Meeting Minutes

Time: 9:00 a.m. to 4:00 p.m. Eastern Time
Location: National Transportation Safety Board Boardroom and Conference Center, 420 10th St SW, Washington, DC 20594

For additional information, please view the Meeting eBook.

Meeting Summary

Prior to the official start of the meeting, the FAA shared that the meeting was being live streamed. The video will be posted online along with any meeting materials.

Drone Advisory Committee (DAC) Designated Federal Officer (DFO) Dan K. Elwell opened the meeting at 9 a.m. on February 27th. Mr. Elwell would need to leave during the lunch break due to prior commitments. Mr. Jay Merkle, the Executive Director of the FAA Unmanned Aircraft Systems (UAS) Integration Office took over the DFO duties from Mr. Elwell, in his absence.

DAC Chairman, Michael Chasen, PrecisionHawk USA, Inc. Chief Executive Officer (CEO), then gave his opening remarks. He highlighted the top priorities for the DAC going forward and shared that DOT will be putting out a solicitation for new DAC members in the near future.

Following the Chairman's remarks, Alexandra R. Randazzo, from the FAA Office of the Chief Counsel, gave a presentation on the Federal Advisory Committee Act (FACA) requirements for DAC members.

Mr. Elwell then invited FAA team members to present the FAA responses to the DAC recommendations presented at the October 2019 meeting.

Mr. Merkle, presented the FAA response to DAC Tasking #1: Remote Identification (Remote ID) Early Equipage. The DAC endorsed the ASTM remote ID standard as the equipage basis for a voluntary program and advised that the FAA should add a regulatory "overlay" and Minimal Operational Performance Standard (MOPS) on top of the ASTM standard as part of regulatory implementation. The FAA response acknowledges the DAC's consensus agreement to recommend the pending ASTM remote ID standard as the basis for any voluntary equipage incentives, and welcomed the DAC's layered approach to incentivizing as described in the recommendation.

Mrs. Elizabeth Soltys, Acting Division Manager, UAS Security, presented the FAA response to DAC Tasking #2: UAS Security Issues. The DAC recommended that:
- Original equipment manufacturers (OEM) should equip UAS with geofencing,
- The federal government should make available a database for critical infrastructure and Temporary Flight Restrictions (TFRs) issued,

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- OEM should create alerts for UAS approaching sensitive areas,
- OEM should voluntarily equip Automatic Dependent Surveillance-Broadcast (ADS-B) receivers into UAS systems,
- OEM should voluntarily enable automated UAS flight limitations, and
- OEM should explore voluntary development and equipage of UAS-based detect and avoid technology

The FAA response agreed with the need for geofencing and working on this pursuit. Regarding the recommendation for a consolidated database, the FAA currently provides standardized sources capturing TFRs. For the third recommendation, creating alerts for UAS operators, the FAA response concurred on this recommendation and supports the expedited development of such means. For the ADS-B recommendation, the FAA and DOT published the proposed RID rule which addresses ADS-B. For the last two recommendations proposed by the DAC, the FAA response supports both recommendations and is looking into fielding both options.

Mr. Rico Carty, Deputy Executive Director of the FAA's Flight Standards Service, presented the FAA response to DAC Tasking #3: Part 107 Waivers. The DAC recommended to:
- Auto-renew expiring waivers
- Modify the FAA DroneZone
- Create a checklist of safety cases for complex waiver approvals
- Streamline automated approval
- Streamline process for groups of operators
- Increase transparency of part 107
- Establish a structured program for part 107 waiver inspectors

To the respective recommendations, the FAA responses were:
- Auto-renewal of expiring waivers:
    o The FAA highlighted plans on expediting part 107 waivers and renewal application process in FAA DroneZone.
- Modification of the FAA DroneZone:
    o The FAA has processes in place for changing information on an issued waiver.
- Creation of a checklist of safety cases for complex waivers:
    o The FAA published examples of approved safety cases for each regulation and is developing a risk took to assist applications.
- Streamlining of automated approval:
    o The FAA is required to review each waiver application submitted but will collaborate with industry on developing new guidelines for training.
- Streamlining of automated approval for operators:
    o The FAA is currently exploring and modifying DroneZone application formats to help streamline; this is anticipated to help with applications, receipt, and analysis of waiver applications.
- Increased transparency and accountability of part 107:

- o The FAA has improved transparency by open communication between UAS Support Center and waiver analysts.
- Establishment of a structured program for part 107 waiver inspectors:
  - o All FAA waiver analysts are certified and received additional part 107 specific waiver training.

Mr. Elwell presented the FAA response to DAC Tasking #4: FAA UAS Comprehensive Plan. The FAA thanked the DAC members for their comments and the FAA will incorporate the feedback into the final plan.

DAC Chairman Michael Chasen then invited DAC members to present on the DAC recommendations from the October 2019 taskings.

Dave Messina, President & CEO, The First Person View (FPV) Freedom Coalition (FPVFC), along Dean Schultz, Executive Vice President (EVP)/Chief Operating Officer (COO) of Reno-Tahoe Airport Authority, presented the DAC recommendations on Tasking #5: UAS Facility Maps. The task group recommended UAS Facility Maps grid refinement from one degree to half degree grid squares. Following the grid redesign, they also suggested putting into place a pilot program to identify best practices and creating a "Stakeholders of the UAS Maps" refinement team.

Task Group #6: Beyond Visual Line of Sight (BVLOS) Challenges, included four sub-group recommendations that were presented by four DAC members. Sub-group 1: Certification, presented by Sean Cassidy, Amazon Prime Air, recommends that the FAA allow an incremental UAS type certification under 14 CFR Part 21.17(b). Sub-group 2: Spectrum/C2, presented by Dave Messina, President & CEO, FPVFC, recommends that the FAA collaborate with stakeholders to create a comprehensive report to Congress and determine how spectrum resources are best utilized for UAS. Sub-group 3: Detect and Avoid (DAA), presented by Jennifer Player, Avineer, recommends the use of DAA technology for safety and future operations. Sub-group 4: Autonomy, presented by James Burgess, Wing Corporation, recommends that the FAA should partner with industry and create performance-based requirements to support autonomous functions.

Max Finkell, Director, Unmanned and Emerging Aviation Technologies, Aerospace Industries Association, presented on behalf of DAC member David Silver, for DAC Tasking #7: UAS Traffic Management (UTM) Performance. Task Group #7 recommends that the FAA and relevant stakeholders put together a timeline of when tasking will be accomplished, allocate resources based on priorities as identified by the group, and that Task Group #7 remain in active to address UTM CONOPs 2.0 when available.

DAC Chairman Michael Chasen then introduced the industry-led topics discussion.

Chris Anderson, ASTM Durability & Reliability (D&R) Working Group Lead, presented on introducing simulation into a D&R certification process. He shared that if simulations were allowed to be used for D&R testing and certification, it would speed up the entire process. This would also allow for continuing rapid innovation, with potential cost savings, towards future certification methods of other aircraft.

The meeting concluded with Mr. Merkle reviewing the two new DAC taskings related to the topics raised by the DAC Chairman.

The meeting resulted in the following new DAC taskings:

Proposed DAC Tasking #7: UTM (continuation of Tasking #7)

Proposed Tasking:
- The UAS Traffic Management (UTM) concept of operations (ConOps) v2.0 was not released during the time period of task group #7's work. The FAA proposes the DAC continue work and provide comments on the release of v2.0

Summary:
- Comment on the UTM ConOps 2.0 concept and provide recommendations about what is most important regarding UTM capabilities. This will help inform FAA priorities and planning as we work toward building UTM capabilities and fully integrating UAS into the National Airspace System (NAS).

Tasking #8: Aviation Safety Culture for Drone Operators

Proposed Tasking:
- What are ways we can help the drone community fully adopt the safety culture that is so ingrained in manned aviation?

Summary:
- Develop recommendations and ideas to assist the drone community in adopting an aviation safety culture. This includes ideas for motivation and suggestions for industry involvement.

Detailed Minutes

Official Statement of the Designated Federal Officer
Elwell read the official statement at 9 a.m.

DFO Opening Remarks
Mr. Elwell started his opening remarks by reiterating that DAC meetings start with the reading of the Official DFO Statement. The agenda for the meeting today was sent ahead of time for everyone's review. Before the presentations began, Mr. Elwell shared that he had some sad news to share. DAC member Matthew Zuccaro had passed away. Elwell spoke of Zuccaro as an icon in the aviation community. Zuccaro had quit college in 1968 to join the Army to become a helicopter pilot. After training at Fort Rucker, Alabama, he was sent to Vietnam. While in Vietnam, he flew helicopters in combat and received two Distinguished Flying Service medals. He served on the Helicopter Association International (HAI) board and was also a writer of note on helicopter safety. He led the safety initiative "Land and Live." The DAC thanked him posthumously for all his effort in this industry. Mr. Elwell then turned over the floor to the DAC Chairman Michael Chasen.

DAC Chair Opening Remarks
DAC Chairman Michael Chasen, offered his condolences to Matthew Zuccaro's family and asked everyone in attendance to join him for a moment of silence in memory of Matthew Zuccaro. Following the moment of silence, Mr. Chasen welcomed everyone who attended the meeting in person and watching online. He shared that when he took on the role of DAC Chairman, he had talked about two main areas affecting the industry's ability to move forward: technology and policy. He shared that we need to make sure that we have policies that don't hamper innovation and highlighted five policies to focus on going forward:

- Remote ID
- BVLOS
- Counter UAS
- The Waiver Process
- Public-Private Partnerships

Mr. Chasen shared that the day's meeting would address FAA responses to previously submitted DAC recommendations on Remote ID Early Equipage, UAS Security Issues, and Part 107 Waivers. Going forward, the next focus areas will be on the UTM Task Group being extended and creating a strong aviation safety culture in the UAS community. He also shared that the DOT will soon post a solicitation for new DAC member. The DOT and FAA want to fill vacancies for underrepresented groups and to ensure that they have a qualified pool of candidates for future vacancies.

Federal Advisory Committee Act (FACA) Requirements Overview
Alexandra R. Randazzo, Office of the Chief Counsel, presented on the FACA requirements for DAC members. Ms. Randazzo is the managing attorney in the Litigation and General Law Division, and provides legal advice on FACA requirements. She provided the DAC with important aspects of the law as it relates to the DAC.

Ms. Randazzo shared that the role of the DAC is to advise the FAA. FACA sets forth procedures such as charters, memberships, etc. The DAC is a discretionary advisory committee. The appropriate federal registry notice, as required by law, was provided for this meeting. The goal is to provide public notice of the intent of the meeting. The law also requires that FACA meetings should be open to the public, unless a determination is made that it should be a closed meeting. As noted at the conclusion of this meeting, minutes of the meetings will be provided to the public. Records of the DAC are managed in accordance with General Records Schedule 6.2.

Turning to the individual DAC members' roles, Ms. Randazzo explained that as members of the DAC, they were each appointed by the Secretary of Transportation after appropriate ethics reviews. Member responsibilities include attending all attending meetings, preparing all committee reports, and offering recommendations.

Ms. Randazzo shared that DAC members can speak to Congress and the media only in their personal capacity, not on behalf of the DAC. Members should not discuss information which are covered under Freedom of Information Act (FOIA) exemptions 4 and 6. The DAC should not receive, compile, or discuss records that are trade secrets, commercial, or financial information. To the extent that the DAC determines, subcommittees should provide their work to the parent committee. The DAC will deliberate the work of the working groups and review their recommendations. Ms. Randazzo closed her presentation by sharing that if members have any questions, she is available to answer them. No members had questions.

Approval of the Agenda and Previous Meeting Minutes
DAC Chairman Mr. Chasen put forth a motion to accept the meeting minutes from the previous DAC meeting. The DAC unanimously approved meeting minutes from the last DAC meeting held on October 17, 2019.

FAA Response to DAC Tasking #1: Remote ID Early Equipage
Mr. Merkle presented the FAA response to DAC Tasking #1. He shared that this tasking was received at the last DAC meeting and the FAA committed to providing a response at this DAC meeting.
The FAA recognized three distinct time periods between this response and full implementation of the remote ID regulations and standards:

- **Period 1**: Starts when an industry consensus remote ID standard is published, and ends when the FAA's remote ID rule is final. Mr. Merkle shared that the FAA is currently in Period 1.
- **Period 2**: Starts when the FAA's remote ID rule is final and a UAS Service Supplier (USS) network is established for remote ID, prior to the FAA's formal acceptance of means of compliance for the remote ID standard. Mr. Merkle encouraged everyone to go comment on the proposed rule.
- **Period 3**: Starts when the FAA has accepted a standard to comply with remote ID, and ends on the required operational compliance date with the rule (currently proposed as three years after rule effectivity in the notice of proposed rulemaking or NPRM).

DAC Recommendation:
They recommended the ASTM remote ID standard to the DAC as the equipage basis for the voluntary program.

FAA Response:
- We acknowledge the DAC's consensus agreement to recommend the pending ASTM remote ID standard as the basis for any voluntary equipage incentives, and welcome the DAC's layered approach to incentivizing as described in their recommendation.

DAC Recommendation:
Incentives provided by the FAA: The DAC recommended incentives regarding waiver application processing and requirements, contract preference, equipage acknowledgement, airspace access, and rebates or monetary incentives.

FAA Response:
- **Waiver application processing and requirements:** The FAA commits to conducting a gap analysis of any remote ID industry consensus standard published during Period 1, and communicating to manufacturers and operators any additional information part 107 waiver applicants would need to provide for the FAA to give credit to for using remote ID as a risk mitigation in a waiver application.
- **Contract preference:** In order to be fair and equitable, it is highly unlikely that the FAA's procurement processes would enable preferential treatment for voluntary early adoption of equipment or compliance to regulations.
- **Equipage acknowledgement:** The FAA will maintain an online database of manufacturers who have declared compliance with an industry consensus standard

recognized by the FAA as a means of compliance with the remote ID rule. We will begin this database with the first declaration of compliance.

- **Airspace Access:** The FAA commits to working with our federal security partners to determine whether an expedited process for remote ID compliant aircraft could be established in order to approve airspace access for certain UAS in certain circumstances. Additionally, we will add a field on the FAA System Operations Support Center (SOSC) Special Governmental Interest (SGI) form for indication of remote ID compliant aircraft, which could facilitate coordination with incident commanders and security partners in certain circumstances.
- **Rebates or monetary incentives:** The FAA commits to considering this option as an incentive for early remote ID compliance and equipage, for a fixed period of time and a specific number of UAS, but would need additional input from manufacturers in order to determine the best window to make this offer.

DAC Recommendation:
Incentives provided by others: The DAC recommended incentives regarding waiver application processing and requirements, contract preference, equipage acknowledgement, airspace access, and rebates or monetary incentives.

FAA Response:
- We strongly encourage states and municipalities to favorably consider remote ID equipped aircraft when establishing their restrictions and conditions, and we commit to undertaking an educational campaign for states/cities/municipalities specifically related to the benefits remote ID provides in terms of situational awareness for their law enforcement and public safety officials. The FAA recognizes that while this may not be a direct incentive for individual operators and recreational flyers, it should broadly incentivize the UAS manufacturer community to produce aircraft in compliance with published industry consensus standards (e.g., the serial number standard) as early and quickly as possible.
- The FAA's final commitment is to reconsider the DAC's recommendations, as well as any additional ideas to incentivize voluntary remote ID equipage, as we get closer to finalizing the rule.

Mr. Merkle ended his presentation by sharing that the rule should incentivize industry to create UAS based on published and industry consensus standards. The FAA commits to reconsider the DAC recommendation and any additional ideas for voluntary remote ID equipage as we are closer to finalizing the rule. Currently, there are over 30,000 comments in the docket of the NPRM.

Discussion:
- Captain Houston Mill (UPS): What is the FAA's time period on this?
  - Jay Merkle (FAA): The FAA is starting this process now.

- Captain Joe DePete (Air Line Pilots Association [ALPA]): Can you elaborate on contract preference?
  - Dan Elwell (FAA): The FAA cannot require something that is not final yet. We are talking about voluntarily remote ID and if an applicant shows they have it, they are in a better standing than someone who does not, but this is only unofficial.

FAA Response to DAC Tasking #2: UAS Security Issues
Ms. Elizabeth Soltys, Acting Division Manager, UAS Security, Program and Data Management branch, presented the FAA response on DAC Tasking #2.

DAC Tasking #2:
- Identify what currently existing or near-term technical solutions at the aircraft or operational limitation/capability level could make it less likely that clueless and careless operators could operate UAS in ways that can be perceived as posing a safety or security threat
- Identify what is the universe of actions that IF relevant industry stakeholders agreed to do them, would substantially reduce the likelihood of unintentional threatening behavior

Ms. Soltys explained that the DAC analyzed the tasking and came up with five scenarios. In those scenarios, they looked at airspace, aircraft, and operators, across what they refer to as their three pillars. These three pillars are: airframe security, airspace/operational security, and airmen/operator security. They ran scenarios looking at TFRs, airspace in and around airports, mass gatherings, the vicinity of other aircraft (manned), and compliant UAS that were appropriately flying in that environment.

Recommendation #1: OEMs should equip their UAS with geofencing capabilities.

FAA Response:
- In her response, Ms. Soltys highlighted that the FAA and DOT had released its remote ID NPRM on December 31, 2019, with a comment period through March 2, 2020. Geofencing is reflected in the proposed rule and as part of the NPRM. The FAA envisions this requirement can be met through geofencing as one capability. The FAA also discussed command and control power limitations but the NPRM does not intend to propose imposing any range limitations on standard remote ID UAS. Ms. Soltys shared that the FAA looked at more sophisticated capabilities such as airspace prohibitions and TFRs, and she discussed that public safety drone missions that would be afforded access to airspace. The FAA would also consider part-time prohibitions. Ms. Soltys highlighted that current law prohibits enforcing FAA statutes by state and local authorities, otherwise known as pre-emption. Local law enforcement does have the necessary tools in its toolbox to deal with voyeurism. They also have ability to manage land, departure, and arrival locations.

Recommendation #2: The federal government should make available a consolidated, standardized, and up-to-date database for critical infrastructure and TFRs issued, and ensure that it is machine processable.

FAA Response:

- On Recommendation #2, Ms. Soltys stated that the FAA does in fact already provide LAANC, the Low Altitude Authorization and Notification Capability, which came online as a beta test in April 2018. To date, LAANC is available at approximately 400 air traffic facilities covering about 600 airports[1]. If you go to the FAA website, the FAA promotes the LAANC capability and you will see that there are active LAANC service providers, approximately nine in total, that handle part 107 waiver requests in almost real-time. These providers also handle those requests that require a more detailed analysis. LAANC was upgraded in 2019 to handle recreational fliers, as well.

- In addition to these services, the FAA offers Notice to Airmen (NOTAMs) and is currently working on our aeronautical information service to enhance the NOTAM functionality with modernization capabilities. In the FAA Extension Safety and Security Act of 2016 Section 2209, the Secretary of Transportation was asked to manage a rule to prohibit or restrict access to a specific airspace. It was well defined what those fixed site facilities would be. Currently, Section 2209 is in the rulemaking process and has not been released yet, so as an interim solution the FAA is employing our current authorities under 14 CFR 99.7. This affords us special security instructions so that our federal security partners can use TFRs, in and around federal prisons, around military bases, and even in environments that are managed or requested by our security partners, such as the Super Bowl.

Recommendation #3: OEMs should create alerts for UAS operators when their UAS is approaching sensitive flight areas, such as controlled airspace, prohibited flight areas, TFRs, etc.

FAA Response:

- The DAC also requested that OEMs should create alerts for UAS operators when their UAS is approaching sensitive facilities such as: controlled airspace, prohibited flight areas, and temporary flight restrictions, etc. Ms. Soltys informed the attendees that the FAA supports this expedited development and fielding of this automation capability. The FAA supports this functionality in the future to also include 4D trajectory as the UTM system expands.

Recommendation #4: OEMs should voluntarily equip "ADS-B In" receivers on UAS systems (i.e., airframe and/or controller), combined with the notification system in recommendation #2 above. A follow-on to this would be voluntary equipage of an airborne conflict resolution/collision avoidance capability for the UAS operator.

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[1] This sentence has been amended from the original transcript in order to accurately present the current status of LAANC.

FAA Response:

- Ms. Soltys shared that for recommendation #4, the DAC recommends, that OEMs should voluntarily equip ADS-B In, receivers on UAS. This would be voluntary equipage for airborne conflict resolution collision avoidance capability for UAS operators. On December 31, 2019, the FAA and DOT issued a NPRM on remote ID. Public comments are being accepted through March 2, 2020. The FAA does in fact address ADS-B In the NPRM. It was evaluated and discussed in the NPRM that ADS-B is a capability that the FAA is not considering at this time. Instead, the FAA looked at spectrum analysis and air-traffic capabilities in that type of airspace. It was determined that there would be saturation and that we did not have the current infrastructure that would be able to manage this type of capability. The FAA in the NPRM proposes to address the identification issues associated with UAS requiring the use of new services as identified in the document.

Discussion:

- Christian Ramsey (uAvionix Corporation): I read the recommendation as advocating for ADS-B In, as "ADS-B receiver on the drone as a means to avoid a manned aircraft that is equipped with ADS-B Out." Your response is based on the assumption that the recommendation is based on an ADS-B Out on the drone and that therefore the manned aircraft could respond. Yes, the NPRM does address ADS-B Out as an inappropriate means of remote ID. It addresses the ADS-B Out function as inappropriate for part 107. It does not address any sort of recommendation at all on the use of ADS-B In as a means to avoid manned aircraft. I'm just reading through the text that there was a maybe a misunderstanding in the recommendation, but maybe someone who was on that task could clarify?
    - Elizabeth Soltys (FAA): ADS-B In is discussed in the NRPM and the comments affiliated with ADS-B are being received through March 2. Did you only wish to discuss ADS-B In?
- Christian Ramsey: The way I read this recommendation is that there is no spectrum utilization for ADS-B In, is that correct? So, I read the recommendation as recommending for ADS-B as a means for detect and avoid passively. The response seems to be the opposite.
    - Jay Merkle (FAA): In the elaboration of the response, the FAA focused a little bit more on the rule and ADS-B Out. He shared that Mr. Ramsey was correct that the recommendation was for ADS-B In and the FAA is actively working with multiple applicants on uses of ADS-B In.
- Christian Ramsey: I'm not seeing a statement. There is no recommendation here for an ADS-B In.
    - Jay Merkle: We will go back and relook at that. But we are actively working with applicants on the use of ADS-B In.

- James Burgess (Wing): I think it's helpful just to note for the DAC and for the FAA, that there are many active engagements and research efforts on detect and avoid, in particular using ADS-B In on the UAS. It does not create spectrum issues and I just think for awareness of the committee, there actually are many organizations I can see, including several around the table, that are working on this effort. It would be helpful to know from the FAA, if that momentum and effort, is well aligned and in the direction that the FAA sees as effective, either now or at a later stage.
    - Jay Merkle: Without revealing who the applicants are, because that is private information, they are all consistent and they are all working towards moving to various ways to detect and avoid. We see a good consensus around all the approaches. It is our understanding that some of those companies are in fact talking with each other on making the approach more common. We strongly encourage that and we are seeing good progress in terms of defining what might be possible with the ADS-B In. We are supportive of the data collection efforts that people are suggesting and very much looking forward to the results. The results of these efforts could give us another very powerful tool in the layered risk mitigation toolbox, particularly in the Mode C Veil.

Recommendation #5: OEMs should explore the voluntarily enablement of automated UAS flight performance limitations — such as altitude limitations, return-to-home features, and a decrease in UAS speed or maneuverability — while in or near sensitive flight areas.

FAA Response:

- Ms. Soltys shared that the FAA does in fact support the development and integration by industry, in cooperation with the FAA, of automated UAS flight performance limitations linked to the proximity of airspace restrictions and other similar areas. The development of any such automation, which significantly alters UAS flight performance and behavior, must be closely coordinated with the FAA to address potential safety and security implications.

Recommendation #6: OEMs should explore the voluntary development and equipage of UAS with performance-based DAA technology, for collision/obstacle avoidance, on the airframe, using acoustic, optical, and/or other sensors, as well as robust DAA algorithms.

FAA Response:

- Ms. Soltys highlighted that the FAA supports this recommendation and would expect close coordination with the FAA, to ensure safety and security implications are worked through.

Discussion:

- Greg Agvent (CNN): As an operator who is flying every day in U.S. airspace, I want to give a little bit of a reality check to your slide number two. Slide two mentioned that the federal government should make available consolidated, standardized information. It's

our experience that we see every day missing or disparate information from a number of different sources, whether it's interactive maps provided by the FAA, facility maps, vector maps, or LAANC information provided by the USS providers or even from manufacturers. While your response is that you offer this, I think there's a lot of work that still needs to be done on rectifying some of the disparate and missing information.

- o Jay Merkle (FAA): Good comment and that is actually where that Automatic Identification System (AIS) effort is focused. AIS will do a better job of pulling all that data together. That is where the AIS links in with your comment.

FAA Response to DAC Tasking #3: Part 107 Waivers
Mr. Rico Carty, Deputy Director, Flight Standards, FAA, presented the FAA response to DAC Tasking #3.

Recommendation #1: Auto-renew expiring waivers

FAA Response:
- Mr. Carty emphasized that he was aware that the part 107 process can be considered a slow and onerous process. The FAA is working to streamline the waiver process. The FAA is currently planning an expedited part 107 waiver renewal application process in the FAA DroneZone. He explained that the FAA can't auto renew, but what they are trying to do is to make the process a little easier for applicants to get through without having to continuously do the entire application. The FAA will reduce the reapplication burden for waiver renewals or for applicants where the residual operational risk, regulatory structure, and policy has not changed since the original waiver issuance. The schedule will be announced at the FAA UAS Symposium in June 2020 with a likely 2020/2021 implementation date.

Recommendation #2: Modify the FAA DroneZone

FAA Response:
- Mr. Carty read the second recommendation of modifying the FAA DroneZone to allow the operator to update non-consequential waiver application information and forgo filing an amendment. The FAA and responsible persons are obligated to ensure all pertinent data and waiver applications, on an issued waiver, are accurate and up-to-date. The FAA must continuously keep this information updated and we have learned some of this from other applications.

Recommendation #3: Create a checklist of safety cases for complex waiver approvals

FAA Response:
- Mr. Carty shared that the FAA has published waiver safety justifications online as required by Section 352. The FAA is also developing a risk tool to assess applicants and

assist in identifying and reducing UAS operational risks which would help with the application process. The intent is that disapproved waiver applicants may contact the UAS Support Center which may provide additional insight on deficiencies in disapproved waiver applications. That is a tool that is currently in use and the FAA will ensure that additional emphasis is placed on that resource. Applicants can call in and they can take a look at that resource and ask questions of our analysis. The FAA is also updating disapproval letters to provide more constructive feedback to the applicants. We will emphasize that applicants are able to contact us to ask what they can do better to get their application approved.

Recommendation #4: Streamline automated approval

FAA Response:
- Mr. Carty moved on to the next DAC recommendation. The FAA is required to review each waiver application submitted and currently that is what we do. The FAA recognizes the potential safety benefits of specialized experience, advanced training programs, and industry audits. Currently, sponsored research projects can identify and quantify the appropriate amount of mitigation credit for specialized experience and advanced training. We are working to incorporate some of that and we are continuing to do so as we move forward. We are taking advantage of some of those mitigations. The FAA will collaborate with industry to leverage the research outcomes and to develop publicly available guidelines for training programs and specialized experience.

Recommendation #5: Streamline process for groups of operators

FAA Response:
- Mr. Carty stated that the FAA is working to streamline some of the process. The FAA is currently exploring and modifying the FAA DroneZone application to streamline the application, receipt, and analysis of waiver applications, and make it a quicker, better, more efficient operation. Part 107 waiver changes will begin to be implemented in calendar year 2020 and into 2021. As mentioned previously, the FAA is continuously evaluating strategy and methods to facilitate improvement in our process.

Recommendation #6: Increase transparency and accountability of part 107

FAA Response:
- Mr. Carty then provided the FAA response to recommendation #6. Mr. Carty emphasized that a waiver analyst cannot act as a risk acceptor. All risk acceptance occurs at the AFS-800 branch level. Those individuals work for Mr. Carty, and the FAA wants to make sure risk acceptance happens at a division manager level or above for part 107. The FAA has improved the transparency of processes by creating an open line of communication between the UAS Support Center and waiver analysts. The UAS Support Center serves as the primary point of contact and information gateway for applicants who seek

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explanation or guidance regarding waivers. Mr. Carty shared that the FAA will work to increase awareness of the UAS Support Center's role as a benefit for applicants.

Recommendation #7: Establish a structured program for part 107 waiver inspectors

FAA Response:
- Mr. Carty shared that all waiver analysts are certified and accredited aviation safety inspectors. They are trained in the waiver process. Additionally, inspectors assigned to the waiver team receive additional part 107 specific waiver training on part 107 waiver analysis, part 107 risk recommendation standardization, part 107 waiver quality control processes, ongoing part 107 waiver agencies subject matter experts, engagement, and education based on complexity of waiver application being analyzed. The FAA holds yearly refresher training for inspectors, at which time anything new that has been learned is incorporated into the process.

Discussion:
- Bob Brock (Kansas Department of Transportation): Our participation in the UAS Integration Pilot Program (IPP) has brought a great deal of lessons learned in engaging with AFS, Flight Standards Service, and the waiver and authorization process, and how to get to a meaningful solution. One thing I would like to offer to the DAC, as a perspective, is that a tremendous number of stakeholders at this table engage in this precise process so routinely to get waiver authorizations accomplished. The communication we enjoyed with this UAS program gives us insight and access to communication channels, directly to the people who will say "yes." Ultimately, the issue we have to overcome is that it is not enough to know there is a gap in your data analysis. What would be helpful is if a Flight Standards person can tell me, "Here are some solutions others have engaged that got them to success." I think there is some very clear and present value in lessons learned that other applicants or stakeholders have done to complete applications successfully. This is both a compliment to UAS IPP and to Jay's leadership, but it is also a "lessons learned" observation for the community. Just getting to "no" isn't improving and elevating the entire program. I think we really can find those paths to lessons learned or the people who do it well, and that will be extremely helpful to the others.
  - Dan Elwell (FAA): That is a great point. One of the goals of the IPP is exactly what you shared. It is to get the best practices, but more importantly, in the aviation ecosystem we keep no secrets when it comes to safety best practices. This is going to be central to the success of this industry, that both regulators and the industry share all of these best practices and all of these technologies that allow safety to continue to be a number one priority. This is especially the case as we get closer and closer to true integration.
  - Jay Merkle (FAA): Going back to Mr. Carty's point, the UAS Support Center today is broadly using the lessons learned that we have. As we codify the lessons learned from IPP, we are adding that to their notes and material. To Dan's point, I want to highlight that the industry-based Unmanned Aircraft Safety Team

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(UAST) is also another place that promotes best practices, particularly safety management. UAST provided a safety management system that operators — everyone from a single operator up to bordering part 135 type operations — can use to help guide them. Using those tools and best practices, we see companies and individuals tend to be more successful in the application process. Those who take advantage of the material on the website and UAS Support Center, tend to have more success. The other thing I want to acknowledge is that we realize that there are some complex operations people want to do and currently are trying to under part 107. This makes it somewhat difficult to get those operations approved under part 107. We know some of those complex operations have been approved under part 135 and that seems to be an easier path. But that might be too much of burden for others. Under the IPP, we are looking at a middle ground and looking to see if we can codify that, so applicants can understand that prior to the availability of a rule. How can we approach a waiver or exception that would be beyond part 107 but not all the way to a part 135?

- Brian Wynne (Association for Unmanned Vehicle Systems International [AUVSI]): One of the approaches that the task group took was to look at gaps from the FAA side and the industry side. One specific gap that was identified in the waiver process was the inability to use an outside standard to establish qualifications of pilots because this is going to be really important as we move forward. I was generally very pleased with the response, but we are going to be evolving the pilot qualifications. As we look at part 135, not just what the qualifications of the pilots are, but also what the certification process is going to be. Is it operation-specific, is it going to be platform-specific, as well as pilot-specific? In regards to part 107 gaps, the industry already saw that and stepped into that, leveraging existing aviation principles and training that was being done by traditional aviators. I would just suggest that given that was a gap that was identified by the people in the waiver process, we ask ourselves: how can we test the veracity of the pilot, who says I really know how to do this? The answer is, prove that you can to us, by things that are well known in aviation. What kind of training you have done, how many hours have you done this kind of operation? You see that throughout the recommendations we made. We don't have to completely start from scratch. Industry is willing to shoulder that burden and provide that training.
    - o Rico Carty (FAA): I don't disagree with that at all. I think from a Flight Standards perspective, we need to think outside of the box. We are at the Orville and Wilbur stage for this type of thinking. We are doing stuff we have never done before from that standpoint. I completely agree that we need to be thinking in different terms on how we train UAS pilots; and when we get into the UAM business, we will need to think differently.
    - o Jay Merkle: I think in Rico's slides you see evidence of some of that deep thinking. The fact that they are doing research and looking at how we can really do a good job of taking credit for all of those things and make sure that they are doing it in a standardized, unified way, rather than a one-off kind of haphazard

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way. I think you have really stimulated thinking in Flight Standards and they are responding to that.

- Captain Joe DePete (ALPA): If I could just add from ALPA's perspective. ALPA applauds the effort that went into this, when you look at the slide that talks about auto-renewal based on compliance unless there are compliance issues. How do you make that determination? Is it after the fact or is forensic or is it pre-emptive — when the waiver analyst looks at the entire package in making a determination? Some of that is going to be out in the field. I am curious to look at the how inspectors and how the framework of that inspection process will take place. Will it be mission-dependent on the type of operation or is it going to need a lot of flexibility? I think the task group did a great job on this.

FAA Response to DAC Tasking #4: FAA UAS Comprehensive Plan
Mr. Dan Elwell, Deputy Administrator, FAA, presented the FAA response to DAC Tasking #4.

FAA Response:
- Mr. Elwell shared that the FAA has received the input on the UAS comprehensive plan and is currently going through all the comments. The FAA thanks the members for their comments, which are very thought provoking. We hope to get our response back to members quickly.

Completion of FAA Responses to DAC Tasking:
At the end of the FAA responses to the DAC recommendations, Jay Merkle shared he would like to make a correction on something he said earlier. He confused the two drone related items on the federal docket. The remote ID NPRM comment period closes on March 2, 2020. There is second docket on airworthiness and use of special categories in that policy and that closes March 4, 2020. He encouraged everyone to submit their comments for the remote ID NPRM.

Before the start of the DAC tasking presentations, Mr. Elwell left the meeting due to another commitment. He delegated the DFO duties to Mr. Merkle for the remainder of the meeting.

Recommendation & Discussion for DAC Tasking #5: UAS Facility Maps

Presenters:
Marily Mora, Task Lead, Dave Messina, President and CEO, FPV Freedom Coalition, and Dean Schultz, EVP/COO, Reno-Tahoe Airport Authority

Ms. Mora introduced DAC Tasking #5. She shared that the Reno-Tahoe Airport Authority was particularly interested in the facility maps tasking, because they were one of the early adopters of the LAANC program. The Reno-Tahoe International Airport accounted for a fourth of the LAANC approvals for operations. She turned over the presentation to Dave Messina and Dean Schultz. Dave Messina is President and CEO of the FPV Freedom Coalition which represents recreational drone users in the United States. Dean Schultz is the COO of the Reno-Tahoe Airport Authority. Effie Needham provided the visuals and video graphics, which helped illustrate the task group's ideas.

Mr. Messina shared that the remit for the UAS facility maps testing group was to recommend to the FAA improvements to the UAS facility maps with collaboration from the FAA and a range of stakeholders. These recommendations would benefit both unmanned as well as manned aircraft operations. First and foremost, any changes that the group supports or makes must have safety as the top priority. The tasking group decided the best way to improve the UAS facility maps was to come up with a problem statement. The team agreed that the UAS facility map should be updated, as it has been three years since the UAS facility maps were created. They have experience from the operators as well as insight into the process. The task group agreed the need to maintain high standards of safety for manned aircraft flights. The group noted that there are areas around airports where zero above ground level (AGL) makes a lot of sense, as supported by people with local experience. The group came up with following recommendations:

- **First Recommendation**: Refine the grid map. This area is where the group spent most of their presentation.
- **Second Recommendation**: Have a pilot program. The idea of a pilot program is to study the process, looking at the data and then have it roll out across the country. These are proposals only and the group is proposing this to the DAC to be voted on.
- **Third Recommendation**: Focus on the "who." In particular, who would do this work? This is vitally important to the group.

The group understands that in many cases, the first time the UAS facility maps were created by members at the air traffic management relying on Air Traffic Policy Order JO 7200 23a. The tasking group felt that expanding the responsibilities across a stakeholder team would not only spread the workload but would also increase the buy-in from unmanned and manned operators. The group felt it was appropriate that there probably could be changes made to the UAS facility maps across the country. The group agreed to increase the amount of airspace for UAS and that could be done by making the grid squares or rectangles smaller. This would allow them to hold AGL at zero on the airport grounds. Then a half mile away they could raise the altitude to something that would provide sufficient and safe operations. The current UAS facility maps have a one-degree grid square or rectangle. These rectangles are about one mile square and the group agreed to split that in half in both directions. Where there is one square, there could then be up to four. The group agreed on this approach and split the grids in half. The proposed grids would be smaller and able to create more of a step as they go from on airport to outside the airport and may be able to create a little more altitude.

The group recommends the work to change the AGL limits should be led by air traffic management, which would be responsible for assigning new AGL limits for each of the new grid squares. During the pilot program the stakeholder team would evaluate the data that the group suggested to determine its utility and to set new AGL limits on the local UAS facility maps. They would also determine if some data sets should be ignored. All data that is discussed in the tasking group is existing data. The group is not recommending the creation of any new data. The group feels the data is current and it will help provide the stakeholder team with sufficient information to provide updates, which will be useful in the refinement and grid process.

The tasking group recommends that this refinement process be applied to controlled airspaces in classes B, C, D, and E. Airports in Class E airspace have been viewed with an overly protective stance, because of a lack of air traffic management (ATM) in sight and also because of a good abundance of caution. Air Traffic Policy Order JO 7200. 23a mentioned a 200-foot per nautical mile criteria which provides good vertical distance but it did not provide a consistent lateral guidance. The group described an oval that was a 10- by 14-mile oval. There is a good lateral area where the FAA could add to the UAS altitude and UAS could be able to fly in those areas off to the sides of the runway. The group put this forward for future consideration because UAS approval is gained through LAANC. There could be dynamic situations that would allow for changes such as in weather; there could be changes that happen maybe longer term for things like construction. This is a flexible system; this is data that also exists so no new data sets are created. It also gives us the ability to do something dynamically and on the fly.

The group had one additional proposal for the DAC, and that is called shielded operations. This concept is accepted in New Zealand as a regulation and it is well received by unmanned and manned operators. The idea is that there would be a nominal lateral distance from the obstruction where no manned aircraft would fly. Local insight to things like law enforcement and medical facilities would overrule the possibility of a shielded operation. An example is the Reno-Tahoe airport, where you can see green shaded area (on the animation) where we know no manned

aircraft would fly. This information is from track data, obstruction obstacle databases, as well as local knowledge. This area would be considered for shielded operations. Next, we take a look at the Reno-Tahoe Airport by the downtown area. The hotel owner's would really like some nice drone videos and photographs to publicize their properties. The idea is that a man-made structure would create a shielded operation that would safely allow UAS to fly, and would be in no way creating any safety issues for manned aircraft.

Mr. Messina ended the presentation by recapping the recommendations and thanked all those who partook in the task group.

Discussion:

- Bob Brock (Kansas DOT): I have one question about the shielded operations as you look at what the FAA calls masked operations. Do you anticipate assigning an equipage requirement for conducting shielded operations, which addresses some of the risk management issues required to handle if you are masked from the satellite and things like that, for the actual aircraft themselves? Sometimes the mask operations can actually induce lost links. This is readily mitigated but not every drone operator may be as technically proficient as we would like them to be. What if we potentially consider a shielded operation, including that you must have risk mitigated against EMI and some of those lost link procedures? Do you anticipate doing things like that?
  - ○ Dave Messina (FPV Freedom Coalition): Yes, we did and initially one of the capabilities was to utilize LAANC. It is in controlled airspace so that we would be putting forward a request for the flight. In addition, it is consistent with the ASTM standard. We would request a polygon of geometry that would be demonstrating exactly where I'm going to fly.
- Captain Houston Mills (UPS): It still feels a little creepy when drones get that close, from the aviator perspective. Is geofencing connected to that, because that whole concept seems very fascinating. I just wonder as you talked through that, since there are different types of command and control, was the geofencing perspective incorporated in this particular piece?
  - ○ Dave Messina: It was not, although what was really interesting to me is we had air traffic management from Alaska, Memphis, Dallas, Reno-Tahoe, and LAX. They were all very supportive of this. We did have some lively discussion about flying on airport grounds. We did talk about geofencing but it was not incorporated in the write-up.
- Captain Houston Mills: From a manned aviation perspective that is just a matter of safety, particularly for those type of operations. The closer you get, you think loss link is not going to happen, but it is going to happen. So that safety link is something I would recommend that we think about.
- Dave Messina: Yes, thank you. We agree.
- Brendan Schulman (DJI): On the geofencing point, we agree. In at least for our geofencing system, we have used ICAO and FAA principles concerning the approach path in and out of the runways. I would expect those to generally correspond to the safe

LAANC related areas and altitudes, in which to fly. As well as the shielded operations which reflect again the obstacle plain principles under ICAO Annex 14 and FAA Part 77. I also just want to say to the group, terrific job and this is quite impressive. I've said it before at the DAC meeting that we would like to see more representation of small business operators, especially for drone service providers who are not represented at the high-level DAC. In terms of the FAA consideration of adding members, that would be terrific. I do see reflected in the work of the group the diverse interests that were represented. I can see that you had the interests of the daily operators in mind and that's certainly important to us. Those are the people who are most directly impacted, including financially in terms of the constraints, on where and when they can fly. Great job in trying to promote innovation and efficiency in the industry.

- Dean Schultz (Reno-Tahoe Airport Authority) Good morning, everyone. I don't want to close out the Q&A but I did want to make a comment that as an airport operator, safety is our number one priority. We are very much concerned with that and as you know that the recommendations here are still a good balance. But given the experience that we've had in our community in the use of drones, a lot of the drone activity is a very localized activity. Whether it is for real estate or photography or construction, there are a lot of times when a very large grid restricts access to airspace that is not necessarily problematic for the operation of the airport. As you saw in Reno-Tahoe, we have north-south runways, primarily. The east-west runway is primarily a general aviation airport. Most of our operations are going north, which leaves a lot of airspace east and west that is not actually utilized substantially. In the first animation there was a grid that went from 50 to 200 smaller grids. It would allow for a more tiered increase into that airspace. Every airport is unique and as I said, we have parallel runways but their activities are not symmetrical. In our city the heavier density population is on the west side of the airfield. Most all of our aircraft activities are on the east side of the airfield, so the UAS facility maps probably should be looked at in that light and not necessarily symmetrical from that perspective as well. Then we did have lengthy conversations on part 77 and Terminal Instrument Procedures (TERPs). It can get very complicated but we didn't want to necessarily get into that level of detail because there are some very important surface approach and departure services particularly that protect approaches and aircraft operations up to and through an altitude of 500 feet. Beyond that they should not be interfering with their own activity. We encourage the FAA to use those resources but not necessarily have to implement every aspect of it. We wanted to have some lateral guidance and consistency but be cautious in not trying to apply every aspect of that. I did also want to emphasize that it was discussed extensively in our conversations the importance of having stakeholders involved in this go-round. Based on the conversations we had, we've heard many stories where stakeholders were in some cases allowed to participate and in other cases they were just informed of what it was going to look like. I think manned as well as unmanned operators, the airport, air traffic controllers, and the FAA management, all have useful information that can be used to form these revised UAS facility maps. I strongly encourage that when this process gets underway that stakeholders are allowed the opportunity to have an input into that process.

- Captain Joe DePete (ALPA): As you know, we participated in this and we strongly support the recommendations with the one caveat. We are presupposing that this is predicated upon the drones acting as expected. So there are still the flyaway risks that concern us a little bit here but hopefully we can work together to try to determine how we could manage that.
- Captain Mills: I also want to add that I think the process you followed was excellent. It was really a collaborative decision-making sort of approach. We get everybody around the table and everybody's not going to agree but hearing from each is really important. I think that this is a good model for any task group to follow. I'm curious if you set out guidelines after your first meeting to say this is how we're going to do this or did you just let it happen naturally?
  - o Dave Messina: We didn't just let it happen. It's four decades of herding cats inside an organization that's ten times as large as the FAA. It was a great group and it is just the experience of facilitating a group, listening, and guiding to an end point.
- Lorne Cass (American Airlines): I agree also with Houston and Joe. Our concern as a large aircraft operator is on establishing this airspace and it looks like you've got the right approach. Our concern, of course, is making sure that everything stays where it is supposed to stay just as we are expected to stay where we are supposed to be as well.
- Captain Joe DePete: How will the flyaway possibility be addressed? We have talked about geofencing but in just different manned airspace where we have different equipment requirements. I'm kind of thinking that if you were that enclosed that there'd be some prerequisite for a geofence or some types of alerting systems or whatever, to be able to tell flight crews that there's a chance of something happening. Have we not gone that far yet to determine how we might handle a remote event?
  - o Jay Merkle (FAA): Under the IPP we are looking at aircraft operations on the airfield and the Air Traffic Organization recently led a safety panel in that area. They are looking at all those kinds of questions and factors. That panel has completed its work and the results of the panel are in FAA internal review, from safety oversight. As soon as that is complete we'll be able to release those results. I think that will give a good indication of the kind of hazards, risks, and potential mitigations that might be useful in and around the airport area.
  - o Dave Messina: From a recreational perspective this is a great deal, great plug for STEM. From recreational users, flyaways are never good, you are losing your expensive device, but it is also not safe. We've got a number of either failsafe devices or failsafe coupled with devices that would be compliant with the minimum kinetic energy requirements.
- Bob Brock: I want to add that the UAS IPP just did flight operations at the Eisenhower International Airport. Thank you for the risk you assumed as taking on this kind of leadership position. It is not an easy task. I think part of your answer maybe comes from Task Group 3 findings and how we talk about part 77 surfaces and identify areas that you could legally be on. There are places you shouldn't be without a certain level of training and certification. State of Kansas operators are fostering an ecosystem; they really want

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every operator to be able to have full access, as a part of the IPP focused very heavily on formalized training procedures to say you are authorized to operate in this kind of airspace. If you are going to operate within a Class B, where there are heavies and other significant aircraft, you need to have that specialized training to deal with emergency procedures. This is just like it is with manned aircraft that is going to have emergency procedures. A lost link situation has a very prescribed model on how to do that safely. I wouldn't put an 18-year-old that has the Costco drone out there and trust that he's going to do his emergency well. So, we do require that in Kansas for how we do operations in these advanced UAS operations to say that not all places are appropriate. That's why it's important to have sufficient and proper training that's validated and to have someone's checked them out. I'll tell you it's a little intimidating to stand on runway 9 left with a drone, when they're clearing aircraft for land on runway 9 right. So every rated pilot turns around to final approach and looked every single time we heard that clearance on the radio to make sure that manned pilot was on the right runway. Those training and certifications are a thing and they can be a thing in UAS just as anywhere else.

- Captain Houston Mills: I am going to add to your thought. This really comes back to the whole access to airspace. I think there is some interconnectivity between this really good effort and as that continues to evolve. You made me think about certification qualification and how the closer you get, the higher the risk. So that great initiative really needs to be interlinked with that access as well.

- Dean Schultz: As a rule, everyone that participated on this panel was very respectful of the fact that you know safe integration is paramount and top of mind. There wasn't a huge push from anyone in particular to have access to every square inch of airspace; they were very respectful of everyone. We are not actually suggesting or recommending that the airspace in closest proximity to an airport should now suddenly be opened up. In fact, we did have many hours of conversation about zeros on airports and as a standard and starting point. I think it was pretty much agreed that it was necessary to have all airport property zeros. But then airport operators like myself may want to actually use a drone in certain situations as well as for various activities. That is going to be an item or an issue that still needs to be worked out. There was no advocating for opening up the airspace over top or underneath the approach and departure paths of runways.

- Todd Graetz (BNSF): I just have one quick question, what surprised you in all the conversations other than what you previously mentioned?
  - Dave Messina: I was blown away that people who do this for a living are really open to opening up their airspace. It sounds cute but I really was surprised. I'm coming in from a recreational drone perspective. There was a view that we should do this and that really surprised me. There was agreement across the group and it happened early on and that allowed us to have a good discussion from there forward.

Recommendation & Discussion for DAC Tasking #6: Beyond Visual Line-of-Sight (BVLOS) Challenges

BVLOS: Certification Sub-Group

Sean Cassidy, Director of Safety and Regulatory Affairs for Amazon Prime Air, presented on the certification sub-group. He highlighted that the recommendations are a continuum of items that will allow an applicant to start out with a fairly constrained process. This is a sequential approach that will go from a very constrained ad hoc approach, to initial operating authority for the vehicle. Then over time it can evolve into a normalized approach to meet the requirements as defined by the statutes, to have airworthiness through minimum safety requirements, and also validation through air operating certificates.

Mr. Cassidy explained that we are in the middle of a comment period for a policy change to Rule 2117B for Special Class Aircraft. This rule was never envisioned to be applied to unmanned systems. It was written for aircraft that are lighter than air and gliders. It is a very positive step forward, that 2117B can be a means of compliance for a special class aircraft for an unmanned system. However, it is just the beginning. Under this kind of risk-based method there is a new kind of approach called durability and reliability (D&R). D&R is an output-based approach to certification, in which an applicant that comes in with a system and go through a Test & Evaluation campaign, against air awareness requirements. If they meet all the conditions, they are issued a type certificate. This was initially oriented toward the IPP crowd, small UAS operating under 55 pounds, using a risk-based approach. A true performance and risk-based approach should be agnostic to the weight of the vehicle. This is reflected in the type certification approaches recommended in the Rule 2117B policy change comment.
Mr. Cassidy then presented the first recommendation from the certification sub-group. There should be a purposeful approach that looks at test cases in which there is an obligation for flight hours. It should incorporate reliability data, fault tree analysis, and failure mode analysis, to allow for a more refined allocation of those hours which would lead to a type certification. This would be a true performance- and risk-based approach.

The second part of the recommendation is a bridge plan. The 44807[2] statute allows for certain categories of aircraft to enter and be put in a commercial service, minus the requirements under 44704[3]. For those applicants whose operators who have a bona fide type certificate and have gone through all these hoops, they can be ensured that they will have continuity of the service

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[2] 49 U.S.C. §44807, Special Authority for Certain Unmanned Aircraft Systems
[3] 49 U.S.C. §44704, Type certificates, production certificates, airworthiness certificates, and design and production organization certificates

from the point they're operating under 44807, up to the point that they get to the actual type certificate.

The sub-group's third recommendation is to normalize the means by which everyone can actually realize beyond visual line-of-sight. Industry is seeking a path that provides more clarity around the role of Air Certification, the role of Flight Standards, and the role of the Air Traffic Organization. From the industry standpoint, by clearing up these swim lanes, we are heading toward that process of normalizing beyond visual line-of-sight operations.

The final recommendation is a look forward. The group advocates beginning work on this right away.

Discussion
- Houston Mills (UPS): Currently, 44807 expires in September 2023 by law. I think there's a current policy that basically shuts it off in October 2020. My question is, does the FAA have a pathway forward to ensure that the exemption shall have a pathway forward in accordance with the law, in case the certification process doesn't pan out? I'm just wondering is there an alternative pathway in case that doesn't happen?
  - Jay Merkle (FAA): 44807 does not expire in October. The IPP expires in October and the operations under the IPP, as a result of the IPP expiring, would lose that exemption. The FAA is looking at what the post-IPP world would look like. That does not mean that as of November 1, anyone in the IPP cannot fly. The FAA is looking at a number of bridging activities between 44807. The FAA realizes there are number of things policy-wise and regulatory-wise that are needed to be put into place before that 44807 exemption expires. The good news is we are seeing significant positive responses to the message that people need to get their aircraft certified. We are also seeing participants doing a lot of work in this area that is leading-edge work. At times it is difficult and painful for the participants but we are forging that path for these new drones. Early in the summer 2019, the FAA had approximately 12 programs that were moving towards certification. We are now up to approximately 40. One of the keys to operating beyond part 107, is a type certification or an airworthiness determination. I feel very positive that Aircraft Certification and Flight Standards are helping the FAA get there. I see industry wanting to get there as well. The answer is yes, we do know there is a need for a bridge and we are forming that bridge and the good news is everyone's responding.
- Captain Joe DePete (ALPA): ALPA sees this 2117b and these approaches as a good step towards a more industry-based set of certification standards. We're supportive of it as long as we try to move quickly towards that goal. I realize that is a catch-22, because you have to understand the mission and the operations. But the end state is to have a set of acceptable industry certification standards.
  - Sean Cassidy: I think the end state is something that does not recognize UAS as a special class aircraft. When we get to normalized operations, UAS should not be

looked upon as a kind of unicorn. They should be looked upon as normalized systems that are fully integrated into the airspace.
- o Jay Merkle: I can assure you, no one in this industry wants to move slowly, but they all do want to move safely.

BVLOS: Spectrum/C2 sub-group

Dave Messina, President and CEO, FPV Freedom Coalition, presented on behalf of the spectrum/C2 sub-group. The sub-group recommendations were approved and vetted by the entire team. The sub-group realized that it would be critical of the FAA in this work and they took that very seriously and with caution.

Looking at Section 374 of the 2018 FAA Reauthorization Act, referencing C band and L band, Congress mandates that the FAA work with the Federal Communications Commission (FCC) and the National Telecommunications and Information Administration (NTIA). Before starting, the group learned the spectrum office within the FAA had, on October 19, 2019, submitted a request for stakeholders to send comments to them by November 19, 2019. The group requested copies of the comments received as they were regarding spectrum arena, in particular Class C and L bands. The sub-group was declined access to the comments, until late in the process. As such, the group went out and gathered much of the feedback and put together a summary of the statements. That distillation became the four problem statements:

- The FAA, FCC, and NTIA do not appear to be coordinating on a single report addressing the allocated L-band and C-band for UAS operations,
- The FAA, in its request for stakeholder feedback, failed to mention or acknowledge standards and analysis already completed that will advance the creation of regulations regarding the safety of UAS operations and inform spectrum usage,
- Industry leaders provided stakeholder feedback to the FAA, proposing that the L-band and C-band not be opened for sharing,
- The Lack of spectrum regulations that enable BVLOS missions and ensure the safety of operations is hampering commercial growth of UAS in the United States.

The sub-group recommends that the FAA should work collaboratively with the FCC, NTIA, and other organizations. UAS operators, along with issues related to spectrum, will be diverse and all spectrum requirements must consider safety. The sub-group found in the write-up that safety was not necessarily the first tenant. Sharing spectrum with terrestrial users and the expectation that terrestrial users would give up bandwidth in times of high use didn't seem practical or prudent to the group. In addition, the World Radio Conference of 2007-2012 allocated spectrum to be made available to the UAS, in particular the C band and the L band. The sub-group recommends the FAA should assert its oversight and take lead to ensure that spectrum is maintained for the use of the UAS. Any consideration of sharing or auction must maintain safety primacy for UAS. The sub-group recommends that the FAA, FCC, and NTIA should work closely together and the

group further suggests that a single or individual champion might be beneficial while working on cross-agency situations. The FAA should assess the existing work already completed, as well as the standards already created and in progress. Lastly, members of the sub-group are eager to help further should the FAA need it.

Discussion

- Greg Agvent (CNN): Can you expand on the last line in the last slide? The line "this work should include recognizing commercial cellular," how significantly was that discussed?
    - o Dave Messina: It was relatively significantly discussed. This was brought to the table by the two large cellular providers. There was a discussion about can it work explicitly or can it not, and do we have to aim terrestrial antennas skyward? This was discussed significantly and even to the point of considering whether maybe it's outside of the remit of the section 374. We felt it was not, as a group.
- Greg Agvent: Follow-up question: I know that the focus was on enabling BLVOS. But was there any discussion at all about the potential to use segregated spectrum for security — say, if a hobbyist was in an unlicensed spectrum and commercial operations were segregated into another spectrum? Did it come up at all, that there was a positive security aspect to separating or segregating spectrum for our control?
    - o Dave Messina: We tried to separate the discussion by mission. It did not come up with respect to security as an input. There was a lot of discussion about what is a better way to split this up because the documents that were put forward by the spectrum office in October had a one-size-fits-all approach. This was met with a lot of rebuttal by many of the respondents. They felt this really needs to be broken down by what you are doing, is it beyond visual line-of-sight, at what altitude, what is your cargo, etc.
- Robie Samanta Roy (Lockheed Martin Corporation): A note on working with the NTIA: I think that is important because they are representing all the other government departments and agencies. For everyone's awareness, there are national security considerations going on now in the 5G world. The Defense Department at the undersecretary level has a task force and is looking at spectrum issues. As we evolve this and as many other things are happening in this very complex, congested electromagnetic spectrum, we will need to be aware of a lot of other moving parts and coordination at the NTIA level. That is going to be really important as many other governmental considerations come into play.

BVLOS: Detect and Avoid Sub-group

Jennifer Player, Founder, Avineer, presented on behalf of the Detect and Avoid (DAA) Sub-group. DAA is a key piece of the puzzle for enabling BVLOS operations. The DAA group came up with four recommendations. They found that a framework is needed for the near-term operational approval waivers. There are several standards development organizations that are

currently engaged in the development of performance standards and test methodologies for DAA systems.

The DAA sub-group's first recommendation is that the FAA ultimately accept these standards once they are published as means of compliance for these systems. Second, the FAA should define operating environments for which a DAA is not required. Third, until those performance standards and test methodologies standards have been published, there is a bit of a gap. To fill that gap the FAA should take the lessons learned, from programs like IPP and Pathfinder, and provide information to industry on how to safely and slowly expand BVLOS operations. Lastly, looking forward and thinking about operations in an integrated airspace, the sub-group recommends that the FAA work with industry to create, endorse, and promote technology, suitable for collaborative DAA between manned and unmanned aircraft.

Discussion
- Robie Samanta Roy (Lockheed Martin Corporation): I want to ensure that the FAA is continuing close cooperation across the agencies. I'm specifically pointing to NASA and the the Department of Defense, where the Air Force Research Lab has been working on DAA technologies. One example is collaboration between NASA, the Air Force, and Lockheed Martin, where they developed a ground collision avoidance system. For example, if an F-16 pilot goes into High-G maneuver and blacks out, the airplane completely goes into automated mode and essentially prevents the aircraft from flying into terrain. There are technologies out there to ensure manned and unmanned teams of aircraft are not bumping into each other, which is essentially the kind of problem we are talking about here. We want to make sure industry and other aviation stakeholders are aware that there is a broad, rich set of activities going on that are completely unclassified. We need to be able to make sure that this community taps into a lot of that activity.
  - Jennifer Player: Certainly, and we should be mindful of the range of UAS and the swap considerations and what a larger UAS can do versus the smaller ones.
- Houston Mills (UPS): From a manned aviation perspective we talked about "see and avoid", and that is really the threshold. Are we going to create something equal to that, mathematically something like ten to the minus ninth? I just think there has to be a solution to that. If it is a mathematical probability in terms of risk mitigation, we want to find something that was equivalent or acceptable from a DAA perspective. Whatever math it is, it seems that this should be one of the cornerstone pieces. I'm sure NASA and others have had similar discussions, for example on the carriage of lithium batteries. There was a lot of concerns about safe carriage of batteries. We talked about that and NASA was here and they were able to educate the group and shared the probability of spontaneous activity is ten to the minus ninth. So these batteries are very safe and they are even on the International Space Station. When we talk about what this will look like and how do we get there, I think we need to bring that level of detail into this conversation.

- o Jennifer Player: We should be mindful that there is a difference between operational safety and system safety. We must bring both together in the appropriate way.
- Christian Ramsey (uAvionix Corporation): I would like to second your last bullet. As a manufacturer of DAA types of equipment, we have some DAA already on the market and others that are in development. We keep an eye on what is happening in the industry across all types of technologies. There is a real concern out there that what is on the market now is not going to get us where we need to be, from a performance perspective or cost perspective or spectrum perspective. We really need the FAA to sort of help guide industry on where they see promise, so that we may direct our activities in certain areas.
  - o Jay Merkle (FAA): Under the IPP and in working with our colleagues on the standards committees, the FAA is seeing a need to create a larger DAA framework. DAA is one term, but we realize it applies in many ways, in many levels of performance. We are preparing to engage industry in a conversation of what does that framework look like and how we can best use it. The FAA is committed to a performance-based standard approach. Any of the technologies that we would want to give people credit for in terms of risk mitigation, we would like to see move towards industry-based consensus standards. We do have some of those standards but they are mostly focused on large aircraft that can carry large systems, and generate a tremendous amount of electricity energy. We are seeing more promise in the solutions in DAA, both in electro-optical and ADS-B In. We are working with industry to establish what the right performance requirements for the mission are, and foreshadowing the autonomy recommendations.

BVLOS: Autonomy Sub-group

James Burgress, Chief Executive Officer, Wing, standing in for Toni Nannini. Mr. Burgess shared the Autonomy sub-group arrived upon three recommendations for the FAA. The Autonomy sub-group highlighted that they looked at across the board performance-based requirements standards. These standards will help everyone take advantage of what this technology can bring and really look at things on a broader scale. The second recommendation is to look at the net benefit of rulemaking activities and what do they do for safety, how that actually improves safety. Lastly, the sub-group recommends looking at operational risk level, to include the consideration of those risks and safety benefits.

Discussion
- Jay Merkle (FAA): Clarifying question, you called the subgroup "Autonomy". In the response, the FAA will most likely address the bullets that you provided rather than the term. Autonomy is a very difficult thing to respond to.

Recommendation & Discussion for DAC Tasking #7: UTM Performance

Max Fenkell, Director, Unmanned and Emerging Aviation Technologies, Aerospace Industries Association (AIA) presented on UTM Performance. The UTM group's tasking scope was specific to review of UTM CONOPs 2.0 and the industry prioritization of UTM performance capabilities. The UTM group created a roadmap compiling the capability, responsibility, resource requirement, current status, and industry priority level in the near term, which is defined as 0-24 months. Each capability was then quantified as: high priority capabilities, medium/high priority capabilities, medium priority capabilities, low/medium priority capabilities, low priority capabilities, or completed capabilities.

Following the list of capabilities and priority level, the UTM group shared their first recommendation. The group recommends that the FAA and relevant stakeholders put a timeline together in advance of the DAC meeting that includes when the FAA and industry believe the task will be accomplished. The second recommendation from the UTM group is that the FAA should allocate resources based on the priority levels provided in UTM group report. Lastly, the UTM group recommended to the FAA that the group should remain in place to address ConOps 2.0, when it is available.

Discussion:
- Jay Merkle (FAA): When you say "ability to monitor UAS in airspace," the airspace surveillance is usually associated with the delivery of instrument flight rules (IFR) or in some cases visual flight rules (VFR) service, so do you really mean surveillance in the same way that we use it in air traffic management?[4]
  - Max Fenkell: I think what we are looking at here is really, the U.S. security technologies that are out there to provide UAS volume reservations (UVRs) and other services. I think this is the route the group took it. We might need to clarify that a little further to your point, if there's a manned vehicle definition for it.
  - Jay Merkle: It is very specific in support of air traffic control (ATC) operations, at least in this environment. I know if I was a policeman in another environment, surveillance would have a different meaning. But for the FAA that is very much the meaning.
  - Lorne Cass (American Airlines): I think in the dialogue, my sense is we were talking about the surveillance that you describe. As the type police would have out there where they are watching. We did have discussion, because when I think of ATM, I think of it like you do: this is surveillance radar, this is ADS-B. Due to the different context, maybe we can define it better.
  - Jay Merkle: I think as we continue to work on this, we are finding that clarifying it would be good. Because in this emerging community, where we have both

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[4] Surveillance is listed as a High Priority Capability by the UTM Group.

traditional and non-traditional, and all these security partners, we have a tendency to talk past each other. So words have meaning and it would be good to better define things.

- o Max Fenkell: I think as we have this transition from traditional aviation, this is something we need to continue to work on. We will commit to going back and looking at that and any other term that we feel maybe necessary.

- Christian Ramsey (uAvionix Corporation): A question on the communication C2 service, and no FAA resource requirement: it feels like there is a requirement there from a spectrum allocation recommendation or standard perspective. Did the group talk at all about the need of guidance from FAA?

  - o Max Fenkell: Spectrum is a topic we touched on a little bit earlier today. It is one topic that is near and dear to everyone at this table. It is the lifeblood of everything we do as an industry and obviously this is assuming we need new allocations, depending on the specific type of spectrum you can operate on. We think there will be some guidance that comes out of the FAA. But that is a conversation that must happen between the FCC, NTIA, and FAA. There is a definite need though to understand what the spectrum capabilities for UAS are and where we might need new allocations, and where we can leverage existing technologies. This is one topic of conversation that needs to continue.

  - o Christian Ramsey: But your conclusion is that there's no FAA resource requirement for that service?

  - o Max Fenkell: That might be one that we need to go back and look at in light of this conversation. One of the nice things about this is we are going to continue to update the document. We will go back to review the proper resource requirement from the FAA.

Industry-Led Technical Topics/Open Discussion
Michael Chasen, DAC Chair

Mr. Chasen then turned to the industry-led topics and open discussion. He asked the group if anyone had a question, comment, or topic of discussion for the DAC members.

Industry-Led Technical Topics: Introducing Simulation into a D&R Certification Process, Chris Anderson, 3DR, ASTM D&R Working Group Lead

Chris Anderson presented on Introducing Simulation into a Durability & Reliability (D&R) Certification Process. Why use a D&R process? The D&R process provides certification faster, easier, allows for continuing rapid innovation, and can be a "Pathfinder" towards future certification methods for other aircraft. There are limitations, including that you are only certified for the tests you conduct. It can also be unduly burdensome. Simulation into a D&R process as an acceptable means of compliance. Simulators are getting better and better, they can provide a variety of conditions. We are unsure of how to submit this simulator data currently. Simulators have some issues, such as they cannot fully create some scenarios. How can we establish the fidelity of a simulation? There are two ways, deterministic and probabilistic simulations. Both of those type of simulations are conducted today. The option might be, in a failure injection matrix, to have a combination of simulations, both real world and some simulated. We would like guidance from the FAA if this would be acceptable. For the more probabilistic testing, there are some ranges you cannot test. The question is, can you just submit simulated data for some scenarios where it is not possible to test in the real world. The time is right for the FAA to consider simulated data and provide industry guidance on how to proceed.

Discussion: Introducing Simulation into a D&R Certification Process

- James Burgess (Wing): We use simulation quite intensively and when we talk about some of the very low likelihood of failure scenarios, there is no other way to test those but through simulation. Just to give some orders of magnitude, we run a million or more simulations a day. Those help us get to the levels we are trying to get to. If there is a way through ASTM standards or industry consensus or work with the FAA, to bring that learning and data into the D&R process, we would be happy to support that and look at how we can contribute.
- Christian Ramsey (uAvionix Corporation): Even in the world of traditional avionics component certification, there are certain requirements that you can't test in an actual real world environment or even at a test lab. There are allowances for analysis and a lot of times that analysis does include an element of simulation. It is not unprecedented what you are now suggesting.

Open Discussion:

- Houston Mills (UPS): One thing we talked at the beginning of the IPP program was that as the FAA gathered data and the program comes to an end, the FAA would perhaps use the DAC as a vetting source or sounding board. I am just curious if the FAA is still thinking about maybe bringing something that the DAC can chew on or perhaps help think about.
  - Jay Merkle (FAA): We need to produce a report 90 days after the end of the IPP. We have already started on the outline of that report and we have also started on our messaging plan. As we get closer to that point and we get the report to the public, there will be some opportunities to bring items to the DAC. There can also be offshoots and you see some of the things we are discussing today, responses to the recommendations, that will be informed by the data and experience gained under the IPP. There are other things we will not wait for the final report to tell the DAC about, pertinent things that the DAC can review. We do consider the emerging data when we think about DAC tasking. As we get closer to the end of the IPP, we are looking at those remaining things to do coming out of the IPP. In order to get truly scalable, economically viable beyond visual line-of-sight, etc., which will become a rich environment for industry-FAA collaboration and DAC tasking.
  - Marily Mora (Reno-Tahoe Airport Authority): In reference to the IPP projects, I thought that there was to be some learnings on roles and responsibilities. Do you still see that coming out of the IPP and would that come back to the DAC — in particular, regarding community involvement?
  - Jay Merkle: We will make everything that comes out of the IPP available to the DAC. The presidential directive does instruct us to do community involvement, community integration, societal integration, etc. We have been very open, that initially we thought we would see a lot of that through flying and our IPP participants who are engaging communities. But it doesn't get to all of the aspects of what state, local, and tribal municipal communities are concerned with. As such, we have adopted some innovative approaches and we think we have a methodology in working with state and local governments, to define needs and requirements, and define how we can work together as an air navigation service provider and as a regulator. There is still more to come and we need to figure a few more things out before we can go wide with that.
  - Bob Brock (Kansas DOT): If the committee has interest we can certainly, as a UAS IPP member, give a short brief on our experience in IPP lessons learned and community outreach results. We have surveys of a thousand people on their opinion of their engagement with drones, of UAS, and of sensor activity. If it would be beneficial to the DAC, we could bring a briefing next time we meet.
  - Jay Merkle: We would be willing to put that on an agenda for next time or the meeting after.

- Brendan Schulman (DJI): I just wanted to acknowledge and appreciate the feedback that we have seen from the FAA. We are seeing the full circle of getting some work done, putting out a work product in a short period. Most importantly, seeing what the FAA has to say about it, which really validates all the time and effort that we spend here and offline in the task groups. Ultimately, we're trying to implement something that collaboratively reflects the industry's approach, the stakeholders' approach, as well as the FAA's thoughts on what is useful. When we think about remote ID, it's something that we have been committed to for years. This is very helpful in knowing, how can we and others, move forward with safety and security goals, well before the regulations come along. We appreciate the advice as well as our opportunity to collaborate in the cycle of input and feedback.
    - Jay Merkle: It has been a good learning experience for us as well. I can see how much work you need to put in during the 90 days. We have many lessons learned in our first review and response to DAC recommendations. I hope that it will be a little smoother internally next time. It was a very worthwhile process and I'm looking forward to moving on the recommendations and the responses.

New Business/Agenda Topics/Review Taskings
**Jay Merkle, Acting DFO, Executive Director, FAA UAS Integration Office, and
Michael Chasen, DAC Chair**

Jay Merkle opened the last agenda item, as the acting DFO. Mr. Merkle summarized the DAC taskings #7 and #8. Mr. Chasen, appointed the following members to lead the new taskings: David Silver as the chair for Tasking #7, UTM (Continuation of Tasking #7) and Joe DePete as the chair of Tasking #8, Aviation Safety Culture for Drone Operators. The two task groups will have 90 days to deliver their work to the DAC.

- **Tasking #7: UTM (Continuation of Tasking #7)**
  Mr. Merkle pointed out that the FAA did not provide the UTM ConOps 2.0 to the DAC for review upon first assigning tasking #7. As such, DAC tasking #7 is an extension of the previous tasking, and provides the DAC with the required document. The FAA was in the final stages of review and it was due to be released that day or by the end of the week. The FAA will start looking at DAC comments but will not provide any formal response until the DAC has had a chance to look at UTM 2.0 concept.

- **Tasking #8: Aviation Safety Culture for Drone Operators**
  Mr. Merkle shared this task had bubbled up through the DAC to the FAA. The task is to look at what are the ways the FAA can help the drone community fully adopt the safety culture that is ingrained in manned aviation. The FAA would like the DAC to develop a set of recommendations and ideas to assist the drone community in adopting aviation safety culture, including ideas for motivation and suggestions for industry involvement, in the process of building up this safety culture.

  o Joe DePete (ALPA): Thank you for the consideration on assigning this task. I appreciate the cooperation of the entire group. As Dan said earlier, we do not compete on safety, we collaborate on safety. This is a great way for us to share some of the experiences that we have learned.

Closing Remarks

Mr. Merkle thanked the DAC members for their Task Group recommendations. He stated that the FAA would carefully look at those recommendations and provide feedback at the next DAC meeting. Mr. Merkle shared that the FAA would work closely with the DAC chair to build the agenda for the next meeting and include a briefing on community involvement. He offered his condolences to Matt Zuccarro's family for their loss. Mr. Merkle also thanked Mr. Chasen for his leadership and thanked the DAC members for their time and effort.

Mr. Merkle then handed over the meeting to Mr. Chasen. Mr. Chasen thanked the DAC members and everyone that was involved. He shared he was impressed by the progress made by the DAC. He highlighted that by the third meeting, the FAA has reviewed the DAC recommendations and provided feedback on where they are going. He felt the DAC is heading in the right direction in its mission and reminded members that DOT will be posting solicitation for new DAC members soon.

Adjourn
The meeting ended at 2:20 p.m. Eastern Time.

Appendix A: Meeting Attendees

First Name	Last Name	Organization	Attendee Type
Michael	Chasen	Chief Executive Officer, PrecisionHawk USA, Inc.	DAC Chair
Greg	Agvent	Senior Director of National News Technology, CNN	DAC Member
Chris	Anderson	Chief Executive Officer, 3DR	DAC Member
Bob	Brock	Director of Aviation and UAS, Kansas Department of Transportation	DAC Member
James	Burgess	Chief Executive Officer, Wing (an Alphabet company)	DAC Member
Lorne	Cass	Vice President, Operations / Industry Affairs, American Airlines (AA)	DAC Member
Mark	Colborn	Senior Corporal, Dallas Police Department	DAC Member
Joseph	DePete	President, Air Line Pilots Association	DAC Member
Trish	Gilbert	Executive Vice President, National Air Traffic Controllers Association	DAC Member
Todd	Graetz	Director, Technology Services, UAS Program, BNSF Railway	DAC Member
David	Greene	Bureau of Aeronautics Director, Wisconsin Department of Transportation	DAC Member
Rich	Hanson	President, Academy of Model Aeronautics	DAC Member
Thomas	Karol	General Counsel, National Association of Mutual Insurance Companies	DAC Member
Gur	Kimchi	Co-Founder and Vice President, Amazon Prime Air	DAC Member
George	Kirov	Vice President and General Manager, Commercial UAS Solutions, L3Harris Technologies	DAC Member
Michael	Leo	Captain, New York City Fire Department	DAC Member
Houston	Mills	Vice President, Flight Operations and Safety, United Parcel Service (UPS)	DAC Member
Marily	Mora	President and CEO, Reno-Tahoe Airport Authority	DAC Member

Christian	Ramsey	President, uAvionix Corporation	DAC Member
Robie	Samanta Roy	Vice President of Technology, Lockheed Martin Corporation	DAC Member
Mariah	Scott	President, Skyward (A Verizon Company)	DAC Member
Brendan	Schulman	Vice President of Policy and Legal Affairs, DJI Technology	DAC Member
Wade	Troxell	Mayor of Fort Collins, Colorado and the National League of Cities	DAC Member
Brian	Wynne	President and CEO, Association for Unmanned Vehicle Systems International	DAC Member
Dan	Elwell	DAC Designated Federal Officer, FAA Deputy Administrator	Government
Jay	Merkle	Executive Director, FAA UAS Integration Office	Government
Khurram	Abbas	FAA	Government
Kristen	Alsop	FAA	Government
Erik	Amend	FAA	Government
Teresa	Anderson	FAA	Government
Tim	Arel	FAA	Government
Chris	Brown	FAA	Government
Robert (Rico)	Carty	FAA	Government
Karen	Chiodini	FAA	Government
Thuy	Cooper	FAA	Government
Bill	Crozier	FAA	Government
Maria	DiPasquantonio	FAA	Government
Alison	Duquette	FAA	Government
Bill	English	NTSB	Government
Asena	Fern	FAA	Government
Nia	Fields	FAA	Government
Elizabeth	Forro	FAA	Government
Reed	Garfield	DOT	Government
Arjun	Garg	FAA	Government
Scott	Gore	FAA	Government
Nicole	Hartman	FAA	Government
Tammy	Jones	FAA	Government
Chad	Kirk	FAA	Government

Gary	Kolb	FAA	Government
Winsome	Lenfert	FAA	Government
Allison	LePage	FAA	Government
Keri	Lyons	FAA	Government
Claudio	Manno	FAA	Government
Julie	Marks	FAA	Government
Mike	McCrabb	FAA	Government
Joe	Morra	FAA	Government
Arun	Murthi	FAA	Government
Chris	Nassif	FAA	Government
Michael	O'Donnell	FAA	Government
Jessica	Orquina	FAA	Government
Brad	Palmer	FAA	Government
Leesa	Papier	FAA	Government
Rob	Pappas	FAA	Government
Lorelei	Peter	FAA	Government
Alexandra	Randazzo	FAA	Government
Genevieve	Sapir	DOT	Government
Elizabeth	Soltys	FAA	Government
Bill	Stanton	FAA	Government
Rob	Sweet	FAA	Government
Gretchen	Tressler	FAA	Government
Adrienne	Vanek	FAA	Government
Tony	Walsh	FAA	Government
Jim	Ackerson	UPS Flight Forward Inc.	Observer
Mark A.	Aitken	DJI	Observer
Chad	Barbir	HERE Technologies	Observer
Justin	Barkowski	American Association of Airport Executives	Observer
Patrick	Bauer	Aero Organization	Observer
Ben	Berlin	Amazon Prime Air	Observer
Sam	Brothers	General Public	Observer
Chad	Budreau	General Public	Observer
Mike	Burnside	American Fuel & Petrochemical Manufacturers	Observer
Sean	Cassidy	Amazon Prime Air	Observer
Andy	Cebula	Airlines for America	Observer
John "JC"	Coffey	Cherokee Nation Technology Portfolio, NOAA	Observer

Drew	Colliate	AUVSI	Observer
Christopher	Cooper	Aircraft Owners & Pilots Association	Observer
Diana	Cooper	Hyundai	Observer
Jason	Cunha	Concept Solutions, LLC	Observer
Dan	Dalton	Wing Airspace Systems	Observer
Jon	Damush	Boeing	Observer
Mel	Davis	Cavan Solutions	Observer
Jeff	Dvgert	ATT	Observer
Robert J.	Ehrich	Slipstream Strategies	Observer
Max	Fenkell	Aerospace Industries Association	Observer
Nicholas T.	Flom	Northern Plains UAS Test Site	Observer
Susan	Friedberg	Dedrone	Observer
Guido	Fuentes	PRISM/ARGUS International	Observer
Paul	Gentile	3DXhobbies	Observer
Ben	Gielow	Amazon	Observer
Tom	Gramaglia	Battle Road Advisors	Observer
Dean	Griffith	Jones Day	Observer
Brendan	Groves	Skydio, Inc.	Observer
Michael	Guterres	MITRE	Observer
Jon	Hegranes	Kittyhawk	Observer
Paul	Hoffman	General Public	Observer
Colton	Hotary	FLIR Systems, Inc.	Observer
Rob	Hughes	Northrup Grumman	Observer
Catherine	Jackson	Airline Dispatchers	Observer
Douglas	Johnson	Consumer Technology Association	Observer
Randy	Kenagy	Air Line Pilots Association International	Observer
Phil	Kenul	General Public	Observer
Rich	King	AUVSI	Observer
Brittany	Kohler	National League of Cities	Observer
Sylvia	Ladunga	ANRA Technologies	Observer
Christopher	Martino	Helicopter Association International	Observer
Dave	Matsuda	Drone Safe Communities	Observer
Maureen	McLaughlin	Iridium	Observer
Terry	McVenes	RTCA, Inc.	Observer
Dave	Messina	FPV Freedom Coalition	Observer
Thomas	Mickler	European Union Aviation Safety Agency	Observer
Nora Ann	Mishler	Unmanned Systems Training	Observer

Margaret	Nagle	Wing	Observer
Effie	Nidam	CNN	Observer
Christopher	Oswald	Airports Council International – North America	Observer
Jennifer	Player	BNSF	Observer
Jonathan	Pruett	General Public	Observer
Mark	Reed	Air Line Pilots Association Int.	Observer
Michael	Robbins	The Moak Group	Observer
Iain	Ronis	Honeywell	Observer
Jim	Rosenblum	Amazon	Observer
Dean	Schultz	Reno Airport	Observer
Al	Secen	RTCA, Inc.	Observer
Catherine	Self	BNSF	Observer
John	Shea	HAI	Observer
Shelly	Simi	General Public	Observer
Victor	Suarez Jr	General Public	Observer
Anne	Swanson	Wilkinson Barker Knauer, LLP	Observer
Clifford	Sweatte	Akin Gump Strauss Hauer & Feld LLP	Observer
Ryan	Terry	Lockheed Martin Corporation	Observer
Andy	Thurling	NUAIR	Observer
Justin	Towles	Akin Gump Strauss Hauer & Feld LLP	Observer
Gregory S.	Walden	McGuireWoods Consulting LLC	Observer
Stella	Weidner	The Boeing Company	Observer
Chief Charles	Werner	DRONERESPONDERS	Observer
Curt	Westergard	Digital Design & Imaging Service, Inc	Observer
Heidi	Williams	National Business Aviation Association	Observer
Ray	Young, Ph.D.	New York UAS Test Site	Observer