

## “Certification of Unmanned Aerial Systems (UAS) for Operations in the U.S. National Airspace System (NAS)”

A 2-Day Forum and Panel Discussion in conjunction with the 2<sup>nd</sup> annual Infotech@Aerospace Conference and Exhibit,

May 8-9<sup>th</sup>, 2007, Sonoma, CA

This Forum will present balanced multiple perspectives on the past, current, and near-future status of certifying and operating UAS in the NAS. Included will be perspectives from the Government, Industry, and Academia.

The first day of the Forum (Tuesday May 8<sup>th</sup>) will focus on UAS certification issues and will consist of an opening plenary presentation by Mr. Doug Davis, the manager of the FAA’s Unmanned Aircraft Program Office, followed by three two-hour panel sessions. These sessions will be comprised of presentations from four distinguished panelists (during the first hour) and the second hour will be open panel discussion with audience participation encouraged.

The second day of the Forum (Wednesday May 9<sup>th</sup>) will focus on technical challenges which must yet be addressed for safe seamless UAS/NAS integration. The first session on Wednesday will consist of presentations from three distinguished panelists (during the first hour) and the second hour will be open panel discussion with audience participation encouraged. This will be followed by three technical sessions covering: Detect, Sense, and Avoid (DSA), Command, Control, and Communications (C3), and Autonomy.

### Session 1 (Tuesday Morning 1) : Plenary Session

Time: 0800-0930

#### Plenary Speakers:

- 1) Vice Admiral Conrad C. Lautenbacher, Jr., U.S. Navy (Retired), Under Secretary of Commerce for Oceans and Atmosphere
- 2) K. Douglas Davis, FAA, Manager, Unmanned Aircraft Program Office, AIR-160

### Session 2 (Tuesday Morning 2) : Overview; Evolving the Certification Basis for UAS

Time: 1000-1200

Session Chair: John Moore, Rockwell Collins (Chair SC203 WG1)

#### Overview:

This session will cover a multi-perspective overview of the current status of national efforts towards seamlessly integrating Unmanned Aircraft Systems (UAS) into the U.S. National Airspace System. The session will open with presentations from the Federal Aviation Administration (FAA), the RTCA Special Committee 203, and the ASTM Committee F-38. These presentations will address the unique characteristics of unmanned aircraft systems, how they differ from manned systems, and how this impacts certification. Also included will be an overview of the current status of standards development in support of eventual full type certification including FAA rulemaking activities which specifically address small UAVs.

The second hour of the session will consist of open panel discussion with encouraged public participation.

#### Distinguished Panelists:

- 1) John Walker, FAA (Retired), current chair of RTCA Special Committee 203 on UAS in the NAS
- 2) Mike Howell, Chair of ASTM Committee F-38, Unmanned Aircraft Systems
- 3) Ken Geiselhart, FAA-UAS Roadmap Principal Investigator
- 4) Joe Boyd, SC-203 Lead for Best Practices for Small UAS

### **Session 3 (Tuesday Afternoon 1): Recent Experiences in Operations and Experimental Certification of UAS**

Time: 1330-1530

Session Chair: John Moore, Rockwell Collins (Chair SC203 WG1)

Overview:

This session will cover recent experiences and lessons learned by current NAS users (those who have already been there) in integrating and operating UAS in the NAS. The session will address the impact that the current UAS-specific regulatory environment is having on users of the NAS including loss of access to airspace for state UAS until federal certification standards are adopted. In addition, perspectives will be given on the current COA process and the status of experimental certifications.

The second hour of the session will consist of open panel discussion with encouraged public participation.

Distinguished Panelists:

- 1) James Sizemore, FAA UAS Certification Office
- 2) Chuck Johnson, Former FAA, currently NASA Dryden
- 3) John Moore, Rockwell Collins, Chair SC-203 Working Group 1
- 4) Mark Ballinger, Raytheon Missile Systems, former president of the AUVSI Saguaro Chapter,

### **Session 4 (Tuesday Afternoon 2): Air Vehicle-Specific Issues Impacting Certification of UAS**

Time: 1545-1745

Session Chair: Armand Chaput, Lockheed Martin

Overview:

This session will provide a manufacturer's perspective on issues associated with certification of air vehicles for operations in the NAS. The session will open with four 15-minute presentations from distinguished industry speakers who will address the impact the regulatory environment has/could have on their products and presents their views on approaches to certification for operations in the NAS. The second hour of the session will consist of open panel discussion with public participation encouraged.

Distinguished Speakers and Panelists:

- 1) Paul McDuffee, Vice President Flight Operations and Training, The Insitu Group
- 2) Tom Bachman, Director, Advanced Technologies, AAI Corporation
- 3) David R. Alexander, Vice President Engineering, Aircraft Systems Group, General Atomics
- 4) Ed Walby, Director, Business Development, Global Hawk, Northrop Grumman

### **Session 5 (Wednesday Morning 1): Technology Milestones Necessary for UAS Certification**

Time: 0800-1000

Session Chair: Jim Neidhoefer, Aerotonomy, Inc.

Overview:

Several major technology hurdles must yet be overcome towards the goal of integrating UAS into the NAS without decreasing the overall safety of the NAS. Some of these hurdles include: 1) the development of a practical Detect, Sense, and Avoid (DSA) system, 2) the development of UAS-

specific Command Control & Communication (C3) protocols, conventions, and procedures, and 3) Automation of many functions currently executed by human pilots.

This session will open with presentations from government, industry, and academic experts covering current issues related to Detect Sense and Avoid (DSA) systems for operations in the NAS including sensor technology, algorithmic challenges, and certification. In addition, issues related to Command, Control, and Communication (C3) systems for UAS operations in the NAS will be examined; including spectrum issues, link security, human interface challenges, national infrastructure, C3 certification standards development, etc. Finally, issues related to automation such as function allocation (which functions will be allocated to autonomous systems and which must be executed by humans), and certification will be explored.

The second hour of the session will consist of open panel discussion with encouraged public participation.

Distinguished Panelists:

- 1) Andy Zeitlin- MITRE Corp., Industry lead for SC-203 WG3, DSA (DSA Session Chair)
- 2) Michael Neale, General Atomics, Industry lead for C3 on SC-203 (C3 Session Chair)
- 3) Eric Johnson, Georgia Institute of Technology (Autonomy Session Chair)

### **Session 6 (Wednesday Morning 2): Command, Control, and Communications for UAS Operations in the NAS**

Time: 1015-1215

Session Chair: Michael Neale, General Atomics (Chair SC203 WG2)

Speakers/Presentations:

- 1) Richard Robinson, Boeing, "Challenges for IT Infrastructure Supporting Secure Network-Enabled Commercial Airplane Operations"
- 2) Robert Strain, MITRE, "A Lightweight, Low-Cost ADS-B System for UAS Applications"
- 3) Steve Henriksen, ITT, "Estimation of Future Communications Bandwidth Requirements for Unmanned Aircraft Systems Operating in the NAS"
- 4) Michael Neale, GA-ASI, "Current and Future UAS Control and Communications Datalinks"

### **Session 7 (Wednesday Afternoon 1): DSA for UAS Operations in the NAS**

Time: 1330-1530

Session Chair: Andy Zeitlin (Chair SC203 WG3):

Speakers/Presentations:

- 1) Richard Schultz, University of North Dakota, "Regulatory and Technology Survey of Sense and Avoid for UAS"
- 2) Russell Wolfe and Dennis Coulter, MTSI Inc. - "Encounter Analysis to Support Detect, Sense, and Avoid (DSA) Elevation Field of Regard (FOR) Requirements"
- 3) Vince Raska (AFRL), Omid Shakernia, Scott Graham, Won-Zon Chen (all Northrop Grumman), Andy White (Defense Research Associates), John Zvanya (FAA)- "Sense & Avoid (SAA) Flight Test and Lessons Learned"
- 4) Eric Portilla, Alex Fung, Omid Shakernia, Won-Zon Chen (all Northrop Grumman), Tom Molnar (AFRL)- "SAA and TCAS Integration"

### **Session 8 (Wednesday Afternoon 2) : Autonomy for UAS Operations in the NAS**

Time: 1545-1745

Session Chair: Eric Johnson, Georgia Tech

Speakers/Presentations:

- 1) David Gibbs, SRA International, Inc., "Autonomous Sense and Avoid: A Technology Demonstration"
- 2) Darryl Davis, Boeing: "Autonomy in the UCAS Program"
- 3) Jim Neidhoefer, Aeronomy, Inc., "Determinism in Autonomy for NAS-Related Applications"
- 4) Vince Ambrosia, NASA, "Recent Experiences with Operating UAS in the NAS"