Interference,” **Christopher J. Hegarty**, Louis K. Dressel, Per K. Enge, Swen D. Ericson, Terence L. Johnson, Karl W. Shallberg, and Kyle D. Wesson, *Proceedings of the 2016 International Technical Meeting of The Institute of Navigation*, January 25–28, 2016, Monterey, CA.

“GPS/GNSS Antenna Characterization,” **Christopher J. Hegarty**, presented at the Department of Transportation GPS Adjacent Band Compatibility Workshop V, October 14, 2016, Washington, DC.

“How Low Cost Carriers Have Affected Air Fares Over the Last Decade,” **Daniel T. Brown**, presented at the Transportation Research Board 95th Annual Meeting, January 10–14, 2016, Washington, DC.

“Human Factors in the Design of Workplace Wellness Programs,” **Valerie Gawron** and **Gregory M. Nelson**, Panelists, SIM University Symposium on Human Factors in Healthcare, August 22, 2016, Singapore.

“Identification, Quantification and Mitigation of ATM-Weather Integration Gaps for NSIP Increments Dependent on Weather Information,” **Matthew J. Fronzak** and **Claudia V. McKnight**, Poster session: Aviation’s Usable Regions of Airspace, Hazards, and Mitigations at the American Meteorological Society (AMS) 96th Annual Meeting, January 10–14, 2016, New Orleans, LA.

Conference Participation

“Impact of Runway Closures on Arrival Flows at a Major Metropolitan Airport,” **John Conroy, James S. DeArmon, and Tudor Masek**, *Proceedings of the American Institute of Aeronautics and Astronautics (AIAA) Aviation 2016 Conference*, June 13–17, 2016, Washington, DC.

“Impacts of Weather on the Nation’s Aviation System,” **Matthew J. Fronzak and Michael Robinson**, Session Co-chairs, American Meteorological Society (AMS) 96th Annual Meeting, January 10–14, 2016, New Orleans, LA.

“Integrating ATM Applications Globally: Creating a Harmonized ATM System,” **Stephane L. Mondoloni**, Panelist, 61st Air Traffic Control Association (ATCA) Conference and Exhibit 2016, October 16–19, 2016, National Harbor, MD.

“Integrating Avionics Standards with Ground ATM Systems to Meet 2025 Operational Needs,” **Mahesh Balakrishna, Thomas A. Becher, Roland M. Sgorcea, and William L. Symionow**, *Proceedings of the 35th Digital Avionics Systems Conference (DASC)*, September 25–29, 2016, Sacramento, CA.

“Interval Management: Development and Implementation of an Airborne Spacing Concept,” **Randall S. Bone**, **William J. Penhallegon**, and **Lesley A. Weitz**, *Proceedings of the American Institute of Aeronautics and Astronautics (AIAA) SciTech 2016 Conference*, January 4–8, 2016, San Diego, CA.

“Invited Session: Interval Management: Avionics Algorithms and Performance Analysis,” **Lesley A. Weitz**, Session Chair, The American Institute of Aeronautics and Astronautics (AIAA) SciTech 2016 Conference, January 4–8, 2016, San Diego, CA.

“Invited Session: Interval Management: Operational Concept, Integration, and Benefits,” **William J. Penhallegon**, Session Chair, The American Institute of Aeronautics and Astronautics (AIAA) SciTech 2016 Conference, January 4–8, 2016, San Diego, CA.

“Introduction to Simple Workload Models Using Cogulator,” **Steven L. Estes**, *Proceedings of the Human Factors and Ergonomics Society Annual Meeting*, September 19–23, 2016, Washington, DC.

“Learning Automation for Traffic Flow Management Decision Support,” **Christine P. Taylor**, **Erik P. Vargo**, and **Craig R. Wanke**, *Proceedings of the American Institute of Aeronautics and Astronautics (AIAA) Aviation 2016 Conference*, June 13–17, 2016, Washington, DC.

Conference Participation

“Leveraging Interval Management to Improve Air Traffic Operations during Departure,” **Craig A. Guensch, Brock J. Lascara**, Peter M. Moertl, and **Lesley A. Weitz**, *Proceedings of the American Institute of Aeronautics and Astronautics (AIAA) SciTech 2016 Conference*, January 4–8, 2016, San Diego, CA.

“Low Cost Surface Awareness Technology and Demonstration,” **Hilton Bateman, Shuo Chen, Ronald S. Chong, Jacob Richkus**, and **Emily K. Stelzer**, *Proceedings of the 35th Digital Avionics Systems Conference (DASC)*, September 25–29, 2016, Sacramento, CA.

“Measuring Flight Efficiency in the National Airspace System,” **Wayne W. Cooper Jr., James S. DeArmon**, and **Tudor Masek**, *Proceedings of the American Institute of Aeronautics and Astronautics (AIAA) Aviation 2016 Conference*, June 13–17, 2016, Washington, DC.

“MITRE AirTOp Update,” **John A. Kuchenbrod**, presented at the Air Traffic Optimization (AirTOp) User Workshop 2016, October 26, 2016, Singapore.

“The MITRE Corporation Countering Unauthorized UAS Challenge: A Case Study in Emerging Counter-Drone Research,” **Andrew R. Lacher**, presented at Defence IQ, Countering Drones Conference, December 6–8, 2016, London, United Kingdom.

“Mobility Solutions to Enhance Citizen Engagement,” **Matthew E. Pollack**, Session Lead, Federal Mobile Computing Summit, The MITRE Corporation and the Advanced Technology Research Center, April 6, 2016, Washington, DC.

“Modeling Uncertainty in Inter-Aircraft Spacing Between the Final Approach Fix and the Runway Threshold,” **Stephanie A. Priess, Hans P. Stassen,** and **Lesley A. Weitz**, *Proceedings of the American Institute of Aeronautics and Astronautics (AIAA) SciTech 2016 Conference*, January 4–8, 2016, San Diego, CA.

“A Monte Carlo Simulation Tool for Evaluating Space Launch and Re-entry Operations,” **Tudor Masek, Jonathan L. Schwartz, Ganghuai Wang,** and **Zheng Tao**, *Proceedings of the 2016 Integrated Communications, Navigation, and Surveillance (ICNS) Conference*, April 19–21, 2016, Herndon, VA.

“A More Complete Characterization of Transportation Margins in the USAGE Model,” **Daniel T. Brown, Katherine T. Harback, Shane L. Martin,** Peter Dixon, James Lennox, and Maureen Rimmer, presented at the 19th Annual Conference on Global Economic Analysis, June 15–17, 2016, Washington, DC.

“New Horizons in Aviation R&D: Balancing Innovation and Safety,” **Lillian Z. Ryals**, presented at the R&D 100 Conference, November 2–4, 2016, National Harbor, MD.

Conference Participation

“Operational Benefits of Parallel Offset Routes,”

Jonathan H. Hoffman, *Proceedings of the 2016 Integrated Communications, Navigation, and Surveillance (ICNS) Conference*, April 19–21, 2016, Herndon, VA.

“Operational Evolutions: Airport & Airspace Optimization/Operations (Track 6), Session B: Enabling Technologies,”

Ralf H. Mayer, Session Chair, 2016 Integrated Communications, Navigation, and Surveillance (ICNS) Conference, April 19-21, 2016, Herndon, VA.

“Operational Evolutions: Airport & Airspace Optimization/Operations (Track 6), Session E: Operational Evolutions

I,” **Thomas A. Becher**, Session Chair, 2016 Integrated Communications, Navigation, and Surveillance (ICNS) Conference, April 19-21, 2016, Herndon, VA.

“Operational Evolutions: Airport & Airspace Optimization/Operations (Track 6), Session F: Operational Evolutions

II,” **Thomas A. Becher**, Session Chair, 2016 Integrated Communications, Navigation, and Surveillance (ICNS) Conference, April 19-21, 2016, Herndon, VA.

“Operational Evolutions: Commercial, Military, and

Consumer UAS (Track 7), Session D: Data Communication

II,” **Ralf H. Mayer**, Session Chair, 2016 Integrated Communications, Navigation, and Surveillance (ICNS) Conference, April 19-21, 2016, Herndon, VA.

“Operational Evolutions: Performance-Based CNS/ATM (Track 7), Session C: Data Communication I,”

Ralf H. Mayer, Session Chair, 2016 Integrated Communications, Navigation, and Surveillance (ICNS) Conference, April 19-21, 2016, Herndon, VA.

“Overview of Speech Recognition Technology to Support Air Traffic Management,” **Robert M. Tarakan**, presented at SpeechTek 2016, May 23–25, 2016, Washington, DC.

“Performance Based Network Concept for Advanced Air Traffic Services,” **John C. Gonda III** and **Dongsong Zeng**, *Proceedings of the 2016 Integrated Communications, Navigation, and Surveillance (ICNS) Conference*, April 19–21, 2016, Herndon, VA.

“Performance-Based Navigation and Vertical Guidance,” **Sebastian V. Massimini**, presented at Eurasian Air Traffic Control Conference, September 28–30, 2016, Sochi, Russia.

“Predictive Models of Departure and Arrival Runway Occupancy Time and Take-Off Distance,” **Thomas L. Spencer**, presented at the NEXTOR II 20th Anniversary Workshop, September 29–30, 2016, College Park, MD.

Conference Participation

“Predictors of Unsuccessful Approaches,”

Valerie Gawron and **Frederick A. Niles**, presented at the Human Factors and Ergonomics Society Annual Meeting, September 19–23, 2016, Washington, DC.

“Projecting Air Traffic Impact of Blocked Airspaces,”

Amal Srivastava, presented at the Embry-Riddle Space Traffic Management Conference 2016, November 16–18, 2016, Daytona Beach, FL.

“Proposed sUAS Safety Performance Requirements for Operations over People,” **Jeffrey L. Breunig**,

Edward A. Lester, and **Brian C. Patterson**, presented at the Massachusetts Institute of Technology (MIT) Lincoln Laboratory Air Traffic Control Workshop, December 8, 2016, Washington, DC.

“Regulatory Perspective: The UAS Rulemaking and Beyond,” **David G. Hamrick**, Panelist, K&L Gates’ Aviation’s Next Frontier: UAS Outlook for 2016, February 8, 2016, Washington, DC.

“Remote and Smart Tower Future 2016 and Beyond,”

Kurt Rammelsberg, presented at the International Civil Aviation Organization (ICAO) Remotely Piloted Aircraft Systems (RPAS) and Remote Air Traffic Services (ATS) Symposium, May 9–10, 2016, Stockholm, Sweden.

“Remote and Smart Tower Future 2026 and Beyond,”
Kurt Rammelsberg, presented at the CANSO Global
ATM Operations Conference, March 10–11, 2016,
Madrid, Spain.

“Research Panel: Through the NAS,” **Amal Srivastava**
and **Zheng Tao**, Panelists, Space Traffic Management
Conference 2016, November 16–18, 2016, Daytona
Beach, FL.

“Results from a Field Evaluation of Interval Management
during an Optimized Profile Descent Arrival and
Approach,” **Randall S. Bone**, **William J. Penhallegon**,
and **Hans P. Stassen**, *Proceedings of the American
Institute of Aeronautics and Astronautics (AIAA) SciTech
2016 Conference*, January 4–8, 2016, San Diego, CA.

“Risk-based Approach to Airworthiness,”
Andrew R. Lacher, Panel Moderator, Association for
Unmanned Vehicle Systems International (AUVSI)
XPONENTIAL, May 2–5, 2016, New Orleans, LA.

“Space Launch and Reentry Operations in the NAS -
Information Integration,” **Catherine N. Bolczak**,
Amal Srivastava, **Thomas J. St. Clair**, and
Amanda M. Staley, *Proceedings of the 2016 Integrated
Communications, Navigation, and Surveillance (ICNS)
Conference*, April 19–21, 2016, Herndon, VA.

Conference Participation

“SWIM Consumer Implementation,” **Anuja Verma**,
*Proceedings of the 2016 Integrated Communications,
Navigation, and Surveillance (ICNS) Conference*,
April 19–21, 2016, Herndon, VA.

“Terminal Controller Feedback on an Automated
Sequencing and Spacing Tool,” Lynne Martin,
Kathleen A. McGarry Peterson, and Kevin Witzberger,
*Proceedings of the Human Factors and Ergonomics Society
Annual Meeting*, September 19–23, 2016, Washington, DC.

“Trajectory Based Operations (TBO) SWIM needs
focused” **Stephane L. Mondoloni**, presented at the FAA
Air Transportation Information Exchange Conference,
September 22–26, 2016, Silver Spring, MD.

“Trajectory-Based Operations Robust Planning under
Trajectory Uncertainty,” **Stephane L. Mondoloni**,
*Proceedings of the 35th Digital Avionics Systems
Conference (DASC)*, September 25–29, 2016,
Sacramento, CA.

“UAS EXCOM Science and Research Panel (SARP) 2016
TAAC Update,” Dallas Brooks, **Edward A. Lester**,
Brian C. Patterson, and Andrew Weiner, University of
New Mexico’s Unmanned Aircraft Systems Technical
Analysis and Applications Center (UAS TAAC) 2016
Conference, December 12–15, 2016, Santa Fe, NM.

“UAS Workshop—UAS Privacy & Security,”

Andrew R. Lacher, Panelist, Transportation Research Board 95th Annual Meeting, January 10–14, 2016, Washington, DC.

“Understanding Counter Drone Technology: Pros & Cons of Different Systems for Military, Government, & Industry,” **Andrew R. Lacher**, Panel Moderator, Countering Drones Conference, December 6–8, 2016, London, UK.

“Unmanned and Autonomous Vehicles: A Cultural Mismatch,” **Andrew R. Lacher**, presented at George Mason University—Center for Air Transportation Systems Research Seminar, April 27, 2016, Fairfax, VA.

“An Update from the NextGen Advisory Committee: Unique Venue for Public/Private Collaboration,” **Lillian Z. Ryals**, presented at the RTCA Global Aviation Symposium 2016, June 1–2, 2016, Washington, DC.

“Using Ensemble Weather Forecasts for Predicting Airport Runway Capacity,” **Shin-Lai Tien**, **Christine P. Taylor**, and **Craig R. Wanke**, *Proceedings of the American Institute of Aeronautics and Astronautics (AIAA) Aviation 2016 Conference*, June 13–17, 2016, Washington, DC.

Conference Participation

“Using Text Mining and Business Intelligence Tools in Regulatory Performance and Risk-Based Oversight,” **Wallace N. Feerrar**, presented at the FAA Flight Standards Asia Pacific Conference, July 19–20, 2016, Washington, DC.

“VDL2 Power Control,” **John C. Gonda III** and **Dongsong Zeng**, *Proceedings of the 35th Digital Avionics Systems Conference (DASC)*, September 25–29, 2016, Sacramento, CA.

“Vision of the Future: What is Our Biggest Challenge?” **Andrew R. Lacher**, presented at the American Institute of Aeronautics and Astronautics (AIAA) Aviation 2016 Conference, June 13–17, 2016, Washington, DC.

Technical Exchange Meetings

Technical Exchange Meetings (TEM) are forums for exchanging ideas, starting new initiatives, learning about new technologies, sharing resources, or collaborating across programs and organizational boundaries.

“ACAS Xa and TCAS II NAS Operational Performance Assessment Update,” **Emily P. Bromberg**, **Ryan W. Huleatt**, **Roland M. Sgorcea**, and **Erik P. Vargo**, ACAS Xa New Hampshire Technical Exchange Meeting, August 2016.

“ACAS Xa and TCAS II NAS Operational Performance Assessment Update,” **Emily P. Bromberg**, **Ryan W. Huleatt**, **Roland M. Sgorcea**, and **Erik P. Vargo**, Data Science and Analytics mini-TEM Series, August 2016, McLean, VA.

ASIAS—The Impact of Aviation Safety Analysis at MITRE, **Michelle L. Harper** and **Jessica R. Lascara**, Getting to Wow—Examples of Analytics Making an Impact Technical Exchange Meeting, Data Science and Analytics mini-TEM Series, August 2016, McLean, VA.

ASIAS Overview, **Edward B. Walsh**, Railroad Technical Exchange Meeting, January 2016, Washington, DC.

“Talend Data Integration,” **Leigh T. Gathings**, presented at the Data Performance Technical Exchange Meeting, May 2016, Colorado Springs, CO.



HONORS, AWARDS, AND RECOGNITION

Special Honors and Recognition

Aviation International News (AINonline) announced that the Federal Aviation Administration (FAA) has named **Lillian Z. Ryals** as a member of the RTCA Drone Advisory Committee (DAC), August 2016.

The Commission on Accreditation of Medical Transport Systems (CAMTS) Board of Directors letter of appreciation for the efforts of **Steven L. Estes, John R. Helleberg, Kent V. Hollinger, and Mitchel Wynnyk** on reviewing their Safety Culture Survey results as part of an FAA grant, September 2016.

The Department of Homeland Security Science and Technology (DHS S&T) Directorate Ceremony, Under Secretary's Award for Outstanding Collaboration was presented to **Kevin M. Long** and Lisa A. Kerby for the Next Generation First Responder Apex Team: Honored for executing first-of-its-kind test and evaluation approach and communication strategies, July 2016.

The American Institute of Aeronautics and Astronautics (AIAA), elected **Lesley A. Weitz** to the grade of Associate Fellow in October 2016.

Honors, Awards, and Recognition

The Federal Aviation Administration notified the PARC Communications Working Groups that two significant ICAO manuals, The Global Operational Data Link Document (GOLD) and The Performance-Based Communications and Surveillance (PBCS), have been approved by the ICAO Secretary General, August 2016.

The R&D 100 Conference awarded the Massachusetts Institute of Technology (MIT) Lincoln Laboratory for their Airborne Collision Avoidance System X (ACAS Xu) project and recognized MITRE as a co-developer along with the Federal Aviation Administration and Johns Hopkins University Applied Physics Laboratory, November 2016.

The 2016 Institute of Electrical and Electronics Engineers (IEEE) and the American Institute of Aeronautics and Astronautics (AIAA) presented a certificate of appreciation to **Dongsong Zeng** for his outstanding contributions during the 35th IEEE/AIAA Digital Avionics Systems Conference (DASC) conference, September 2016.

RTCA 2016 Award for Global Harmonisation was presented to **Randall S. Bone**, **John C. Gonda III**, and **Dongsong Zeng** during the EUROCAE/RTCA Annual Symposium, April 2016.

The National Aeronautics and Space Administration presents the Group Achievement Award to the Operational Integration Assessment (OIA) Team:

Paul V. MacWilliams, Kathleen A. McGarry Peterson, Andrew S. Mendolia, David L. Toms, and Mitchel Wynnyk, for designing, developing, and conducting a complex human-in-the-loop simulation to test NASA's Terminal Sequencing and Spacing technology in an operational environment, June 2016.

RTCA presented its Outstanding Leadership Award to **Lesley A. Weitz** for her contributions on Special Committee 186: Automatic Dependent Surveillance-Broadcast in producing DO-361: "Minimum Operational Performance Standards (MOPS) for the Flight-Deck Interval Management (FIM)" at the 2016 Global Aviation Symposium, June 2016.

RTCA presented its Significant Contributor Award to **David J. Elliott** for his contributions on Special Committee 186: Automatic Dependent Surveillance-Broadcast in producing DO-361: "Minimum Operational Performance Standards (MOPS) for the Flight-Deck Interval Management (FIM)" at the 2016 Global Aviation Symposium, June 2016.

Honors, Awards, and Recognition

RTCA presented its Significant Contributor Award to **Randall S. Bone** for his contributions on Special Committee 186: Automatic Dependent Surveillance-Broadcast in producing DO-328A: “Safety, Performance and Interoperability Requirements Document for Airborne Spacing—Flight Deck Interval Management (ASPA-FIM)” at the 2016 Global Aviation Symposium, June 2016.

RTCA presented its Significant Contributor Award to **Brock J. Lascara** for his contributions on SC-206 Aeronautical Information and Meteorological Data Link Services in producing DO-358: “Minimum Operational Performance Standards (MOPS) for Flight Information Services–Broadcast (FIS-B) with Universal Access Transceiver (UAT)” at the 2016 Global Aviation Symposium, June 2016.

RTCA presented its Significant Contributor Award presented to **J. William Carson** for his contributions to the SC-206 Aeronautical Information and Meteorological Data Link Services in producing Supplement to DO-358: “Minimum Operational Performance Standards (MOPS) for Flight Information Services-Broadcast (FIS-B) with Universal Access Transceiver (UAT),” 2016 Global Aviation Symposium, June 2016.

RTCA presented its Significant Contributor Award presented to **Douglas Havens** for his contributions to the SC-206 Aeronautical Information and Meteorological Data Link Services in producing Supplement to DO-358: “Minimum Operational Performance Standards (MOPS) for Flight Information Services-Broadcast (FIS-B) with Universal Access Transceiver (UAT),” 2016 Global Aviation Symposium, June 2016.

Best Paper Awards

Best of Session award presented to **Hilton Bateman, Shuo Chen, Ronald S. Chong, Jacob Richkus, and Emily K. Stelzer**, for their paper “Low Cost Surface Awareness Technology and Field Demonstration,” at the 35th Digital Avionics Systems Conference (DASC), September 2016, Sacramento, CA.

Best Professional Paper award presented to **David Chanen** for his paper “Deep Learning for Extracting Word-Level Meaning from Safety Report Narratives” at the 2016 Integrated Communications, Navigation, and Surveillance (ICNS) Conference, April 2016.

Honors, Awards, and Recognition

Best Paper of the Commercial Space Transportation Track award presented to **Tudor Masek, Jonathan L. Schwartz, Zheng Tao, and Ganghuai Wang** for their paper “A Monte Carlo Simulation Tool for Evaluating Space Launch and Re-entry Operations” at the 2016 Integrated Communications, Navigation, and Surveillance (ICNS) Conference, April 2016.

Best Paper of the Performance-Based CNS/ATM Track award presented to **John C. Gonda III** and **Dongsong Zeng** for their paper “Performance Based Network Concept for Air Traffic Services” at the 2016 Integrated Communications, Navigation, and Surveillance (ICNS) Conference, April 2016.

Best Paper of the Climate Change and Aviation Weather Track award presented to **Anuja Verma** for her paper “SWIM Consumer Implementation,” at the 2016 Integrated Communications, Navigation, and Surveillance (ICNS) Conference, April 2016.

Letters of Commendation

From the Airports Authority of India in appreciation for MITRE’s generous hospitality and cooperation during our visit. We really appreciate the thorough planning and coordinated presentation of valuable information during our interaction. It showed a really good appreciation of our present day challenges and opportunities, February 2016.

Honors, Awards, and Recognition

From the Colvin Run Elementary School's Conservation Rangers of Endangered Species team and coaches in appreciation of the amazing IDEA lab tour conducted by **Paul V. MacWilliams, Jacob Richkus, and Samantha L. Tungul**, October 2016.

From the European Aviation Safety Agency in appreciation of the time and support of the valuable and instructive presentations given by **Eric B. Chang, Heather L. Danner, Christopher J. Devlin, Eugene A. Mwendwa, Prakash Subramanian, and Edward B. Walsh** during their MITRE visit, October 2016.

From the Federal Aviation Administration in appreciation for the MITRE team's significant contributions to the collaborative effort in producing the PBN NAS Navigation Strategy 2016, which was endorsed by the NextGen Advisory Committee (NAC), March 2016.

From the Federal Aviation Administration in appreciation for the MITRE team's support in developing and briefing the Capability Package for the PBN Timing, Speed and Spacing Sequencing Tool NAC Tasking, March 2016.

From the Federal Aviation Administration in appreciation for **Erin R. Catlett and Christopher G. Roberts** for facilitating effective training on a complex tool: *runway* Simulator, March 2016.

Honors, Awards, and Recognition

From the Federal Aviation Administration in appreciation for the MITRE Space Team's support and patience for a very successful six months on the ATO Commercial Space Integration Office accomplishments, April 2016.

From the Federal Aviation Administration in appreciation for the MITRE team's support of the ATO Commercial Space Integration document, April 2016.

From the Federal Aviation Administration in appreciation of **Michelle A. Duquette's** tremendous assistance during the UAS Symposium in conjunction with Embry-Riddle Aeronautical University, April 2016.

From the Federal Aviation Administration in appreciation for the excellent job **Elida C. Smith** did in setting up and executing the "demo day" at MITRE. This event was invaluable in educating the NAC PBN Tools Group on the various candidate capabilities, and in so doing, helped the community move forward with this important tasking, May 2016.

From the Federal Aviation Administration in appreciation for the support **Justin R. Boesel, Michael L. Crane, Jason A. Reinhart,** and **Stanley J. Roessner** provided at the SE 210 meeting, May 2016.

Honors, Awards, and Recognition

From the Federal Aviation Administration, a letter of appreciation to **Lillian Z. Ryals** and the MITRE team for their tremendous help developing the Performance Based Navigation (PBN) National Airspace System (NAS) Navigation Strategy, May 2016.

From the Federal Aviation Administration in appreciation of **Michael J. Fremberg, Grant Pan, John R. Polk, and Anuja Verma's** great technical collaboration they provided to the FAA over the past year regarding the ASIAS work, July 2016.

From the Federal Aviation Administration in appreciation of **Michael J. Fremberg** and **Eugene A. Mwendwa's** support of the Digital Audio Legal Recorder Remote Audio Access System (DRAAS), July 2016.

Commendation from the Federal Aviation Administration regarding **Cherlynn M. Jones's** methodical approach she used during her presentation on the Tuscon spaceport case study, August 2016.

From the Federal Aviation Administration regarding receiving approval from the JRC for the S1P2 Full Services portion of the program, in appreciation of MITRE's excellent systems engineering work and leadership in helping the FAA achieve this milestone, August 2016.

Honors, Awards, and Recognition

From the Federal Aviation Administration in appreciation of the MITRE team in completing the “Human-in-the-Loop (HITL) Simulation Planning, Execution, and Reports Integration of IDRP and ARSI,” August 2016.

From the Federal Aviation Administration in appreciation for the efforts of **Monique Exum** and **Suzanne Porter** throughout the TRACON Evolution program, September 2016.

From the Federal Aviation Administration in appreciation for the efforts of **Michelle J. Blucher** and **David Gouldey** for the work accomplished in compiling the TRACON Evolution Shortfalls Analysis document, September 2016.

From the Federal Aviation Administration in appreciation for the efforts of **Paul A. Diffenderfer** throughout the TRACON Evolution program, September 2016.

From the Federal Aviation Administration in appreciation for the efforts expended on the coagulator work by **Devon B. Kelley** and **Raymond Stanley**, September 2016.

From the Federal Aviation Administration congratulating the MITRE Team in completing the A-IM Capture document on time, September 2016.

The FY16 Business Excellence recognition was awarded to the VOR MON program team members during the Federal Aviation Administration’s PMO All Hands meeting, September 2016.

Honors, Awards, and Recognition

From the Federal Aviation Administration in appreciation for the MITRE Team's support of the "Operational Roles and Responsibilities for Space Vehicle Operations" white paper, November 2016.

From the Federal Aviation Administration in appreciation for the MITRE Team's contribution for the AFST (renamed SFMA) 6th Mini-Evaluation 6 Summary Report, November 2016.

From the Federal Aviation Administration in appreciation for **Thomas B. Hudak II**'s participation at SASP1 in Montreal, November 2016.

From the Federal Aviation Administration in appreciation for **Matthew J. Fronzak** and **John J. Huhn**'s contributions during the Weather Evaluation Team (WET) meeting, November 2016.

From the Federal Aviation Administration in appreciation for **Robert M. Avjian**, **Matthew J. Fronzak**, **Constance E. Morgan**, **Kurt Rammelsberg**, **Michael Robinson**, **William J. Swedish**, and **Shin-Lai Tien**'s assistance with the Aviation Weather Division's "weather integration initiatives," December 2016.

From the Federal Aviation Administration in appreciation for **Amanda S. Matthews**' support on the 3T evaluation coordination, October 2016.

Honors, Awards, and Recognition

From RTCA in appreciation for **Kelly R. Markin's** leadership on Phase 2 Terms of Reference updates for the SC-228 milestone, September 2016.

From the University of Maryland in appreciation for **Craig R. Wanke's** presentation at the NEXTOR 20th Anniversary Workshop, September 2016.

Patents Awarded

“Air Traffic Analysis Using a Linear Inequalities Solver,”
William P. Niedringhaus, Paul T. R. Wang, and
Matthew T. McMahon, U.S. Patent No. 9,251,710,
February 2, 2016.

Patent Applications Filed

“Camera Surveillance Planning and Tracking System,”
Shuo Chen, Ronald S. Chong, Jacob Richkus,
Emily K. Stelzer, David M. Tuomey, and Vilas Nene,
January 2016.



PROFESSIONAL SOCIETIES

Fellows

- **Human Factors and Ergonomics Society**
Valerie Gawron
- **The Institute of Electrical and Electronics Engineers**
Christopher J. Hegarty
- **The Institute of Navigation**
Ronald Braff
Christopher J. Hegarty
- **International Ergonomics Association**
Valerie Gawron
- **Royal Aeronautical Society**
Stephane L. Mondoloni

Associate Fellows

- **American Institute of Aeronautics and Astronautics**
Thomas A. Becher
Valerie Gawron
John C. Gonda III
Christopher J. Hegarty
Andrew R. Lacher
Wesley B. Link
David R. Maroney
Sebastian V. Massimini
Ralf H. Mayer
Stephane L. Mondoloni
Glenn F. Roberts
Craig R. Wanke
Lesley A. Weitz
Andrew D. Zeitlin

Professional Societies

Memberships

Advanced Computing Systems Association (System Administration) (USENIX)

Air Force Association (AFA)

Air Line Pilots Association, International (ALPA)

Air Traffic Control Association (ATCA)

Aircraft Owners and Pilots Association (AOPA)

American Association of Airport Executives (AAAE)

American Association of University Women (AAUW)

American Economic Association (AEA)

American Institute of Aeronautics and Astronautics (AIAA)

American Mathematical Society (AMS)

American Meteorological Society (AMS)

American Physical Society (APS)

American Planning Association (APA)

The Association for Operations Management (APICS)

American Society of Civil Engineers (ASCE)

American Society for Quality (ASQ)

American Society of Safety Engineers (ASSE)

American Statistical Association (ASA)

Armed Forces Communications and Electronics Association (AFCEA)

Association for Aviation Psychology (AAP)

Association for Computing Machinery (ACM)

Association for Enterprise Information (AFEI)

Association for Unmanned Vehicle Systems International (AUVSI)

Certified Consulting Meteorologist (CCM)

Certified Information Systems Security Professional (CISSP)

Experimental Aircraft Association (EAA)

Federal Aviation Administration Managers Association (FAAMA)

Guild of Air Traffic Control Officers (GATCO)

Human Factors and Ergonomics Society (HFES)

Information Systems Audit and Control Association (ISACA)

Institute for Operations Research and the Management Sciences (INFORMS)

Institute of Electrical and Electronics Engineers (IEEE)

- Communications Society (COMSOC)
- Computer Society (CS)
- Control Systems Society (CSS)
- Industrial Electronics Society (IES)
- Industry Applications Society (IAS)
- Women in Engineering (WIE)

Professional Societies

Institute of Navigation (ION)

International Air Transport Association (IATA)

International Council on Systems Engineering (INCOSE)

International Federation of Automatic Control (IFAC)

International Institute of Forecasters (IIF)

International Society of Air Safety Investigators (ISASI)

International Union of Radio Science (URSI)

Mathematical Association of America (MAA)

National Air Traffic Controllers Association (NATCA)

National Association of Flight Instructors (NAFI)

National Black MBA Association (NBMBA)

National Contract Management Association (NCMA)

National Safety Council (NSC)

National Society of Black Engineers (NSBE)

Project Management Institute (PMI)

Royal Aeronautical Society (RAeS)

Royal Institute of Navigation (RIN)

SAE International (SAE)

Society for the Advancement of Material and Process
Engineering (SAMPE)

Society for Industrial and Applied Mathematics (SIAM)

Society of Women Engineers (SWE)

TBM Owners and Pilots Association, Inc. (TBMOPA)

Threaded Track for Analysts by Analysts (TTAA)

Transportation Research Board (TRB)

Transportation Research Forum (TRF)

Virginia Helicopter Association (VHA)

Whirly Girls—International Women Helicopter Pilots

Women in Aerospace (WIA)

Women in Aviation, International (WAI)

Women Military Aviators (WMA)

Honor Societies

Beta Gamma Sigma (Business)

Eta Kappa Nu (Electrical and Computer Engineers)

Omega Rho (International Operations Research)

Phi Beta Kappa (Liberal Arts and Sciences)

Sigma Pi Sigma (Physics)

Tau Beta Pi (Engineering)

Users Groups

Airline Group of the International Federation of
Operational Research Societies (AGIFORS)

AirTOP User Group (AUG)

Americas & Pacific Rim TAAM Users Group (APTUG)

Professional Societies

BADA User Group (BUG)

Large Installation System Administration Special Interest Group (LISA)

Special Interest Group on Computer-Human Interaction (SIGCHI)—ACM / SIGCHI

Worldwide TAAM Users Group (WWTUG)



TECHNICAL COMMITTEE MEMBERSHIPS

American Institute of Aeronautics and Astronautics (AIAA)

- **Aviation 2017 Executive Steering Committee**
Glenn F. Roberts
- **Program Committees**
 - ***Transformational Flight***
David R. Maroney
 - ***Unmanned Systems***
Andrew R. Lacher
David R. Maroney
- **Standing Committees**
 - ***Emerging Technologies Committee***
David R. Maroney
 - ***Corporate Member Committee***
Lillian Z. Ryals
- **Technical Activities Committees**
 - ***Aircraft and Atmospheric Systems Group***
David R. Maroney, Deputy Director
 - ***Air Transportation Systems***
Stephane L. Mondoloni
David R. Maroney, Emeritus Member

Committee Participation

- ***Guidance, Navigation, and Control***
Lesley A. Weitz, Chair
- ***Intelligent Systems Technical Committee***
Andrew R. Lacher
- ***Modeling and Simulation***
Christine P. Taylor

American Association of Airport Executives (AAAE)

- **Operations, Safety, and Planning Committee**
Cheryl R. Andrews

American Meteorological Society (AMS)

- **Aviation, Range, and Aerospace Meteorology (ARAM)**
Matthew J. Fronzak
- **Aviation, Range, and Aerospace Meteorology (ARAM) Conference**
Michael Robinson

Civil Air Navigation Services Organisation (CANSO)

- **Operations Standing Committee**
Bruce E. Killian, ASBU Chair

EU-U.S. Cooperation on Satellite Navigation

- **Working Group C—ARAIM Technical Subgroup**
Young C. Lee

Federal Aviation Administration (FAA)

- **1090 MHz Spectrum Risk Assessment Team**
Stanley R. Jones
- **Advanced Interval Management and Dynamic Required Navigation Focus Groups, FAA Data Communication Segment 2 Subject Matter Expert**
John C. Gonda III
- **Air Carrier Training Aviation Rulemaking Committee (ACT ARC) Flight Path Management Working Group**
William A. Miller
- **Center of Excellence for Commercial Space Transportation, Executive Committee**
Zheng Tao
- **Flight Standards: CNS Task Force** (*Joint with Airlines for America*)
Michael R. Cramer
Sean F. McCourt
William A. Miller
- **General Aviation Issues Analysis Team (GA-IAT)**
Jeffrey P. Mittelman, Tri-chair
- **Performance-Based Operations Aviation Rulemaking Committee (PARC)**
Michael R. Cramer, WG Chair—Navigation
 - ***Communications Working Group***
Dongsong Zeng

Committee Participation

- *VNAV Action Team*
William A. Miller, RNP Established Action Team
Chair
- **Research, Engineering, and Development Advisory Committee (REDAC)**
 - *REDAC Human Factors Subcommittee*
Christopher T. DeSenti
 - *REDAC NAS Operations Subcommittee*
Emily K. Stelzer
 - *REDAC Subcommittee for Aircraft Safety*
Andrew R. Lacher
- **Space-Based ADS-B Support Team**
Stanley R. Jones
- **Unmanned Aircraft Safety Team (UAST)**
Deborah A. Kirkman
Patricia Abel Massimini
Hassan Shahidi
Anuja Verma
- **Unmanned Aircraft System (UAS) Aviation Rulemaking Committee (ARC)**
David G. Hamrick
- **Unmanned Aircraft Systems Executive Committee (DHS, DoD, FAA, NASA)**
 - *Science and Research Panel*
Andrew R. Lacher
Brian C. Patterson
 - *USA/Europe ATM R&D Seminar*
Craig R. Wanke

Human Factors and Ergonomics Society

- **A. R. Lauer Safety Award Committee**
Valerie Gawron, Chair
- **Aerospace Systems Technical Group**
Valerie Gawron, Chair
David A. Domino
Kathleen A. McGarry Peterson
Scott H. Mills
Emily K. Stelzer
- **Cognitive Engineering and Decision Making Technical Group**
Emily K. Stelzer

International Society of Air Safety Investigators (ISASI)

- **Human Factors Working Group**
Mitchell L. Serber

***International Telecommunication Union—
Radiocommunication Sector (ITU-R)***

- **Efficient Orbit/Spectrum Utilization for FSS and BSS (WP 4A)**
Michael Tran
- **Efficient Orbit/Spectrum Utilization for MSS and RDSS (WP 4C)**
Michael Tran
- **MMS/GMDSS: Aeronautical Mobile Service and Radiodetermination (WP 5B)**
Michael Tran

Committee Participation

- **Remote Sensing Systems (WP 7C)**

Michael Tran

- **Space Radiocommunication Applications (WP 7B)**

Michael Tran

National Aviation Authorities

- **Joint Authorities for Rulemaking on Unmanned Systems (JARUS)**

Brian C. Patterson

National Business Aviation Association (NBAA)

- **NTSB Recommendation Project Team**

Jeffrey P. Mittelman

Regional Airline Association

- **Flight Technology Committee**

Sean F. McCourt

RTCA, Inc.

- **RTCA Annual Symposium**

Deborah A. Kirkman, CAASD Coordinator

- **Drone Advisory Committee (DAC)**

Lillian Z. Ryals

- **Integration and Coordination Committee (ICC)**

Robert A. Hekl

- **NextGen Advisory Committee (NAC)**

Lillian Z. Ryals

- **NAC Advisory Subcommittee**
Dennis A. Sawyer
- **NAC Policy Board**
Lillian Z. Ryals
- **Program Management Committee (PMC)**
Christopher J. Hegarty, Chair
- **Tactical Operations Committee (TOC)**
Douglas L. Molin
 - ***GPS Adjacent Band Compatibility Task Group***
Kelly R. Markin
- **Wake Vortex Tiger Team**
Clark R. Lunsford

(See also RTCA, Inc., Standards Committee Memberships.)

SAE International

- **Air Traffic Management Steering Committee**
Christopher J. Hegarty

Transportation Research Board (TRB)

- **Airfield and Airspace Capacity and Delay (AV060)**
Marcus Smith
- **Aviation Economics and Forecasting (AV040)**
Katherine T. Harback
- **Aviation System Planning (AV020)**
Ehsan Esmailzadeh
Michael T. Wells

Committee Participation

- **Committee on Intergovernmental Relations in Aviation (AV010)**
 - *Commercial Space Transportation Subcommittee*
Cheryl R. Andrews
Marcus Smith
- **Common Performance Metrics for Airport Infrastructure and Operational Planning (ACRP 03-41)**
Marcus Smith
- **Environmental Impacts of Aviation (AV030)**
Anuja A. Mahashabde
- **NextGen—Understanding the Airport’s Role in Performance-Based Navigation (ACRP 03-34)**
Laurence F. Audenaerd, Review Panel Member
- **Standing Committee on Aircraft/Airport Compatibility (AV070)**
Neal Westlund
- **Standing Committee on Airfield and Airspace Capacity and Delay (AV060)**
Neal Westlund
- **Standing Committee on Light Commercial and General Aviation (AV080)**
Neal Westlund

Transportation Research Forum (TRF)

- **Chicago Chapter**
Laurence F. Audenaerd

Women in Aerospace (WIA)

Elida C. Smith, Board of Directors

Emily K. Stelzer



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William A. Miller

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Andrew R. Lacher
Edward A. Lester

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European Organisation for Civil Aviation Equipment (EUROCAE)

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International Civil Aviation Organization (ICAO)

- **Aeronautical Communications Panel Working Group I**

Dongsong Zeng

- **Flight Operations Panel**

William A. Miller, Advisor

- **Instrument Flight Procedures Panel (IFPP) Integration Working Group**

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- **Navigation Systems Panel**

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Leesburg Executive Airport Commission

Caiolinn C. Ertel

National Academy of Sciences

- **Aviation Safety Assurance Committee**

Craig R. Wanke

RTCA, Inc.

- **RTCA/EUROCAE Forum on Aeronautical Software (FAS)**

John C. Angermayer

■ **SC-147 Traffic Alert & Collision Avoidance System (TCAS)**

Joseph M. Boyd
David J. Elliott
Edward A. Lester
Andrew D. Zeitlin

■ **SC-159 Navigation Equipment Using the Global Navigation Satellite System (GNSS)**

Christopher J. Hegarty, Co-Chair
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M. Bakry El-Arini
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Roland O. Lejeune
Michael Tran

■ **SC-186 Automatic Dependent Surveillance-Broadcast (ADS-B)**

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Stephanie A. Priess
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Robert C. Strain
Lesley A. Weitz

Committee Participation

- **SC-206 Aeronautical Information Services and Meteorological Data Link Services**

Laurence F. Audenaerd
J. William Carson
Izabela L. Gheorghisor
Douglas Havens
Brock J. Lascara
Clark R. Lunsford
Robert C. Strain
Dongsong Zeng

- **SC-213 Enhanced Flight Vision Systems and Synthetic Vision Systems (EFVS/SVS)**

David A. Domino
Mitchell L. Serber

- **SC-214 Standards for Air Traffic Data Communication Services**

Randall S. Bone, Tiger Team Co-Chair
Stephen L. Giles
John C. Gonda III
Daniel B. Kirk
Dongsong Zeng, Subgroup Chair

- **SC-216 Aeronautical Systems Security**

John C. Angermayer

- **SC-223 Internet Protocol Suite (IPS) and AeroMACS**

Francis Box
Izabela L. Gheorghisor
Dongsong Zeng, Secretary

- **SC-227 Standards of Navigation Performance**

Michael R. Cramer

William A. Miller, WG-3 Chair

- **SC-228 Minimum Operational Performance Standards for Unmanned Aircraft Systems**

Donald S. Arnstein

Francis Box

Joseph M. Boyd

Izabela L. Gheorghisor

Leonid Globus

R. Michael Guterres

Edward A. Lester

Kelly R. Markin

Kyle R. Noth

Brian C. Patterson

Erin M. Sunshine

- **SC-230 Airborne Weather Detection Systems**

Robert M. Avjian

- **SC-233 Addressing Human Factors/Pilot Interface Issues for Avionics**

Valerie Gawron



ACADEMIC AND SPECIAL APPOINTMENTS

Teaching Positions

DePaul University

- **Visiting Scholar**
Laurence F. Audenaerd

Northwestern University

- **Adjunct Faculty**
Laurence F. Audenaerd

George Washington University School of Engineering and Applied Science

- **National Advisory Council**
Andrew R. Lacher

Queens University, Belfast, Northern Ireland

- **Visiting Professor in Remotely Piloted Aircraft Systems**
David R. Maroney

State University of New York at Buffalo

- **Department of Mechanical and Aerospace Engineering, Faculty Advisory Board**
Lesley A. Weitz, Board Member

Courses Taught Through MITRE

Aviation System Block Upgrades (ASBU) Implementation Training, February 8–12, 2016, AEROTHAI, Bangkok, Thailand.

Decision Makers' Methodology and Best Practices for Aviation System Block Upgrades (ASBU) Implementation Training, **Scott L. Jacobs** and **Kent V. Hollinger**, August 1–5, 2016, Singapore, Singapore Aviation Academy.

“Safety Management Systems (SMS) Principles,” March 7–11, 2016, July 11–15, 2016, September 12–16, 2016, December 5–9, 2016, McLean, VA.

“SMS Audit,” April 15, 2016, October 21, 2016, McLean, VA.

“SMS II,” April 12–14, 2016, October 18–20, 2016, McLean, VA.

“SMS Principles,” March 14–18, 2016, ABX Air, Inc., Wilmington, OH.

“SMS II,” April 5–7, 2016, Skywest Airlines, Salt Lake City, UT.

“SMS Audit,” April 8, 2016, Skywest Airlines, Salt Lake City, UT.

“SMS Overview,” April 18–19, ASERTEC, Monterrey, Mexico

“SMS Gap Analysis,” June 13–15, ASERTEC, Monterrey, Mexico

“SMS Gap Analysis,” June 17, ASERTEC, Toluca, Mexico

SMS Principles,” October 10–14, 2016, JetBlue, New York, NY.

Other Courses Taught

“DO-178C: Software Considerations in Airborne Systems and Equipment Certification,” **John C. Angermayer** and **Kent V. Hollinger**, RTCA Training, March 21–23, 2016, June 21–23, 2016, September 19–21, 2016, and December 12–14, 2016, RTCA, Washington, DC.

“*runway* Simulator Training: Assembly and Execution, Separations Component, Skills Evaluation, and Deep Dive,” **Erin R. Catlett** and **Christopher G. Roberts**, March and June 2016, The MITRE Corporation, McLean, VA.

“Simulation Applications in Training,” **Valerie Gawron**, presented for the Flight and Ground Vehicle Simulation Update, January 18, 2016, Binghamton University, Binghamton, NY.

Academic and Special Appointments

Special Appointments

Virginia Unmanned Systems Commission,

David G. Hamrick, appointed by Governor Terry McAuliffe.

Laurence F. Audenaerd, Advisor Position: Niles West Township High School, Illinois Jr Academy of Science Fair. Awarded “Best in Category” for Project “*Designing Wake Turbulence Avoidance Systems for Unmanned Aerial Vehicles.*”



BOOK & JOURNAL EDITORS & REVIEWERS

- **American Institute of Aeronautics & Astronautics, Inc.**
 - *Journal of Aerospace Information Systems*
Craig R. Wanke, Reviewer
 - *Journal of Air Transportation*
Scott H. Mills
Glenn F. Roberts, Associate Editor
Craig R. Wanke, Associate Editor
Lesley A. Weitz, Reviewer
 - *Journal of Aircraft*
Craig R. Wanke, Reviewer
 - *Journal of Guidance, Control, and Dynamics*
Shin-Lai Tien, Reviewer
Craig R. Wanke, Reviewer
Lesley A. Weitz, Reviewer
- *Air Traffic Control Association: Air Traffic Control Quarterly*
Glenn F. Roberts, Editorial Board
Craig R. Wanke, Reviewer
R. Michael Guterres, Reviewer
- *Canadian Journal of Civil Engineering*
Panta Lucic, Reviewer

- ***Ergonomics in Design: The Quarterly of Human Factors Applications***
Valerie Gawron, Editorial Board
- ***European Journal of Operational Research***
Panta Lucic, Reviewer
Craig R. Wanke, Reviewer
- ***Global Navigation Satellite System: Technologies and Applications Series, Artech House***
Christopher J. Hegarty, Co-series Editor
- **Institute of Electrical and Electronics Engineers**
 - ***Aerospace and Electronics Systems***
R. Michael Guterres, Reviewer
 - ***Transactions on Aerospace and Electronic Systems***
Young C. Lee, Associate Editor
 - ***Transactions on Communications***
Donald S. Arnstein, Reviewer
 - ***Transactions on Intelligent Transportation Systems***
Craig R. Wanke, Reviewer
- ***International Journal of Aviation Psychology***
Valerie Gawron, Domain Editor
Emily K. Stelzer, Reviewer
- ***Journal of Aerospace Operations***
Shin-Lai Tien, Reviewer
- ***Journal of Navigation*** (Royal Institute of Navigation)
Christopher J. Hegarty, Editorial Advisory Board

- ***Journal of the Transportation Research Board***
Laurence F. Audenaerd, Reviewer
- ***Journal of the Transportation Research Forum***
Laurence F. Audenaerd, Reviewer
- ***NAVIGATION: Journal of the Institute of Navigation***
Christopher J. Hegarty, Associate Editor
Young C. Lee, Reviewer



TECHNOLOGY TRANSFER

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Technology Transfer

Here is a list of recent technologies and capabilities developed in CAASD that were transferred in 2015-2016 or are in the process of being transitioned currently.

Technology	Year	Recipient
AOV UAS Analyst Portal	2016	FAA
eventAnalyzer	2016	FAA
UAS COA Application and Processing System	2016	FAA
Speech Inputs to Surface Logic	2016	FAA
En Route Controller Workload Model	2016	FAA
Closed Runway Operation Prevention Device	2016	FAA
Exhaust Plume Analyzer	Ongoing	Industry
Safety Culture Survey Data Visualizer	Ongoing	Industry
TARGETS	Ongoing	FAA and Industry
Runway Simulator	Ongoing	FAA and Industry
Threaded Track Data Fusion Algorithms	Ongoing	FAA
Concept Maturity Framework	Ongoing	FAA

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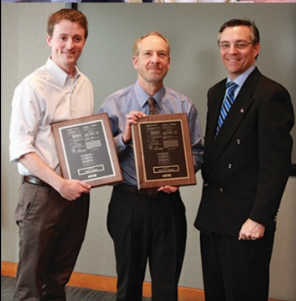
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PHOTO LEGEND

Back interior cover includes photos of CAASD staff participating in various conferences, meetings, showcases, and industry events over the course of 2016.



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