UASSC 17-010

Unmanned Aircraft Systems Standardization Collaborative (UASSC) Kick-off Meeting
MEETING SUMMARY
Thursday, September 28, 2017, 9:00 am – 4:30 pm EDT (w/reception after)
National Housing Center (part of National Association of Home Builders)
1201 15th Street, NW, Auditorium
Washington, DC 20005

Overview: Today's meeting is the first face-to-face organizing meeting of the UASSC, the purpose of which is to coordinate and accelerate the development of the standards and conformity assessment programs needed to facilitate the safe integration of unmanned aircraft systems (UAS) – commonly known as drones – into the national airspace system (NAS) of the United States. The collaborative will also focus on international coordination and adaptability, with the goal of fostering the growth of the UAS market. The work effort will entail the development of a standardization roadmap to identify existing standards and standards in development, define where gaps exist, and recommend additional work that is needed, along with a timeline for its completion, and organizations that can perform the work. A May 19, 2017 meeting laid the groundwork for the collaborative.

Secretary's Noted: Presentations and breakout reports from the meeting are available as a single zip file here. They are also posted individually here. The embedded links below point directly to the individual presentations.

Discussion Topic / Speaker
Welcome and ANSI Opening Remarks – Joe Bhatia, President and CEO, ANSI Mr. Bhatia welcomed the participants. He provided introductory remarks about ANSI and its role as administrator and coordinator of the U.S. voluntary standardization systems. He noted that UAS integration is a complex challenge and that ANSI is well suited to facilitate the dialogue through its collaborative process. Mr. Bhatia noted recent Federal Aviation Administration (FAA) regulatory activity which is helping the drones market to grow. Mr. Bhatia described ANSI's engagement on this topic. A stakeholder meeting in May demonstrated that many standards developing organizations (SDOs) are involved in UAS standardization, prompting the need for coordination. The May meeting confirmed that there is broad-based support for ANSI to move forward with the UASSC and develop a standardization roadmap to facilitate UAS integration into the national airspace system and coordination among SDOs working in this space. Mr. Bhatia emphasized the need to ensure international coordination and adaptability as well, and that ANSI has many relationships to assist in that regard. Mr. Bhatia explained that the UASSC would work to clarify the current standards landscape, articulate standardization needs, inform resource allocation for standards participation, and drive coordinated standards activity, while minimizing duplication of effort. The roadmap document, developed over the course of a year, will describe the current and desired standards landscape, identify published standards and standards in development, assess gaps, make recommendations to fill those gaps, establish priorities for action, and suggest organizations who can do the work. Mr. Bhatia emphasized that active engagement by subject matter experts is essential to crafting a comprehensive roadmap that addresses all of the standardization issues of concern. He added that ANSI would welcome financial support with appropriate recognition from those who may be in a position to provide sponsorships. He acknowledged Earl Lawrence and FAA as the first sponsor. He added that Brian Wynne also has committed to such seek support from his organization, AUVSI, and its members. API also has committed to pursue support.

Mr. Bhatia introduced and thanked Earl Lawrence and Brian Wynne for agreeing to serve as the public- and private-sector co-chairs of the UASSC, respectively. He also welcomed Art Hinaman of FAA who will be filling in for Earl who must leave early.

After reviewing the flow of the agenda, Mr. Bhatia urged those assembled to participate actively in the day's discussions.

Government Perspective – Earl Lawrence, Director, UAS Integration Office, Federal Aviation Administration, and UASSC public-sector Co-chair

Mr. Lawrence thanked Mr. Bhatia and ANSI for convening this meeting. He acknowledged the many familiar faces in the room, many of whom have been meeting at this same venue over the summer to develop guidelines on ID and tracking of drones, work that is concluding this week. He emphasized that safety is what is most important to FAA. Safety gets you more access and that is what the industry wants.

Mr. Lawrence reiterated that FAA is financially supporting this effort. In addition, FAA is supporting it via Art Hinaman as standards manager. And Art has a team behind him, many of whom are attending standards meetings. FAA supports the use of industry consensus standards. They are a huge help to FAA, enabling it to take advantage of the best talent available. Self-regulation also helps achieve the safety objective.

Mr. Lawrence indicated that he is also promoting the efficient use of FAA resources which are stretched. This roadmapping effort, knowing who is doing what, is really important to the agency so that it knows where to put resources. There were questions at the first ANSI UAS meeting such as do we need this. And it was clear there were people who were not aware of what others were doing in some cases, and there was duplication. So, getting the word out will help us avoid duplication and enable us to use resources efficiently.

Mr. Lawrence emphasized that education of the FAA, the industry, and all of government is needed. That feeds into consideration of who is the audience for the report this group will produce. What are the gaps that government authorities need to be aware of? For example, there's been a lot of focus on certification standards for radios and aircraft. What about pilots? What's the procedure for inspecting a cell tower? The cell industry is setting standards on how to train its people to do that inspection. Likewise, what are the standards for rescuing people from burning buildings? It would take a long time for FAA to develop pilot standards to meet everyone's needs. The FAA can take advantage of what this group is doing.

In terms of what the roadmap should look like, Mr. Lawrence said he liked what had already been put on the table. We need to think carefully about the scoping statement, executive summary, and table of contents. Who are we writing this for? There are multiple audiences including standards bodies, certification bodies, Congress and their staff, Executive agency personnel (e.g., DoD, Commerce, FAA), the international community. What message are we sending? What decisions are these audiences going to be making based on what's in the report?

In terms of international, the U.S. is a leader in this new technology and everything we do is being looked at by everybody. So the level of quality needs to be at the top. This is our opportunity to shine. That is why we really appreciate having a national standards organization to develop a U.S. plan. What will Congress and the rest of the world think when they read it? Think about this as we work through it.

Mr. Lawrence noted that he and Art Hinaman have been brainstorming on how we organize ourselves. We should think about the roadmap audiences as well as the groups who are writing standards. Maybe the core report is here are the gaps. We need to take an inventory. Just as we did with the remote ID and tracking aviation rulemaking committee (ARC), we need to ask what are the wants and needs of the community. We know the obvious ones.

Mr. Lawrence apologized that he would not be able to be present the entire day as FAA is closing out the ARC report.

Mr. Bhatia noted that he had just returned from the ISO General Assembly and there was much interest from other countries in what we are doing on UAS.

Industry Perspective – Brian Wynne, President and CEO, the Association for Unmanned Vehicle Systems International (AUVSI), and UASSC private-sector Co-chair

Mr. Wynne thanked Mr. Bhatia for the opportunity to co-chair. He thanked Earl Lawrence and said it is great to have a government partner like Earl along with Art and the team he has pulled together that will enhance this collaboration.

Mr. Wynne shared an anecdote that in the mid-1990s he ran an organization dedicated to making the world safer with machine readable codes. A client who was a major automobile maker needed buyer's guides. The company had a sophisticated just in time manufacturing system and suppliers all over the world. They had designed a shipping label for their suppliers to use. It was a learning experience that gave him an appreciation of just how valuable standards are.

On UAS, Mr. Wynne noted that there's not a moment to be lost. The UAS community is absolutely relying on all of us to get things in the right sequence. It must be done better by industry in terms of bringing the technological solutions to the government. But in order to do that, we have to coordinate what's going on. There can be no wasted, duplicative effort.

Mr. Wynne drew the analogy that this is similar to bar coding where, when price controls were instituted, warehousing began and all the CEOs in the grocery industry decided to use the UCC bar code. That launched the bar code industry. That bar code was an open standard in the public domain. When that bar code met the internet, global commerce changed. The stakes are similarly high with drones.

Mr. Wynne commented that some participants have been saying this is one more meeting, adding to a tremendous workload that we already have. But it's one we can't afford to overlook. If we don't coordinate our efforts right now, there will be much greater efficiencies that are lost and economic opportunity costs. Mr. Wynne is glad to put AUVSI's support behind this exercise and glad FAA is behind it as well.

UASSC Organizational Matters – Jim McCabe, Senior Director, Standards Facilitation, ANSI
Document: UASSC 17-005, McCabe presentation

Mr. McCabe expanded on the comments made by Mr. Bhatia in terms of ANSI's background. ANSI's mandate includes facilitating the sort of interaction on standards that we're discussing today and coordinating with federal agencies. ANSI collaboratives provide a neutral forum for coordinating and identifying standards needs and priorities. Past ANSI collaboratives have been done at the request of or in partnership with federal agencies in diverse areas such as homeland security, nanotechnology, electronic health records, electric vehicles, and energy efficiency in the built environment.

Out of today's meeting we want to determine how we organize ourselves into working groups to develop the roadmap. Outreach to those not here today is also key. We need to identify leaders to co-chair the working groups and set up a schedule of meetings. Most of the work is done through virtual, online meetings. We've found that 60-90 minute phone calls on a bi-weekly basis is an effective way to keep the work moving forward.

For each roadmap topic that gets discussed, we engage volunteers to help craft a description of why the issue is important, identify the relevant published standards and those in development, and formulate a gap statement when there is no existing published standard. We make a recommendation how to fill the gap, determine if additional R&D is needed, establish the priority for action, and identify one or more organizations that potentially could address the gap based on their current scope of work.

Mr. McCabe described the criteria and matrix that ANSI uses to determine the level of priority for the identified gaps. He also talked about the roles of the collaborative co-chairs and steering committee which helps to provide overall planning and strategic direction.

The ingredients for success with these collaboratives include that there is a demonstrated need for coordination; broad stakeholder support; and clearly defined objectives, timelines, and deliverables. We are targeting to complete the roadmap within a year. We also need committed leadership and participants. As Mr. Bhatia mentioned, public and private-sector funding to help offset ANSI's costs is welcome.

Mr. McCabe called out ANSI's recent partnership with America Makes to develop a standardization roadmap for additive manufacturing, which is available as a free downloaded at www.ansi.org/amsc.

UASSC Mission, Objectives, and Deliverable – Brian Wynne
Document: UASSC 17-003, Summary 19 May 2017 ANSI UAS Meeting; UASSC 17-004, ANSI Agenda Master slide deck

Mr. Wynne led the group through the draft UASSC mission, objectives, and deliverables as set forth in today's meeting agenda (UASSC 17-001rev) which had been tweaked as a result of the discussion at the May 19th ANSI UAS meeting. The group approved what was presented in the agenda, as modified with the edits noted below.

Mission

- To coordinate and accelerate the development of the standards and conformity assessment programs needed to facilitate the safe, mass integration of unmanned aircraft systems (UAS) into the national airspace system (NAS) of the United States, with international coordination and adaptability.

Edit: Delete the word "mass"

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 UAS standardization landscape and enable stakeholders to better focus standards participation resources

Edit: Add "and future" after "current"

- 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 homeland security applications

Edit: Replace "homeland security" with "public safety"

Deliverable

- A comprehensive roadmap developed over the course of a year describing the current and desired standardization landscape for UAS

Preparation for Breakout Group Discussion: UASSC Roadmap Organization and Working Group Structure – Art Hinaman, Manager, Technical Support Branch, Federal Aviation Administration; Wes Ryan, UAS Certification Policy Lead, Aircraft Certification, Federal Aviation Administration; Jim McCabe, ANSI
Document: UASSC 17-004, ANSI Agenda Master slide deck; UASSC 17-006, Wes Ryan presentation

This was a discussion of how the UASSC standardization roadmap might be logically organized. The roadmap table of contents or outline will inform how the UASSC organizes itself into working groups to take an inventory of existing and in-development standards and do the gap analysis looking at different topical areas of concern

and where there may be a need for additional standards. A few different approaches were noted in today's meeting agenda, along with questions for discussion.

Mr. Hinaman invited Wes Ryan of FAA to describe the risk-based regulatory approach noted on the agenda in further detail.

Mr. Ryan went through relevant parts of a recent presentation. He noted that FAA was still working its way through a classification scheme for airworthiness requirements and UAS integration. Originally it looked at an energy-based approach (slide 17). Instead of classifying just by size and energy, you also have to consider operational integration. The current regulatory structure (slide 16) includes at one end the small UAS part 107 rule and at the other the 14 CFR 21.17(b) special class type certification. FAA is in the process of creating a new Part 21 "permit to fly" rule. It will be an airworthiness certification based on industry standards which is where this collaborative will be helpful. FAA desires to concentrate resources on the high risk areas.

If you take the 3 regulatory "bins" shown on slide 16 and overlay them with the 6 risk classes of aircraft, you get the chart that appears on slide 18. The risk increases as you move from left to right. There is also an increasing level of aircraft certification as you move from the bottom to the top. Cert requirements are based on level of risk to the NAS. FAA is also developing a research and development plan that will have a risk-based operational classification strategy (slide 19) with increasing regulatory rigor for aircraft doing higher risk missions. So there is the airworthiness process and the integration into airspace process. FAA is still trying to figure out how we meld these classification schemes together, from the operational integration to the airworthiness and design certification (slide 20).

FAA is always looking for safety assurance/risk controls and we get that from the various pieces: the airworthiness and design of the aircraft, conditions for safe flight, pilot training, maintenance and operational limitations, and airspace. That's what makes this collaborative exciting.

Mr. Hinaman noted the airspace use case approach and the topical areas approach set forth on the agenda. He opened the floor for discussion. Various comments and suggestions were put forward including the following:

- DHS consider the various uses of the technology. We're working on test methods for response robots. Standards facilitate the deployment of a capability. Specific use cases need to be looked at.
- Infrastructure, ground control will also be very important
- Low altitude commercial may require us to include industrial sector perspectives
- Urban air mobility is an emerging area
- Entertainment industry, demonstration drones, video photography, are also use cases
- Managed spectrum vs. unmanaged spectrum is also a consideration
- Data handling/processing could be its own subgroup perhaps. Combine privacy/security with the data.
- Standards for testing/certification needs to be separate for people and drones
- We need global harmonization
- Look at the ICAO Remotely Piloted Aircraft Systems Panel structure
    - WG1 Airworthiness
    - WG2 Command and control, spectrum
    - WG3 Hazard detection and avoidance, ACAS interoperability
    - WG4 Personal licensing
    - WG5 Operator certification, Flight Ops
    - WG6 Strategy, integration into air navigation system
    - WG7 Humans in the system (human factors, roles and responsibilities)
    - SMS TF Safety and risk management task force
    - The last two of the above are overarching. There is also a small UAS action group.

- FAA aviation systems standards office has three broad categories: systems, equipment, procedures. Maybe tweak that to: certification (of operators and equipment), equipment standards, procedural standards
- Organize around technology, operations, and environment, with certification covered under each of these headings
- Break it down by people, places (category of airspace), and things/objects (communications systems)
- From a process perspective, there is a range of complex topical issues to cultural ones. Identify 3 or 4 broad categories.
- Good ideas from each approach can be incorporated.

The sense of the group was that people liked the topical areas approach set forth in agenda: airworthiness, operational procedures, and trained personnel. But it was recognized that you can't separate these from risk and the airspace. Standards get more rigorous as the risk goes up and you move into higher levels of airspace. We need to figure out the columns and the rows, i.e., a matrix approach, and what goes under the headings looking at the risk.

The group agreed to go with the topical/ matrix approach focusing on four high level domains:

- Certification of People (licensing/training/qualification of remote pilots/visual observers)
- Airworthiness (certification of aircraft/equipment/hardware/software/components/system)
- Operations/Procedures (including public safety/privacy/security)
- Airspace/Infrastructure (the environment/where the UAS will operate)

Under each of these, we will need to look at the risk classifications and CONOPS/uses cases.

Working Lunch & Concurrent Breakout Groups – All
Document: UASSC 17-002, ANSI UASSC Standards Landscape updated 8/15/17

It was agreed to have 3 mixed breakout groups. The task for each group is to determine what subtopics (rows) should be covered under the 4 broad domains (columns) that have been identified. Essentially, each group will try to answer questions 2 and 6 from the agenda:

- 2. What subtopics should be covered under those broad topical areas?
- 6. What are the most pressing UAS issues requiring standardization?

The groups and their leaders were noted as follows, along with their initial/primary areas of focus. Each group was invited to tease out the subtopics under all four domains, time permitting, after looking at their initial area.

- Group 1 Facilitator – Mark Blanks, Virginia Tech. Group 1 will start with certification of people.
- Group 2 Facilitator – Phil Kenul, TriVector Services. Group 2 will start with airworthiness.
- Group 3 Facilitator – Mark Reichardt, Open Geospatial Consortium. Group 3 will start with operations/procedures.

Breakout Group Report Backs to Full Group – Brian Wynne / All
Document: UASSC 17-007, Breakout Group 1 Report; UASSC 17-008, Breakout Group 2 Report; UASSC 17-009, Breakout Group 3 Report

The breakout groups reported on their deliberations as further detailed in their reports identified above.

Group 1 report - Mark Blanks gave the report. Christine DeJong, ASTM, served as note-taker. The group discussed certification of people (they renamed it personnel), and airspace/infrastructure.

The group divided personnel into manufacturing, maintenance/continued airworthiness, and operations, and then further subdivided these.

The group broke down airspace/infrastructure into: technology/product, communications, security, collision avoidance, airports/vertiports.

The group did not try to map the risk classes but noted that you could have the risk classes as columns adjacent to the rows.

Questions/Comments
Drones are utilized for nefarious purposes to attack our infrastructure. They are also utilized to assist in hurricanes. So perhaps add protection of infrastructure.

Group 2 report – Tracy Lamb, AUVSI, served as note-taker and gave the report. The group discussed all four domains: airworthiness, operations, personnel, and airspace/infrastructure, and then further subdivided these.

Airspace scenarios/use cases would go in the blue CONOPS column. There's also the risk category associated with each of those CONOPS which would go in the adjacent green column.

There was much discussion of standards, compliance with standards, and enforceability.

Group 3 report – Mark Reichardt gave the report assisted by Coitt Kessler, Austin Fire Department. Lance King, Northrop Grumman, served as note-taker.

Group 3 covered only operations. They did not get into the other 3 domains.

The group divided operations into: operational environment/conditions, operator (remote pilot in command), communications, mission, test and validation, and airspace integration, then further subdivided these.

Overarching themes discussed as operational included: risk (we could assign risk categories as applicable as we go through the matrix), artificial intelligence/machine learning, lifecycle management (maintenance and logistic considerations), marking/registration. Also, physical security, privacy, cybersecurity (on the communications side).

Urgent standards needs included: common terminology, cybersecurity, remote pilot training (e.g., for use in hurricane operations given recent lessons learned), airspace integration, standards architecture (expressing the standards landscape in terms of specific user communities/applications). Bringing in the emergency response community as we are vetting the standards landscape is critical.

Open Discussion / Conclusions from Report Back – Art Hinaman / All

Mr. Hinaman shared his impressions of the breakout reports, identifying common threads. He indicated he heard a lot of parallels and no conflict. He liked the Group 1 focus on personnel (manufacturing, maintenance/continued airworthiness). Ground handling and "terping" of airports was something he hadn't thought about. Let's not reinvent the wheel on things like pilot training (e.g., FAA has flight standards); there's plenty of other stuff to focus on. He liked the CONOPS scenario-based approach from Group 2, looking at all the mission profiles (e.g., structure firefighting versus wild land firefighting, search and rescue, surveillance, high altitude transmitting, etc.), from pre-flight through launch, flight, recovery, post-flight, modes of failure, cause and effect. Also, means of compliance and alternate means of compliance, which again varies considerably depending on the mission and aircraft (e.g., reading instructions "out of the box" vs. a 777). Disposal and lifecycle management he hadn't thought about. Security and cybersecurity comes up a lot and is a big one to tackle. Group 3 noted a lot of things we're working on standards for, while others are problems requiring a solution. We are looking at spectrum management (how do you pay for your time on the cell towers). Autonomy comes up often. Testing methods again goes back to the size of the aircraft. Those are some of the things he was happy to see and parallels.

Comments

- Aerial fertilization, pesticiding is important for the agricultural community. This technology can replace manned aircraft. We need to develop use cases.
- The ANSI collaborative process has been very useful for DHS in the area of homeland security and first responders. ANSI held a workshop on lessons learned post hurricane Katrina. There has been wide use of UAS in response to recent hurricanes so perhaps we could have a workshop on lessons learned from that.
- A new player in this ecosystem is the systems integrator taking well qualified off the shelf standards-based technology and "selling it" forward. That isn't represented in the current aviation system.
- Look at NIST work on sUAS and rescue robotics. Those test methods are under ASTM E54.09.
- We need to work on performance-based standards. We need to seriously prioritize and decide what we want to work on first.
- Look at what the breakout groups came up with against the FAA's implementation plan
- Also look at what is already being done and where it is being done. FAA has a lost link working group. Take an inventory.

Wrap-Up and Next Steps– Jim McCabe
Document: UASSC 17-004, ANSI Agenda Master slide deck

Mr. McCabe reviewed next steps in terms of organizing the collaborative, along with a rough timeline of milestones to get us to the finish line of having a roadmap by the end of September 2018. He noted among other things the following:

- We need to add additional initiatives to the standards landscape, e.g., GUTMA, 3GPP, OGC et al.
- We will do a consolidated matrix of the breakout inputs. From that, we'll be able to formulate a plan for participation.
- We need to do further outreach to those not here today.
- We will consult with the co-chairs on a steering committee, WG chairs, and establishing a timeline for virtual meetings.
- Once a structure is in place, we'll need the active engagement of participants to develop the roadmap
- We're looking at a follow-up face-to-face meeting in the May/June timeframe once we have a draft roadmap available, and then invite and review comments on it.

Closing Remarks – Joe Bhatia

Mr. Bhatia thanked everyone for their expert participation. Our solutions must address the needs as they exist today but also look toward the future. A challenge will be getting the right volunteers in the right subgroups. We need public- and private-sector leadership to direct the collaborative. That will determine our ability to achieve the objective we have laid out. We welcome your input and guidance. We cannot address everything. We need to prioritize. We also need your financial support. We will continue outreach. Please let us know who we should talk to.

Mr. Bhatia wished everyone a good evening and invited participants to enjoy the reception.

Attendees

First Name	Last Name	Title	Organization
Nicholas	Abbondante		Intertek
Jonathan	Alvear	International Trade Specialist, Transportation and Machinery	International Trade Administration (ITA)
David	Amaral	Systems Engineer	MITRE

Amanda	Armistead	Counsel	Small UAV Coalition
Justin	Barkowski	Director, Government Affairs, Regulatory	Aircraft Owners & Pilots Association (AOPA)
Joe	Bhatia	President & CEO	American National Standards Institute (ANSI)
Mark	Blanks	Director, MAAP and VT UAS Test Site	Virginia Tech
Sarah	Bloomquist	Program Manager, Standards Facilitation	American National Standards Institute (ANSI)
Art	Branch	Systems Engineer	MITRE
Mark	Burrows	Owner/Founding Partner	Colorado Unmanned
Tim	Butters		National Council on Public Safety UAS (NCPSU)
Sean	Cassidy	Director, Safety & Regulatory Affairs	Amazon Prime Air
Uven	Chong	Lead Engineer	Booz Allen Hamilton
Diana Marina	Cooper	Senior Vice President, Policy and Strategy	Precision Hawk USA Inc.; Small UAV Coalition
Kelley	Cox	Director, Business & Membership Development	American National Standards Institute (ANSI)
Ryan	Crane	Director, Standards and Certification Initiatives	American Society of Mechanical Engineers (ASME)
Barbara	Davis	Standards Engineer / Project Manager	Underwriters Laboratories, Inc. (UL)
Matt	DeGarmo	Systems Engineer	MITRE
Christine	DeJong	Director, Business Development	ASTM International (ASTM)
Christina	Engh	Manager and Program Analyst	Army National Guard
Jonathan	Evans	Co-President	Skyward: A Verizon Company and Global UTM Association (GUTMA)
Joe	Eyerman	Director, Center for Security, Defense, and Safety	RTI International
Dierdre	Gallop-Anderson	Senior Policy Analyst, Office of Infrastructure Protection, National Protection and Programs Directorate	Department of Homeland Security (DHS)
Ben	Gielow	Senior Manager, Public Policy	Amazon
Gordon	Gillerman	Director, Standards Coordination Office	National Institute of Standards and Technology (NIST)
Peter	Glowacki	Project Manager	CSA Group
Mark	Greene	General Engineer	Department of Justice (DOJ)
Charlie	Guddemi	Retired	U.S. Park Police
George	Gulla	VP Sales, Membership & Business Development	American National Standards Institute (ANSI)
Tom	Gunnarson	Lead of Regulatory Affairs	Zee.Aero
Arthur	Hinaman	Manager, Technical Support Branch	Federal Aviation Administration (FAA)
Steve	Kelley	Air Traffic Consultant	Padina Group, The
Randy	Kenagy	Manager, Engineering, & Operations	Air Line Pilots Association, International
Philip	Kenul (RDML)	Senior Vice President, Aviation and Operations	TriVector Services, Inc.

Coitt	Kessler	Program Manager, Robotic Emergency Deployment (RED) Team	City of Austin Fire Department
Lance	King	Senior Policy Advisor	Northrop Grumman
Chris	Kucera	Director, Air Operations	Analytical Graphics, Inc.
Tracy	Lamb	Vice President Regulatory & Safety Affairs - Chief Pilot	Association for Unmanned Vehicle Systems International (AUVSI)
Earl	Lawrence	Director, UAS Integration	Federal Aviation Administration (FAA)
Diego	Lodato	Engineer	Booz Allen Hamilton
Stephen	Luxion	Deputy Director, ASSURE FAA UAS COE	Mississippi State University/ASSURE
Jennifer	Marshall		NIST
Nan	Mattai	SVP	Rockwell Collins
Philip	Mattson	DHS Standards Executive, and Director, Office of Standards	Department of Homeland Security (DHS)
Jim	McCabe	Senior Director, Standards Facilitation	American National Standards Institute (ANSI)
Jim	McEachern	Senior Technology Consultant	Alliance for Telecommunications Industry Solutions (ATIS)
Mike	McNair	Innovation Lead, Autonomy	Bell Helicopter
Brian	Meincke	Assistant Vice President, Business Development	ASTM International (ASTM)
David	Merrill		Elory Air
Mary	Mikolajewski	Manager, Technical Committee Operations	ASTM International (ASTM)
David	Miller	Director of Standards	American Petroleum Institute (API)
Samuel	Minifie	Policy Advisor, Midstream & Industry Operations	American Petroleum Institute (API)
Dan	Mitchell	Quality Management	Pentagon Performance Inc.
Rose	Mooney	President	Archangel Aero
Rich	Moran	Director of Membership	Alliance for Telecommunications Industry Solutions (ATIS)
Travis	Norton	Technical Director	Bureau Veritas - Consumer Products Services (Bureau Veritas)
Wesley	Oliphant	Principal, Chief Technical Officer	Advanced Aerial Inspection Resources
Julio	Posse	Director, Corporate Product Safety	Sony Electronics
Mark	Reichardt	President & CEO	Open Geospatial Consortium (OGC)
Pat	Rizzi		Commercial Drone Alliance
Steve	Rogers	Owner/Founding Partner	Colorado Unmanned
Brian	Runkel	President & Owner	Runkel Enterprises
Wes	Ryan	Manager, Advanced Technology Branch	Federal Aviation Administration (FAA)
Lisa	Salley	VP for Global Industry Services	American Petroleum Institute (API)
Matthew	Satterley	Federal Public Policy Manager	AirMap
Mary	Saunders	Vice President for Government Relations and Public Policy	American National Standards Institute (ANSI)
Fran	Schrotter	SVP & COO	American National Standards Institute (ANSI)
Chief Donald	Shinnamon, Sr. (Ret.)	Business Development	Aeryon Labs; Public Safety Aviation Accreditation Commission (PSAAC) UAS Standards Development Committee

Bill	Shvodian	Distinguished Member of the Technical Staff	Sprint
Bill	Sobotka	Senior Principal	MCR LLC
Jace	Sotomayor		EMG
John	Stevens	President & COO	SkyData Technologies, LLC
Will	Susiene	Product Safety Manager	Intel
Harold	Thistle	Program Manager	USDA Forest Service (representing ASABE)
Melanie	Tiano	Director, Cybersecurity and Privacy	CTIA
Lawrence	Todd		Intertek
Nick	Tongson	Director of Standards	American Institute of Aeronautics and Astronautics (AIAA)
Gregory	Walden	Aviation Counsel	Small UAV Coalition
Aaron	Weddle		Army National Guard
Charles	Werner	Interim Chair	National Council on Public Safety UAS (NCPSU)
Michael	Wixted	Emergency Services Specialist	National Fire Protection Association (NFPA)
Brian	Wynne	President & CEO	Association for Unmanned Vehicle Systems International (AUVSI)
Ray	Young	Technical Director	Northeast UAS Airspace Integration Research Alliance (NUAIR Alliance)