

Commercial Space Industry Standardization Coordination Meeting Summary

Friday, January 31, 2020, 8:30 am – 12:00 noon Eastern
20 F Street, NW Conference Center, Washington, DC

As the national coordinator for the U.S. private-sector system of voluntary standardization, the American National Standards Institute (ANSI) convened this meeting to discuss the current standards landscape for the commercial spaceflight industry. A number of standards developing organizations (SDOs) and federal agencies are independently developing a variety of standards and roadmaps to meet the needs of this sector, underscoring the need for coordination to avoid duplication of effort and to achieve a coherent set of standards. The meeting explored how ongoing coordination can be facilitated through an ANSI standardization collaborative and the development of a standardization roadmap to support the broader policy dialogue now taking place around the growing commercial space industry market.

Presentations and related materials from the meeting are available as a single zip file [here \(22MB\)](#) and they are posted individually [here](#). The embedded links in the remainder of this report point directly to the individual presentations.

- [View the Master Slide deck](#)
- [View the Final Draft Agenda for the January 31, 2020 Meeting](#)

Discussion Topic and Speaker

Welcome and ANSI Opening Remarks - Joe Bhatia, President and CEO, ANSI

Mr. Bhatia welcomed the participants. He explained ANSI's role as the U.S. national standards body representing our nation globally, and the coordinator of the U.S. private sector-led voluntary standardization system. He noted that, as a coordinating body, ANSI is uniquely positioned to provide a neutral venue for broad and open discussion of standardization issues for emerging technologies and national priority areas, and the development of consensus recommendations to address them. ANSI's Standardization Collaboratives foster such cross-sector dialogue and advance the coordination of standards and conformance programs. The Institute has a long and successful track record of convening stakeholders in such diverse areas as homeland security, nanotechnology, electric vehicles, energy efficiency in the built environment, additive manufacturing, and, most recently, unmanned aircraft systems (UAS).

Mr. Bhatia noted the growth of the commercial spaceflight industry and the exciting opportunities that accompany it. As with any growing technology sector, there are bound to be risks and challenges, underscoring the importance of standards and conformance programs to help support recent developments in the public policy framework, and to ensure a safe commercial space industry ecosystem.

Mr. Bhatia explained that ANSI has been in discussions with stakeholders on this topic since the middle of last year and today's discussion is a continuation of that important dialogue. At the end of the day we want to answer this question: Is an ANSI Standardization Collaborative and roadmap for the commercial space industry needed?

Mr. Bhatia went on to say that an ANSI Collaborative could be helpful by:

- fostering coordination, minimizing duplication of effort, and effectively focusing standards participation resources;
- describing the current and desired future standards landscape; and
- identifying standardization needs with the goal of achieving a coherent set of standards.

All are welcome to participate, regardless of ANSI membership status.

Mr. Bhatia indicated that ANSI generally undertakes such collaboratives with the expectation that those in the community who stand to benefit from the work will also consider providing financial support through partner sponsorships, with attendant recognition benefits. All revenue received via such sponsorships is directly applied to offset the Institute's costs of operating the collaborative.

Mr. Bhatia reviewed the schedule for the day. He encouraged active participation and information sharing by the participants to provide the greatest understanding of the community's perspectives. He wished everyone a successful meeting.

A Federal Agency Perspective - Kevin O'Connell, Director, Office of Space Commerce, U.S. Department of Commerce (DOC)

Mr. O'Connell cited the importance of norms, standards, and best practices for this sector, and the need for an open architecture data repository. He and Mr. Coleman have been talking about holding a meeting like the one today for a year.

A driver for action is [space policy directive 3 \(SPD-3\)](#) on national space traffic management policy which, among other things,

- Directs the advancement of Space Situational Awareness (SSA) and Space Traffic Management (STM) and data sharing
- Calls for updating U.S. Orbital Debris Mitigation Standard Practices and establishing new guidelines for satellite design/operation, especially in relation to licensing
- Directs several agencies to develop space traffic standards and best practices including on-orbit collision avoidance support services

The Commerce Department is charged with maintaining the public open architecture SSA data repository, managing an on-orbit collision avoidance support service, and working with others to develop a plan for providing SSA data and basic STM services.

At the request of the Office of Space Commerce, the National Institute of Standards and Technology (NIST), part of DOC, initiated the development of a landscape of existing standards which was further developed by ANSI. This can help inform the dialogue.

SPD-3 also acknowledges the need to encourage and facilitate continued growth in the U.S. commercial space sector and reduce regulatory burdens that inhibit innovation while maintaining safety. Heavily regulating this sector right now would be a mistake. There are many new ideas on the horizon. The Consortium for Execution of Rendezvous and Servicing Operations (CONFERS) is talking about the kinds of standards that can be envisioned. Improving the quality of SSA is key.

A Federal Agency Perspective - Kelvin Coleman, Deputy Associate Administrator for Commercial Space Transportation (AST), Federal Aviation Administration (FAA)

Mr. Coleman commented that standards development provides a commonly accepted basis for managing change smoothly. There is significant change taking place in the commercial space industry today with a wide array of services being offered. As a regulator, FAA must keep pace. This includes moving from a highly

prescriptive framework to one that is performance-based in terms of compliance. This is where standards come into play.

Congress has instituted a regulatory learning period until October 2023 and has encouraged work on voluntary industry standards. A review has been undertaken of existing standards from NASA, Europe, the International Association for the Advancement of Space Safety (IAASS), et al., looking at areas such as design, manufacturing, and operations.

What is needed now is a cooperative effort among government, industry, and the public toward consensus standards. FAA AST is a member of ASTM F47 on commercial spaceflight and its subcommittee on occupant safety of suborbital vehicles, alongside industry. It also supports the work of the International Organization for Standardization (ISO) TC 20/SC 14 on space systems and operations including its work on orbital debris mitigation.

Working together on standards provides an environment for continued industry growth. The rulemaking effort currently underway is not the panacea. The work being discussed here today is important.

An Industry Perspective - Eric Stallmer, President, Commercial Spaceflight Federation (CSF)

Mr. Stallmer quoted former Defense Secretary Donald Rumsfeld on known knowns, known unknowns, and unknown unknowns. Mr. Stallmer does not know if a roadmap is the right course. In 2015, Congress directed the development of industry consensus standards. CSF started to write its own standards but they are not industry standards. It's hard work.

CSF companies are being contacted every week by SDOs about writing standards. CSF is working with ASTM F47, but standards work takes time. The industry is so diverse. It includes spaceport operators, launch companies, those who develop the payloads, those involved in space operations, et al. CSF works closely with companies that aren't members of CSF. It is also working with the FAA on issues such as airspace integration, spaceport categorization, and regulatory reform. Working collaboratively is necessary.

Mr. Stallmer is interested in finding out what he doesn't know. What is the best approach? Do we want foreign standards to dictate what American companies do? How do we bring in all of the SDOs so the U.S. can continue to be the world leader?

Presentations on Current Priorities

- View an in-development ["standards landscape" spreadsheet](#) of current known standards activities and related documents provided with the agenda.

The next part of the agenda included brief, high level overviews of priorities from representatives of other agencies, industry trade associations and coalitions, and SDOs. Presentations highlighted current areas of focus and future work.

Karl Kensinger, Deputy Chief, Satellite Division, Federal Communications Commission (FCC)

Mr. Kensinger addressed activity at FCC such as lessons learned/practices developed in the licensing processes including from NASA's development of assessment tools used by FCC licensees or applicants to incorporate quantitative metrics.

There have been significant changes in the market including the emergence of large constellations, small satellites, and new space ecosystems. These are things that flow into the FCC licensing process. Questions arise in relation to the scale of these operations.

These issues overlap with larger issues that the U.S. government as a whole is looking at. There is plenty of activity in this area.

The FCC proceeding issued in November elicited sixty comments from a broad selection of commenters including robust participation from industry large and small, academia, the amateur satellite community, and the United Church of Christ, among others.

Developments since the notice of proposed rulemaking (NPRM) include the U.S. government release of revisions to the orbital debris mitigation practices. FCC covered a lot of the same ground. It is well positioned to carry these forward into FCC regulations subject to Commission review and input.

It is now past the one year mark which is long for an FCC proceeding. FCC has not announced a target date. The typical process is that the staff develops the recommendations which are coordinated with the Commission. Roughly three weeks prior to the Commission meeting the document is released for review.

James Schier, Chief Architect for Space Communications and Navigation, National Aeronautics and Space Administration (NASA)

➤ [View Jim Schier's NASA presentation](#)

Mr. Schier gave an overview of NASA activity in relation to commercialization within space. There has been a shift in an environment that was government dominated to one of industry cooperation. There is a massive effort underway to send humans back to the moon in the next decade.

NASA is also working on a set of international deep space interoperability standards. It is working with traditional partners on the international space station (ISS) but it is also encouraging a lot of industry participation. NASA expects a steady evolution of these standards.

NASA's contracting approach is also shifting from a traditional government request for proposals (RFP) with an industry prime. It is really the dawning of a new era at NASA following a more open, interactive public-private partnership based approach.

NASA has a solicitation out for a human landing system on the moon. Maxar will provide the power and propulsion element. NASA expects this trend will continue where industry will own and operate their system under contract to provide goods to NASA.

There are eight interoperability standards being worked on in a number of areas including the International Communication System Interoperability Standard (ICSIS). It identifies standard interfaces, spectrum allocations, and standards and protocols for interoperable communications in space.

There is also a transition plan from a NASA owned and operated space station to one that will accommodate commercial modules.

NASA is also participating in orbital debris management.

➤ [View Jim Schier's DOD presentation](#)

Mr. Schier noted that he is also on detail to the Pentagon as a chief technical architect in DOD's research and engineering (R&E) section. R&E sets the technical direction for DOD to champion new capabilities needed by the warfighter.

There is a lot of modernization going on. This includes the Defense Advanced Research Projects Agency (DARPA), the Missile Defense Agency, et al. Modernization priorities within advanced capabilities include fully networked command control and communications, cyber, 5G, quantum science, autonomy, and additional capabilities in space systems. Standardization is addressed within the Defense Standardization Program.

The Space Development Agency (SDA) is where Mr. Schier's office is located. SDA has the charge to define and monitor a threat-driven space architecture and field the next generation of space capabilities. It leverages partnerships within DOD and with commercial industry for success. They are defining a notional architecture, layers of capabilities including communications, tracking from launch through operations, multiple sensors, SSA including out to the moon, and alternate position, navigation, and timing (PNT) capability. They released two RFIs this week, one on optical interface links and the other on ad hoc mesh space internetworking.

Therese Jones, Senior Director of Policy, Satellite Industry Association (SIA)

Ms. Jones stated that SIA represents some 50 satellite operators, ground equipment suppliers, manufacturers, and launch companies. This includes a wide variety of operators and stakeholders such as traditional geo players, large communications constellations, remote sensing satellites, et al.

SIA is involved in several different standards processes including 3GPP. Historically, they've been involved in cybersecurity standards. Several years ago they came out with high level best practices to implement NIST and ISO standards. They are very active in the orbital debris mitigation guidelines and best practices.

It is hard to get agreement on standards so SIA prefers to work on high level best practices. They have released best practices on space sustainability that encourage industry to work with SDOs. They have been part of efforts to develop a space sustainability rating system. They are also involved in implementing the United Nations (UN) long-term sustainability guidelines. They encourage their members to test their satellites before launch.

SIA members are trying to come up with data standardization standards for the open architecture data repository mentioned by Mr. O'Connell.

SIA is participating in the American Institute of Aeronautics and Astronautics (AIAA) working group (WG) on STM. They expect to be working with DOC, FCC, the State Department, UN, et al. They are interested in working with the organizations here today.

Dan Oltrogge, Founder, Space Safety Coalition (SSC); Director, Center for Space Standards and Innovation, Analytical Graphics, Inc.

➤ [View Dan Oltrogge's presentation](#)

Mr. Oltrogge noted that Analytical Graphics contributes heavily to the development of international standards in both ISO/TC 20/SC 14 (standardization of international best practices) and CCSDS (standardization of international space data messages), to include orbit, attitude, tracking data, reentry, conjunction, events, navigation. He encouraged the commercial community to participate in these important standards activities, and to draw upon the wealth of existing international standards before embarking upon the development of new and/or duplicative ones.

It is important to look at all aspects of how standards are developed. This includes the bidirectional adoption and development of international standards in the U.S., as well as seeking to transition mature U.S. standards and guidelines into international standards. The standards landscape is a mix of interrelated

treaties, standards, industry best practices, etc. AIAA did a study on space governance, finding that all elements of our space community (operators, international bodies such as the UN, the Inter-Agency Space Debris Coordination Committee (IADC) and ISO, industry associations and national regulatory bodies) play important roles in addressing long-term sustainability of space operations. These elements constitute a virtuous cycle, whereby all elements have to work together to collectively improve upon our current standards.

Mr. Oltrogge noted that AGI is also a corporate member of CSF and supports the commercial development of aspirational best practices through avenues such as the Space Safety Coalition (SSC). SSC is currently 37 industry operators and stakeholders. It draws heavily on UN and IADC guidelines and international standards of ISO/TC 20/SC 13, Space data and information transfer systems, and ISO/TC 20/SC 14, Space systems and operations. SSC has endorsement of their document from most parts of the globe. It is a living best practices document.

Fred Slane, Executive Director, Space Infrastructure Foundation

- [View Fred Slane's presentation \(long version\)](#)

Mr. Slane explained that the Space Infrastructure Foundation works with SDOs to develop standards. They are also involved in education and outreach, working with many of the SDOs. One challenge is that it is hard to put all of the work product from the SDOs together to make it usable. There is a need to have the SDOs get together to talk about how metadata is structured so that it can be presented to the user community.

The Mission Applicability Guide (MAG) takes space standards information and puts it into one place. Much of the data is inconsistent in terms of how it is presented. They want to have the conversation with the SDOs to identify ways that the data can be easily harvested through a more structured labelling of metadata. ISO, the Consultative Committee for Space Data Systems (CCSDS), AIAA, for example, all have different approaches.

Stephen Townes, Committee Manager, ISO/TC 20/SC 13; Chief Technologist, NASA Jet Propulsion Laboratory Interplanetary Network Directorate

- [View Stephen Towne's presentation](#)

Mr. Townes explained that CCSDS comprises the major space agencies of the world. It works very closely with ISO/TC 20/SC 13 on standards for space data and information transfer systems. ISO has a slightly different way of doing things but the standards are about 95% the same. The goal is to enhance governmental and commercial interoperability and cross-support, while also reducing risk, development time and project costs. More than 900 missions have adopted CCSDS standards.

CCSDS has six technical areas that take an end to end look at standards. Working groups (WGs) thereunder deal with specific topics.

NASA decided to focus on the same set of standards. Redundancy and risk are key. Standards extend to orbiting Mars and the ground stations. Orbiters of the European Aviation Safety Agency (EASA) are talking to NASA orbiters. Interoperability standards makes this work perfectly.

Some common questions include: How do the standards change as technological innovation changes? When is the right time to develop a standard? Are we coordinating with industry standards activities?

CCSDS adopts or adapts other standards where possible so as not to reinvent the wheel, e.g., IEEE 802.11. CCSDS and IETF have worked together over the years. CCSDS also works with the Object Management Group. Similarly, ISO/TC 20/SC 13 works cooperatively with ISO/TC 20/SC 14 and others.

Standards are good for both users and providers. Infusion is key.

Nick Tongson, Committee Manager, ISO/TC 20/SC 14; Director, Standards, American Institute of Aeronautics and Astronautics (AIAA)

➤ [View Nick Tongson's presentation](#)

Mr. Tongson stated that AIAA is a professional society with close to 30,000 individual members in over 90 countries and also has close to 100 corporate members.

AIAA has two programs: one covers the development of U.S. domestic standards as an ANSI-accredited SDO, and the administration of the U.S. technical advisory group (TAG) to ISO/TC 20/SC 14. The other is management of the international secretariat of SC 14.

Some examples of work on the national side include aerospace pressure vessels that are used by NASA. AIAA has also worked with CSF on reusable launch vehicles. Aerospace Research Central (ARC) houses the published documents.

SC 14 currently has seven WGs covering a variety of projects that might be relevant to the commercial space industry. Many of these are loosely based on AIAA documents that have been put forward internationally. There is collaboration between SC 14 and SC 13, e.g., on harmonization of terms. The national standards body from Russia is proposing a new WG8 on human spaceflight.

Len Morrissey, Director, Global Business Development and Strategy, ASTM International

➤ [View Len Morrissey's presentation](#)

Mr. Morrissey noted that ASTM was founded in 1898. It has developed over 12,000 standards and has 33,000 members. Its standards cover everything from buildings to jet fuel to trains and so on.

ASTM agrees it is helpful to reduce duplication of effort. There is enough work for everyone to do.

ASTM F47 on commercial spaceflight was started in 2016. It has an international membership of over 100 experts working in an open, transparent way.

F47 has nine subcommittees covering various aspects. Thus far it has approved two standards: one on terminology and another one released last year. There are seven task groups and five active work items. Mr. Morrissey provided ANSI with the current work program to update the standards landscape spreadsheet. Meetings are open and there are two events on the calendar.

F47 is working on roadmapping for its standards work program. It is open to collaborating and adopting/utilizing others' standards where they exist. Collaboration is essential. Kristy Straiton is the staff manager for F47.

Logen Johnson, Aerospace Standards Engineer, SAE International

➤ [View Logen Johnson's presentation](#)

Mr. Johnson stated that SAE International is an ANSI-accredited SDO. It is very active in other ANSI collaborative activities on additive manufacturing and UAS.

SAE is a mobility SDO. It provides a neutral forum for the development of consensus based standards. It has over 9,000 active space standards that apply directly to the aerospace industry, many of which will transfer

to the commercial space sector. These standards are developed by and for the global community. SAE has representation from a number of countries with meetings held all over the world.

SAE has over 180 active aerospace committees working to keep pace with innovation and supporting regulation. Some notable activities include PNT, artificial intelligence (AI), cyber physical systems, systems integration, human factors, etc.

SAE understands that standards development is a slow process. SAE is focused on how new technology is transforming the mobility industry. It looks at how can standards be nimble, applicable, fast-paced, and available when industry needs them. Examples of some relevant activities include hypersonic, supersonic, data governance, structured health monitoring, prognostics and diagnostics, etc.

SAE did an evaluation of where its standards are referenced in regulation. SAE can leverage its existing expertise for the commercial space sector.

Overview of ANSI Standardization Collaboratives - Jim McCabe, Senior Director, Standards Facilitation, ANSI

- [View Jim McCabe's presentation](#)

Mr. McCabe provided background on ANSI and an overview of ANSI standardization collaboratives. These are a mechanism to advance cross-sector coordination in the development and compatibility of standards and conformance programs needed to support emerging technologies and national / global priorities. ANSI has worked with federal agencies and private sector partners to define standards needs in many diverse areas.

Standardization roadmaps take about a year to develop and describe the current and desired standards landscape. The roadmap identifies existing standards and standards in development, assesses gaps, makes recommendations to fill gaps, establishes priorities for action, and suggests organizations to do the work based on their current scope of activity. A roadmap is useful when there is a need for a comprehensive gap analysis and issues need to be addressed simultaneously to facilitate coordination.

Mr. McCabe described the typical organizational structure of a collaborative and the ingredients for success. ANSI will look to the affected stakeholder community to help provide funding to offset ANSI's costs of administering the collaborative.

Moderated Open Discussion on Need/Strawman for Possible Commercial Space Industry Standardization Collaborative and Roadmap (and Focus Areas) – All/Facilitator: Oscar Garcia, Chairman and CEO, Interflight Global Corporation

- [View the Master Slide deck](#)
- [View the Strawman for the ANSI Commercial Space Industry Standardization Collaborative and Roadmap](#)

Mr. Garcia posed the question: What is the problem we are trying to solve? He noted that there are multiple efforts to build a commercial spaceflight industry sector that is safe, resilient, flexible, scalable, sustainable, and interoperable. Could there be one place where stakeholders could go to find out what is happening in terms of safety and standardization? The problem is that the various efforts currently underway are not synchronized/aligned. Having a portal of activities would help to provide direction.

Mr. Garcia described a few elements why an ANSI collaborative and roadmap could be helpful: 1) Safety, 2) Regulatory Streamlining and Compliance, 3) Scalability and Interoperability (including International), and 4)

Sustainability and Profitability. Put another way, he asked: What is the cost benefit of pursuing versus not pursuing the effort?

Some of the comments made in the ensuing discussion were as follows:

- Time is another factor. When do we need standards and in what timeframe?
- Nine of the top ten commercial satellite companies are foreign owned. It would be nice to provide U.S. leadership. They all have unique architectures raising costs. It is a problem not to have interoperability.
- The cellular telephony/communications market mushroomed when 3GPP introduced standards, and now roaming and interoperability are an accepted requirement. Standards created market opportunity. Do we need to do a market analysis?
- What are the benefits or challenges for the SDOs in collaborating on all of this?
- SAE has been involved in the ANSI additive manufacturing and UAS standardization collaboratives. SAE provides a neutral platform for standards development but we need industry to come to it. The collaboratives provide a benefit in helping to identify the gaps. That's evident from the standards landscape spreadsheet.
- ASTM has also been involved in ANSI collaboratives. The UAS collaborative is serving a need. We need to ask are the conditions right? What problems are we trying to solve? That needs to be balanced against the resources needed. We've had some good experiences, and some where we thought the industry wasn't ready. How developed is the industry? We all agree we need to collaborate. How we get there we need to discuss more.
- Standards have the potential to better shape the regulatory environment.
- Interoperability is necessary for safety and sustainability. Terminology and how we use it across the industry is an example of practical usability.
- This is an aspirational goal but the devil is in the details. CSF did some in house standards in the beginning. We reached out to some of the SDOs here, a little naïve on what those collaborations would bring. We thought the SDOs would write the standards themselves but the SDOs need subject matter experts. We heard at a CSF Board meeting – which doesn't represent everyone – that people are very busy. I'm not sure it makes sense to have yet another organization which provides infrastructure pulling together the same people that are writing the standards. Is this the right time?
- The collaborative would not be writing standards but bringing together those entities to provide alignment of roadmaps through a single roadmap.
- CONFERS is struggling with a lot of the same challenges. We have a lot of new capabilities. The first satellite servicing company is working now. We're told we need standards for licensing. It's a catch-22. We don't yet have the industry practice to inform the development of standards.
- There is a bit of the cart before the horse. A lot of work we're doing with ASTM is coming up with an acceptable means of compliance for a proposed rulemaking that is undergoing a significant evolution. This effort is a little too early. We may produce a roadmap that has to go into a second or third iteration because big impacts are going to happen. A clearinghouse or portal of existing activities could be helpful but an expensive, time-consuming activity is not the right step at this moment.
- This discussion is quite productive. We all come in to the discussion with our own personal blinders on. Maybe we don't have awareness or interest in standards in another area. Doing an assessment of space governance specific to safety and STM was a huge task. We're going to find that more than one SDO is working in an area. There is competition between SDOs. No one here is representing ISO; we are U.S. volunteers supporting ISO. People are saturated with developing standards. For some time it has felt like there is a distinct lack of coordination on the U.S. side and maybe we're going down some paths that are not comprehensive. We should be trying to infuse our U.S. best practices

into various SDOs. It should be bi-directional. We should be influencing and incorporating international standards.

- Collaboration activities help to avoid duplication of effort. They document who's doing what. The collaborative doesn't have to be a herculean effort. I have been somewhat involved in the ANSI UAS collaborative. All of the SDOs are tapping the same industry people. Some companies are bigger than others. This kind of effort may help to pool resources and make sense of the standards efforts. Having some conversations will help the industry as a whole use resources effectively.
- Safety is paramount. A cataclysmic disaster will put different pressures on the regulators. This is an opportunity for industry to shape the direction of things. It is important to take some steps forward both for international leadership and to show that industry is paving the way. There is still high value. The cost of inaction potentially creates risks and complexities down the road.

Mr. McCabe noted that another model for how an ANSI collaborative operates is using a workshop format. This is another means of coordination that involves holding a series of topical workshops over time that include both presentations and breakout discussions. A written workshop report is produced afterwards describing what was discussed and any recommendations. ANSI's Homeland Defense and Security Standardization Collaborative has followed this model for many years. It is a less heavy lift on volunteers and staff than developing a roadmap.

Additional comments included the following:

- We need regulatory certainty. FAA is working hard toward regulations but they are not the panacea. We need to supplement those with standards for cost savings, efficiencies, investor confidence. FAA is on target to publish a rule for launch and re-entry in the fall of this year. That could be a target. More companies are getting involved in human spaceflight. We face a moratorium in 2023 on regulation. Let's be mindful of that date as well. As long as standards are being developed, then we don't necessarily need regulations if industry shows it can regulate itself.
- The diving industry avoided regulation back when there was desire to regulate it. Does Congress believe we are meeting what they requested in 2016 to develop standards? If there is a risk there, does embarking on this effort help us in that regard?
- SPD3 was mentioned. If Congress asked is there a U.S. roadmap at this time for the commercial space industry, the answer is no.
- Regulators are on the hook to answer to Congress. These kind of activities represent a positive indication that progress is being made toward that path.

Next Steps/Adjourn – Jim McCabe

Mr. McCabe acknowledged that there was definitely a mixed message in the comments. He hoped that people felt they learned something from the meeting that they did not know coming into it. Maybe reconvene in six months to continue the conversation in a standards workshop format? Having standards panels at existing industry conferences is another potential way to foster ongoing dialogue. It sounds like more conversations need to happen.

Ms. Schrotter noted that the concerns are real concerns and it is not unusual to hear these at the outset of such an initiative. ANSI has found that bringing people together in a national effort across the industry can't be done without having one place to come for discussion. She asked that participants please give further consideration to this. ANSI thinks it is important to have an effort in the U.S. in order for the U.S. to continue to lead this industry. ANSI is happy to continue to facilitate this dialogue and see where the issues are and where the information sharing and coordination are needed. ANSI is committed to providing solutions.

Mr. McCabe thanked everyone for participating.

Attendees (in person)

Name	Job Title	Organization
Christopher Allison	Sr. Systems Engineer (Licensing and Regulatory Affairs)	SNC
Jim Armor	Director, Government Relations	Northrop Grumman
Brandon Bailey	Cybersecurity Project Leader Senior	Aerospace Corporation
Ashley Bander	Director, Space Systems	Aerospace Industries Association (AIA)
Joe Bhatia	President and CEO	ANSI
Chris Cannizzaro	Physical Science Officer	U.S. Department of State
Chris Carnahan	AVP, Technical Operations & Standards	Aerospace Industries Association (AIA)
Kelvin Coleman	Deputy Associate Administrator for Commercial Space Transportation	FAA Office of Commercial Space Transportation
Kelley Cox	Director, Business & Membership Development	ANSI
Karina Drees	CEO	Mojave Air & Space Port
Brandon Eden	Manager, Government Operations	United Launch Alliance (ULA)
Robert Feierbach	Co-Founder & CEO	O-Glaunch
Gregory Fredenburg	Head of Regulatory Compliance	Virgin Galactic
Oscar Garcia	Chairman & CEO	InterFlight Global
Ritesh Ghimire	Aerospace Engineer	FAA UAS Integration Office
Paul Gill	Manager, NASA Technical Standards Program	NASA
Gordon Gillerman	Director	NIST
Lori Gordon	Civil Systems Technology	Aerospace Corporation
Jim Hatt	Director of Strategic Operations	FAA Office of Commercial Space Transportation
Diane Howard	Chief Counsel for Space Commerce	U.S. Department of Commerce, Office of Space Commerce
Steve Jangelis	Safety Chair	Air Line Pilots Association (ALPA)
Logen Johnson	Aerospace Engineer	SAE International
Therese Jones	Senior Directory of Policy	Satellite Industry Association
Ron Keen	Senior Advisor	U.S. Department of Homeland Security
Karl Kensinger	Deputy Chief, Satellite Division	Federal Communications Commission (FCC)
Shawn Linam	President and CEO	Qwaltec
Michael Lopez-Alegria	Principal	MLA Space, LLC
Priscilla Magee	Consumer Outreach Manager	ANSI
Jim McCabe	Senior Director, Standards Facilitation	ANSI
Taber MacCallum	Co-CEO CTO	Space Perspective
Mercedes McPhee	Space Policy Analyst	Commercial Spaceflight Federation
Len Morrissey	Director, Global Business Development and Strategy	ASTM International
Michelle Murray	Regulations Manager	FAA Office of Commercial Space Transportation
Andrew Nelson	President/Consultant	Nelson Aerospace Consulting Associates/Spaceport Camden
Dr. George Nield	President	Commercial Space Technologies, LLC

Kevin O'Connell	Director	U.S. Department of Commerce, Office of Space Commerce
Daniel Oltrogge	Director, Center for Space Standards and Innovation	Analytical Graphics, Inc.
Darrel Pennington	Senior Staff Engineer	Air Line Pilots Association (ALPA)
Angela Peura	Strategic Communications Advisor	NASA
Audrey Powers	Deputy General Counsel	Blue Origin, LLC
Judith Ritchie	Director, Government and Industry Affairs - Aerospace	SAE International
Glenn Rizner	Senior Technical Advisor	FAA Office of Commercial Space Transportation
William Robertson	Senior Manager of Product Assurance	The Spaceship Company
Mary Saunders	Vice President, Government Relations and Public Policy	ANSI
Caryn Schenewerk	Sr. Counsel	SpaceX
James Schier	Chief Architect for Space Communications and Navigation	NASA
Fran Schrotter	Sr. VP & COO	ANSI
Ryan Shepperd	Mission Planning and Orbital Analysis SSA Lead	Iridium
Frederick Slane	Executive Director	Space Infrastructure Foundation
Eric Stallmer	President	Commercial Spaceflight Federation
Seth Statler	Director of Government Affairs	National Fire Protection Association
Kristy Straiton	Manager, Technical Committee Operations	ASTM International
Zheng Tao	Sr Systems Engineer/Project Manager	Concepts Beyond
Nick Tongson	Director, Standards	American Institute of Aeronautics and Astronautics (AIAA)
Stephen Townes	ISO/TC 20/SC 13 Committee Manager, Chief Technologist JPI Interplanetary Network Directorate	NASA/JPL-Caltech
Lissy Velez	Business Development Program Manager	ASTM International
Brian Weeden	Director of Program Planning	Secure World Foundation
Melissa Wylie	Program Administrator, Standards Facilitation	ANSI
Total	58	

Attendees (remote)

Name	Job Title	Organization
Mark Daley	Deputy for Operations	U.S. Department of Commerce, Office of Space Commerce
Mark DeAngelo	Aerospace Engineer	SAE International
Bob Russotti	Senior Director, Online Marketing	ANSI
George Gulla	SVP, Publication Sales	ANSI
Robert Ocampo	Systems Safety Engineer	Blue Origin, LLC
Total	6	