ANSI Unmanned Aircraft Systems Standardization Collaborative (UASSC)

July 15, 2020 Webinar
## Today’s Agenda

<table>
<thead>
<tr>
<th>Topic</th>
<th>Facilitator/Chair</th>
</tr>
</thead>
<tbody>
<tr>
<td>UASSC background, mission, objectives</td>
<td>UASSC Co-Chairs</td>
</tr>
<tr>
<td>Gap Analysis Process</td>
<td>Jim McCabe, Sr. Dir, Standards Facilitation, ANSI</td>
</tr>
<tr>
<td>Topics / High Priority Gaps covered by Working Groups (WG)</td>
<td>WG Co-Chairs</td>
</tr>
<tr>
<td>Q&amp;A</td>
<td>All</td>
</tr>
</tbody>
</table>

- We’ll hold Q&A until the end
- Raise hand to be unmuted or ask via Q&A panel

These slides & the recording link will be made available on the ANSI website
UASSC Co-Chairs

◆ Government
  – Art Hinaman
    Manager, Technical Support Branch
    Office of UAS Integration
    Federal Aviation Administration
    (on behalf of UASSC Co-Chair Jay Merkle)

◆ Industry
  – Chris Martino
    Vice President, Operations
    Helicopter Association International
ANSI Unmanned Aircraft Systems Standardization Collaborative (UASSC)

- Launched in 2017 following a meeting where standards and policy activities were discussed
- Many standards developing organizations (SDOs) involved in UAS, prompting need for coordination
- Mission: To coordinate and accelerate the development of the standards and conformity assessment programs needed to facilitate the safe integration of unmanned aircraft systems (UAS) into the national airspace system (NAS) of the United States, with international coordination and adaptability
Objectives

- To foster coordination and collaboration among industry, standards developing organizations, regulatory authorities, and others on UAS standardization issues, including pre-standardization research and development
- To clarify the current and future UAS standardization landscape and enable stakeholders to better focus standards participation resources
- To provide a basis for coherent and coordinated U.S. policy and technical input to regional and international audiences on UAS standardization
- To support the growth of the UAS market with emphasis on civil, commercial, and public safety applications

- UASSC is **NOT** developing standards
Deliverable

- A comprehensive roadmap describing the current and desired future standardization landscape for UAS
  - V1 published December 20, 2018
  - V2 published June 30, 2020
  - 71 open gaps (no published standard) identified w/accompanying recommendations
  - Available as a free download at www.ansi.org/uassc
Goals for Version 2

- Expand topics covered (e.g., spectrum applicable to C2 link and communications, recreational operations, passenger transport, etc.)
- Engage subject matter experts not previously involved
- Identify potentially overlooked issues and gaps
  - 16 new gaps identified
- Track progress to address the roadmap recommendations, including new or completed work
  - 2 version 1 gaps closed
- Review priorities
- Incorporate feedback
Structure and Participation

- Steering Committee – Governing Body
- **WG1** – Airworthiness Standards
- **WG2** – Flight Operations Standards: General Concerns and Personnel Training, Qualifications, and Certification Standards
- **WG3** – Flight Operations Standards: Infrastructure Inspections, Environmental Applications, Commercial Services, and Workplace Safety
- **WG4** – Flight Operations Standards: Public Safety

- Participation open to UAS stakeholders that have U.S. operations
  - ANSI membership not a prerequisite
  - Participants come from industry, government agencies, standards developing organizations (SDOs), and other interested stakeholders
  - Some 400 individuals from 250 organizations (public and private) supported the roadmap’s development
Roadmap V2 Process and Contents

- September 12, 2019 kick-off meeting to launch version 2 update
- Overviews of activity by government agencies, industry initiatives, SDOs
- **Gap analysis with recommendations where standards are needed** constitutes the main body of the document
  - A “gap” means no published standard exists for the issue in question
  - Identifies priorities for action, organization(s) that can do the work, and related R&D needed
- Working groups generally met twice monthly via virtual web meetings
  - Subject matter experts drafted the gap analysis sections
- Public review and subsequent disposition of comments
- Publication of V2 on June 30, 2020
Process Flow for Describing Issues & Gaps

1. Describe the Issue
2. List any Published Standards
   - If published standards adequately address the issue, STOP (NO GAP)
3. List any In-Development Standards
4. State the Gap
5. Is R&D needed? If so, describe it.
6. Is the Priority High, Medium, or Low?
7. Use Prioritization Matrix
8. Provide a recommendation how to address the gap
9. List an organization(s) that can address the R&D and standards gap
Sample Gap Statement

- **Gap I2: Crane Inspections.** Standards are needed to establish requirements for the use of UAS in the inspection, testing, maintenance, and operation of cranes and other material handling equipment covered within the scope of ASME’s B30 volumes

- **R&D Needed:** No

- **Recommendation:** Complete work on draft [B30.32-20XX, Unmanned Aircraft Systems (UAS) used in Inspection, Testing, Maintenance, and Lifting Operations](#) to address crane inspections using UAS.

- **Priority:*** Medium

- **Organization:** ASME

- **Status of Progress:**** Green

- **Update:**** Work continues on development of the draft B30.32 standard.

* Refer to prioritization matrix on next two slides

** Status of Progress & Update for carryover gaps from version 1.0
Prioritization Matrix: Making the CASE for the Gap

Priority Level

<table>
<thead>
<tr>
<th>Scoring Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 - critical</td>
</tr>
<tr>
<td>2 - somewhat critical</td>
</tr>
<tr>
<td>1 - not critical</td>
</tr>
</tbody>
</table>

Criteria

- **Criticality (Safety/Quality Implications)** How important is the project? How urgently is a standard or guidance needed? What would be the consequences if the project were not completed or undertaken? A high score means the project is more critical.

- **Achievability (Time to Complete)** - Does it make sense to do this project now, especially when considered in relation to other projects? Is the project already underway or is it a new project? A high score means there's a good probability of completing the project soon.
# Prioritization Matrix (contd.)

## Criteria

- **Scope (Investment of Resources)** - Will the project require a significant investment of time/work/money? Can it be completed with the information/tools/resources currently available? Is pre-standardization research required? A high score means the project can be completed without a significant additional investment of resources.

- **Effect (Return on Investment)** - What impact will the completed project have on the industry? A high score means there are significant gains for the industry by completing the project.

## Scoring Values

- 3 - low resource requirement
- 2 - medium resource requirement
- 1 - resource intensive
- 3 - high return
- 2 - medium return
- 1 - low return

## Score Rankings

- High Priority (a score of 10-12)
- Medium Priority (a score of 7-9)
- Low Priority (a score of 4-6)
## Roadmap V2 Open Gaps Breakdown

<table>
<thead>
<tr>
<th>WG/Chapter</th>
<th>Priority</th>
<th>High (0-2 years)</th>
<th>Medium (2-5 years)</th>
<th>Low (5+ years)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>WG1 Airworthiness (6)</td>
<td></td>
<td>17</td>
<td>2</td>
<td>0</td>
<td>19</td>
</tr>
<tr>
<td>WG2 Flight Operations (7)</td>
<td></td>
<td>10</td>
<td>3</td>
<td>0</td>
<td>13</td>
</tr>
<tr>
<td>WG3 Infrastructure Inspections/Commercial Svcs (8)</td>
<td></td>
<td>9</td>
<td>9</td>
<td>2</td>
<td>20</td>
</tr>
<tr>
<td>WG4 Public Safety Operations (9)</td>
<td></td>
<td>5</td>
<td>6</td>
<td>1</td>
<td>12</td>
</tr>
<tr>
<td>WG2 Personnel Qualifications (10)</td>
<td></td>
<td>6</td>
<td>1</td>
<td>0</td>
<td>7</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>47</td>
<td>21</td>
<td>3</td>
<td>71</td>
</tr>
</tbody>
</table>

53 open gaps need Research & Development
## V2 High Priority Open Gaps Breakdown

<table>
<thead>
<tr>
<th>WG/Chapter</th>
<th>Priority (0-2 years)</th>
<th>Tier 1 (Most Critical)</th>
<th>Tier 2 (Critical)</th>
<th>Tier 3 (Least Critical)</th>
</tr>
</thead>
<tbody>
<tr>
<td>WG1 Airworthiness (6)</td>
<td>17</td>
<td>9</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>WG2 Flight Operations (7)</td>
<td>10</td>
<td>5</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>WG3 Infrastructure Inspections/Commercial Svcs (8)</td>
<td>9</td>
<td>3</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>WG4 Public Safety Operations (9)</td>
<td>5</td>
<td>2</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>WG2 Personnel Qualifications (10)</td>
<td>6</td>
<td>0</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>47</strong></td>
<td><strong>19</strong></td>
<td><strong>15</strong></td>
<td><strong>13</strong></td>
</tr>
</tbody>
</table>
Working Group 1 – Airworthiness Standards (Roadmap Chapter 6)

Co-Chairs

- Phil Kenul
  Senior Vice President, Aviation and Operations
  TriVector Services, Inc.
  (Chair, ASTM F38)

- Mark DeAngelo, PhD
  Aerospace Engineer
  Standards Innovation & Technology – SAE International
  Pilot – Part 61 Private Certificate
Working Group 1 – Airworthiness Standards (Roadmap Chapter 6)

**ANSI UASSC Roadmap**

[Developed by ANSI/Industry (contains Recommendations, Gaps, Ref., etc.)]

Standards Development Organizations (SDOs) are encouraged to address ANSI Roadmap Gaps by revising existing Stds. or writing new Stds.

**FAA Rules, Guidance, Policies**

**FAA Certification/Approval ==>**

Show Compliance & Find Compliance
(using Accepted Industry Stds., FAA Regs, ACs, etc.)
Working Group 1 – Airworthiness Standards (Roadmap Chapter 6)

- Design and Construction
- UAS System Safety
- Quality Assurance/Quality Control

Avionics and Subsystems:
- Command and Control (C2) Link and Communications
- Navigation Systems
- Systems Performing Detect and Avoid (DAA) Functions
- Software Considerations and Approval
- Flight Data and Voice Recorders for UAS
- Cybersecurity

- Electrical Systems
- Power Sources and Propulsion Systems
- Noise, Emissions, and Fuel Venting
- Mitigation Systems for Various Hazards to UAS
- Parachutes for Small Unmanned Aircraft
- Maintenance and Inspection
- Enterprise Operations: Level of Automation/Autonomy and Artificial Intelligence (AI)

*Blockchain for UAS*

*Bold Italics = New to version 2*
WG1 – High Priority Gaps

Tier 1 (Most Critical)
- Gap A1: UAS Design and Construction (D&C) Standards
- Gap A2: UAS System Safety
- Gap A6: Alignment in Standards Between Aviation and Cellular Communities
- New Gap A20: Unlicensed Spectrum Interference Predictability
- Gap A7: UAS Navigational Systems
- Gap A8: Protection from Global Navigation Satellite Signals (GNSS) Interference Including Spoofing and Jamming
- Gap A9: Detect and Avoid (DAA) Capabilities
- Gap A10: Software Considerations and Approval
- Gap A12: UAS Cybersecurity

Tier 2 (Critical)
- Gap A4: Avionics and Subsystems
- Gap A16: Mitigation Systems for Various Hazards to UAS
- Gap A18: Maintenance and Inspection (M&I) of UAS
- Gap A19: Enterprise Operations: Levels of Automation/Autonomy and Artificial Intelligence (AI)

Tier 3 (Least Critical)
- Gap A13: Electrical Systems
- Gap A14: Power Sources and Propulsion Systems
- Gap A15: Noise, Emissions, and Fuel Venting
- Gap A17: Parachute or Drag Chute as a Hazard Mitigation System in UAS Operations over People (OOP)
Working Group 2 – Flight Operations Standards: General Concerns and Personnel Training, Qualifications, and Certification Standards (Roadmap Chapters 7 & 10)

Co-Chairs

- Joe Valasquez
  Founder and Chief Flight Engineer
  DroneScape, PLLC

- Jon Gustafson, PS, CFedS, PMP, GISP
  Senior Principal, US East Geospatial Services Leader
  Stantec
Working Group 2 – Flight Operations Standards: General Concerns and Personnel Training, Qualifications, and Certification Standards (Roadmap Chapters 7 & 10)

Operations: General Concerns:
- Privacy
- Continued Operational Safety
- Beyond Visual Line of Sight
- Operations Over People
- Weather
- Data Handling & Processing
- UAS Traffic Management
- UAS Remote Identification
- Geo-fencing
- **Recreational Operations**
- **Design and Operation of Aerodrome Facilities for UAS**
- **UAS Service Suppliers Process and Quality**

Personnel Qualifications:
- Terminology
- Manuals
- UAS Flight Crew
- Additional Crew Members
- Maintenance Technicians
- Compliance/Audit Programs
- Human Factors in UAS Operations
WG2 – High Priority Gaps

Tier 1 (Most Critical)
- Gap O2: Continued Operational Safety
- Gap O3: Beyond Visual Line of Sight (BVLOS)
- Gap O4: UAS Operations Over People (OOP)
- Gap O8: Remote ID: Direct Broadcast
- Gap O9: Remote ID: Network Publishing

Tier 2 (Critical)
- Gap O5: UAS Operations and Weather
- Gap O7: UTM Services Performance Standards
- Gap O10: Geo-fence Exchange

Tier 2 (contd.)
- New Gap O12: Design and Operation of Aerodrome Facilities for UAS
- New Gap O13: UAS Service Suppliers (USS) Process and Quality
- Gap P2: Manuals
- Gap P3: Instructors and Functional Area Qualification
- Gap P5: UAS Maintenance Technicians
- Gap P9: Human Factors in UAS Operations

Tier 3 (Least Critical)
- Gap P1: Terminology
- Gap P7: Displays and Controls
Working Group 3 – Flight Operations Standards: Infrastructure Inspections, Environmental Applications, Commercial Services, and Workplace Safety (Roadmap Chapter 8)

Co-Chairs

- Brian Daly
  Assistant Vice President, Standards & Industry Alliances
  AT&T

- Philip Hall
  Founding Director & CEO
  RelmaTech Inc.
Working Group 3 – Flight Operations Standards: Infrastructure Inspections, Environmental Applications, Commercial Services, and Workplace Safety (Roadmap Chapter 8)

Vertical Infrastructure Inspections:
- Power Plants and Industrial Process Plants
- Cranes
- Building Facades
- Low-Rise Residential and Commercial Buildings
- Communications Towers

Linear Infrastructure Inspections:
- Bridges
- Railroads
- Power Transmission Lines, Structures, and Environments
- Hydrocarbon Pipeline Inspections
- Airport Operations

Environment Applications:
- Environmental Monitoring
- Pesticide Application
- Livestock Monitoring and Pasture Management

Commercial Services:
- Package Delivery
- Cargo Transport
- Passenger Air Taxi Transport (short-haul)
- Passenger Transport (long-haul)
- Sensing Services
- News Gathering

Workplace Safety
WG3 – High Priority Gaps

Tier 1 (Most Critical)
- **New Gap I17:** Commercial Passenger Air Taxi Transport via UAS (short-haul flights carrying few passengers and/or cargo)
- **New Gap I19:** Commercial Sensing Services
- **New Gap I20:** Use of sUAS for Newsgathering

Tier 2 (Critical)
- Gap I12: Occupational Safety Requirements for UAS Operated in Workplaces

Tier 3 (Least Critical)
- Gap I1: UAS Inspections of Power Plant and Industrial Process Plant Assets
- Gap I7: Railroad Inspections: BVLOS Operations
- Gap I9: Inspection of Power Transmission Lines, Structures, and Environ Using UAS
- Gap I10: Pesticide Application Using UAS
- Gap I11: Commercial Package Delivery via UAS
Working Group 4 – Flight Operations Standards: Public Safety (Roadmap Chapter 9)

Co-Chairs

- Kristy Kiernan, PhD
  Assistant Professor, Program Chair MS in Unmanned Systems
  College of Aeronautics, Worldwide
  Embry-Riddle Aeronautical University

- Eric Schwartz
  Quality Project Manager, Power Delivery
  Florida Power and Light Company
Working Group 4 – Flight Operations Standards: Public Safety (Roadmap Chapter 9)

- sUAS for Public Safety Operations
- Hazardous Materials Incident Response
- Transport and Post-Crash Procedures Involving Biohazards
- Forensic Investigations Photogrammetry
- Payload Interface and Control for Public Safety Operations

- Search and Rescue
  - sUAS IR Cameral Sensor Capabilities
  - sUAS Automated Missions during Emergency Response
- Response Robots
- Public Safety Tactical Operations
- UAS Detection & Mitigation
- Emergency Management and Disasters
- Data Formatting for sUAS Public Safety Operations
WG4 – High Priority Gaps

Tier 1 (Most Critical)
- **New Gap S11: UAS Detection**
- Gap S9: UAS Mitigation

Tier 2 (Critical)
- **New Gap S13: Data Format for Public Safety sUAS Operations**

Tier 3 (Least Critical)
- Gap S3: Transport and Post-Crash Procedures Involving Biohazards
- Gap S5: Payload Interface and Control for Public Safety Operations
Questions?

- Raise hand to be unmuted or ask via Q&A or chat panel

- Send questions / comments / get on mailing list: uassc@ansi.org
For More Information

Jim McCabe  
Senior Director, Standards Facilitation  
1-212-642-8921; jmccabe@ansi.org

Melissa Wylie  
Program Administrator, Standards Facilitation  
1-212-642-4996; mwylie@ansi.org

American National Standards Institute

Headquarters  
1899 L Street, NW  
11th Floor  
Washington, DC  20036  
T:  202.293.8020  
F:  202.293.9287

New York Office  
25 West 43rd Street  
4th Floor  
New York, NY 10036  
T:  212.642.4900  
F:  212.398.0023

www.ansi.org/uassc

www.ansi.org

webstore.ansi.org