AAM Crosscutting Working Group:

ISSA/IASMS
ConOps Discussion
Panelists

- John Koelling
- Dr. Paul Krois
- Dr. Robert Mah
- Dr. Wendy Okolo
- Dr. Steve Young
The goal of these discussions is to receive feedback from all of you in the community. **We will be utilizing the microphone and chat features on the MS Teams platform.** To ensure that we can do this in an organized fashion, we have laid out a few ground rules:

- **Leave your cameras/webcams off to preserve WiFi bandwidth**
- **Enter comments/questions in the chat function on the right side of the screen**
  - The emcee will record and respond to the chat messages as applicable
- **Use your mute/unmute button (i.e., remain on mute unless you have been called on by the emcee to speak)**
- **Type “REQUEST TO SPEAK: [First & Last Name]” in the chat box to notify the emcee that you would like to verbally comment or ask a question**
  - The emcee will (to the best of their ability) call on each of you in the order that your names appear in the chat
- **Say your name and affiliation before you begin speaking**
- **Speak loudly and clearly**
  - You will be given up to 90 seconds (1.5 minutes) to verbally comment/ask a question. Brevity is greatly appreciated
- **Remember this is Social Media, so be professional in all verbal and written comments/questions**
  - If your verbal or written questions are unprofessional or disrespectful in nature, you may be asked to leave and be removed from the virtual meeting room. Once removed, you will not be able to re-enter the meeting
  - Examples of unprofessional or disrespectful behavior include, but are not limited to:
    - Intimidation or bullying
    - Offensive and abusive language
    - Passive aggression
    - Demands for special attention and treatment
    - Uncooperative behavior
    - Excessive criticism
    - Unwillingness to talk through an idea or issue

*Please note, these sessions may be recorded and shared on the NARI registration site within a week or so of the event.*
IASMS High-Level Architecture (National Academies)

**National Airspace System**

- **Monitor**
  - Collect sensor and performance data
  - Check data quality
  - Fuse data
  - Distribute data

- **Assess**
  - Model flight planning data
  - Assess operational/performance data
  - Mine safety data bases

- **Mitigate**
  - Time-dependent action
    - Automatic action
    - Procedure-based (augmented using decision support tool)

- **Safety Assurance Action**

- **NAS System State**

- **Time Horizon**
  - Pre-Flight
  - In-Flight
  - Post-Flight
Scopes of the Safety Management System

- Overall Safety Management System
- In-Time Aviation Safety Management Systems (IASMS)
- In-Time System-Wide Safety Assurance (ISSA)

Stakeholders vary by domain (e.g., Commercial Ops, sUAS, UAM, GA)
1. **WEATHER**
   - Advanced Weather Models

2. **Passenger Emergency**

3. **RF INTERFERENCE**
   - RF Interference Models

1. **OBSTACLE COLLISION AVOIDANCE**
   - DAA Safety Monitor

2. **VEHICLE SYSTEM FAILURE**
   - Vehicle Health Monitors

3. **TRAFFIC COLLISION AVOIDANCE**
   - DAA Safety Monitor

1. **FLIGHT OVER PEOPLE/MOVING VEHICLES**
   - 3rd Party Risk Modeling

2. **TERRAIN COLLISION AVOIDANCE**
   - APNT Solutions

1. **DAA Safety Monitor**

1. **3rd Party Risk Modeling**

1. **Pre-flight Safety**

2. **Route adjustment**

3. **Collision avoidance**

- **Noise Abatement Zone**
- **Non-cooperative**
- **Original Route**
- **Modified Route**
- **+10 min**
- **Hospital Vertiport**
- **4DT ROUTE CONFLICT**
- **ATM-X Sequencing**

**Key**
- 1. Pre-flight
- 2. Route adjustment
- 3. Collision avoidance

- ** Continue Operation**
- **Emergency Landing**
- **In-time Safety**
Operational Safety: In-Time System-Wide Safety Assurance

**ISSA Capability** = A system that monitors data, assesses data, and performs or informs a mitigating action.

**IASMS** = Interconnected ISSA Capabilities That Provide In-Time Risk Management and Safety Assurance.

**Vehicle ISSA Capabilities**
- Communication/C2
- Remote ID
- Many Others
- Conflict Advisory/Alert
- UAS System Monitoring

**Vehicle Information Classes**
- Link Performance
- Aircraft State
- Monitor Health
- New Performance
- Power Health
- Configuration Settings
- Aerodynamic Model
- Human Performance

**Airspace ISSA Capabilities**
- USS Network Discovery
- Airspace Authorizations
- Many Others
- Constraint Management
- Conformance Monitoring
- USS System Monitoring

**Airspace Information Classes**
- Airspace Conformance
- Geo-spatial Constraints
- Human Performance
- Air Traffic
- Flight Plan
- Configuration Settings

**SDSP ISSA Capabilities**
- Weather
- Surveillance
- Many Others
- uFOQA
- Operator Messaging
- Third-Party Risk

**SDSP Information Classes**
- Weather (MET)
- ANSP Infrastructure
- Population Density
- Configuration Settings
- Safety Reports
- Human Performance
Example ConOps Use Case: Non-Participant UAS Operation

Additional Deeper Dive Use Cases:
- Vertiport Emergency and Closure
- Emergent Risk in Mixed Air Space

Other Use Cases:
- Deteriorating Battery Health
- Vehicle Lost Link—NORDO

- Bird Strike—Physical Damage
- USS/U4-SS Service Disruption
- Time-Based Flow Management Issues
NASA AAM Mission Priorities

System Safety Needs

1. Airspace System Design & Implementation
2. Individual Vehicle Management & Operations
3. Vehicle Development & Production
4. Airspace & Fleet Operations Management
5. Community Integration

- Assured Automated Architectures
- National Campaign
- High Density Vertiplex
- AAM System Architectures

Graphic Adapted from NASA AAM presentation
Backup
Discussion Questions

• What have we missed in the ISSA ConOps?
  ➢ Do you disagree with anything in the ConOps?

• What are the gaps in the Use Cases?
  ➢ What Use Cases should be added?
  ➢ Do the Use Cases touch across all 5 parts of the penta-copter?
  ➢ What do you think about the video and the three detailed Use Cases in the ConOps? Do you disagree with anything? What should be added?

• How should the Use Cases be tuned for particular domains?

• What should be the major parts of a UAM Safety Case?
Design-Time and Operational-Time Safety Needs

<table>
<thead>
<tr>
<th>Functional Capabilities</th>
<th>Safety Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monitor</td>
<td>Sensors, standards, etc.</td>
</tr>
<tr>
<td>Assess</td>
<td>Models, networks, etc.</td>
</tr>
<tr>
<td>Mitigate</td>
<td>Procedures, design, etc.</td>
</tr>
</tbody>
</table>

**Technologies**

- **Autonomous Fleet Management**
  - Fully Autonomous Vehicle

- **Autonomous Vehicles**
  - Autonomous
  - Remotely Supervised

- **High Performance Models**
  - Flight Supervisor
  - Piloted Air Taxi
  - Remotely Piloted Air Taxi

- **Airspace**

- **Networks**
  - USS, SDSP

- **Data and Prognostics**

- **Risk Management**
  - Risk Thresholds
  - RM Controls

- **Safety Assurance**
  - Safety Margin
  - Sensors and Networks
  - Data Collection & Analysis

**Capabilities**

- Package Delivery
  - RPIC BVLOS

- Recreational
  - sUAS RPIC VLOS

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