



# Drone Advisory Committee

10/17/2019 DAC Meeting • Washington, DC

## Meeting Minutes

**Time:** 9:00 a.m. to 4:00 p.m. Eastern Time

**Location:** National Transportation Safety Board Boardroom and Conference Center,  
420 10<sup>th</sup> St SW, Washington, DC 20594

**For additional information, please view the Meeting eBook.**

## Meeting Summary

Drone Advisory Committee (DAC) Designated Federal Officer (DFO) Dan K. Elwell opened the meeting at 9 a.m. on October 17. Mr. Elwell notified the committee that he would hand over his DFO duties later in the morning to Mr. Jay Merkle, the Executive Director for the FAA Unmanned Aircraft Systems Integration Office, because he had to leave early.

DAC Chairman, Michael Chasen, PrecisionHawk USA, Inc. Chief Executive Officer (CEO), then gave some opening remarks before inviting each of the Task Groups to present their recommendations.

Mr. Gabriel Cox, Drone System Architect, Intel Corporation, presented the first Task Group's recommendations on Remote Identification (ID), on behalf of Mr. Steve Ucci who could not attend. The group endorsed the ASTM Remote ID (RID) 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. They provided several ideas for incentives that the FAA could use with industry and other stakeholders.

Mr. Dan Dalton, Vice President of Operations, Airspace Systems, Inc., presented the second Task Group's findings on UAS Security Issues on behalf of Jaz Banga who was also unable to attend. The Task Group focused on industry-led airframe and operational security measures rather than policy recommendations. Their recommendations mostly focused on the UAS original equipment manufacturers (OEMs) and included employing geofencing, alerts for UAS operators, automated UAS flight performance limitations, and equipage using Automatic Dependent Surveillance-Broadcast (ADS-B) "In" receivers and performance-based detect and avoid (DAA) technology. The group also urged the FAA to make a consolidated, standardized, and updated database that is machine-processable for accessing information about critical infrastructure and Temporary Flight Restrictions (TFRs) issued.

Mr. Brian Wynne, President and CEO, Association for Unmanned Vehicle Systems International then presented the third Task Group's findings on Part 107 Waivers. The Task Group recommended auto-renewals for waivers meeting a specific set of requirements, customer-friendly modifications to the DroneZone, satisfactory waiver approval checklists, a streamlined



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automated approval process for certain operators, improved transparency on applications, and more training requirements for waiver inspectors.

Mr. Merkle provided an update on the FAA's work on Remote ID, as well as Recreational Flyers (Section 349). Merkle also shared that the FAA expects to publish the Remote ID Notice of Proposed Rulemaking (NPRM) on December 20, which will initiate the public comment period. He stated that the FAA is on schedule to provide the Knowledge Test for recreational flyers by December 2019.

Mr. Joel Szabat, Acting Under Secretary in the Department of Transportation's (DOT) Transportation Policy Office followed Merkle and offered a few remarks on the state of UAS today and the work that the FAA has done in support of full integration. He urged the DAC to continue helping the FAA to improve its processes and innovate solutions.

Mr. Bobby Fraser, then Acting Assistant Administrator in the FAA's Office of Communications, provided an overview of the FAA's first-ever National Drone Safety Awareness Week. Fraser shared some details about what the FAA was doing to support the information campaign and provided the DAC with several ideas on how they could help promote the cause.

Ms. Angela Stubblefield, Deputy Associate Administrator for the FAA's Office of Security and Hazardous Materials Safety, updated the DAC on what the FAA has been doing about UAS Security. She focused on key FAA and interagency activities, especially the pilot program for Remote ID and detection technologies that the agency was charged with creating in the 2018 FAA Reauthorization Act. Stubblefield also discussed the standards for detection and mitigation technologies that the FAA is developing. Finally, she spoke on the Core 30 Concept of Operations (CONOPS), the national response plan for a persistent UAS disruption at the Core 30 airports, and mentioned that it is awaiting approval from the National Security Council.

DAC Chairman Michael Chasen then discussed industry-led topics, including FAA Facility Maps, beyond visual line-of-sight operations, and UAS Traffic Management system.

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

## **The meeting resulted in the following new DAC taskings:**

### **Tasking #1: Facility Maps (90 Days, beginning on October 17, 2019)**

- What are options for better FAA/industry collaboration to update and improve UAS facility map and airspace access for all operators? This tasking will provide ideas and information for creating future facility maps and creating a more dynamic airspace system to accommodate increased traffic, both for UAS and traditional manned aviation.
- Tasking Summary



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- Provide information about pain points or areas where they feel UAS operations may be possible either given restrictions or during limited times.
- Consider possibilities for a layered or dynamic approach to allowing operations to areas where drone operations are currently prohibited.
- TASK GROUP LEAD: Marily Mora, President and Chief Executive Officer, Reno-Tahoe Airport Authority

## **Tasking #2: BVLOS Challenges (90 Days, beginning on October 17, 2019)**

- What are the remaining beyond visual line-of-sight (BVLOS) challenges that the DAC sees? Information gained from this tasking will help prioritize FAA resources to meet the requirements of expanded BVLOS operations and can help inform upcoming decisions on what comes after IPP, PSPs, etc. and future FAA work plans.
- TASK GROUP LEAD: Todd Graetz, Director, Technology Services, UAS Program, BNSF Railway

## **Tasking #3: UTM (90 Days, beginning on October 17, 2019)**

- Provide industry comment on the UAS Traffic Management (UTM) Concept of Operations v2.0 and provide industry prioritization of UTM capabilities. The information gained from this tasking will help prioritize resources, work, and investment as FAA, DOT, and industry works together to create UTM capabilities to support future expanded UAS operations.
- TASK GROUP LEAD: David Silver, Vice President for Civil Aviation, Aerospace Industries Association



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## Detailed Minutes

### Official Statement of the Designated Federal Officer

Elwell read the official statement at 9 a.m.

### Approval of the Agenda and Previous Meeting Minutes

The DAC unanimously approved the agenda and meeting minutes from the last DAC meeting held on June 6, 2019.

### DFO Opening Remarks

Drone Advisory Committee (DAC) Designated Federal Officer (DFO) and Deputy Administrator Dan K. Elwell thanked the committee for its dedication and hard work in serving on the DAC, especially on the June 6 Taskings. Mr. Elwell gave a quick overview of the Integration Pilot Program's progress over the previous six months and reminded the members about the upcoming first-ever National Drone Safety Awareness Week set for the first week in November. He outlined the DAC Meeting's agenda and reaffirmed that the FAA welcomed hearing perspectives from industry and stakeholders on the DAC Taskings on which several industry representatives would be presenting. He introduced Jay Merkle, the Executive Director for the FAA Unmanned Aircraft Systems Integration Office, as well as other FAA officials, and the DAC Chairman, Michael Chasen. Due to a scheduling conflict, Mr. Elwell explained that he would have to leave early and would hand off DFO duties to Mr. Merkle.

### DAC Chair Opening Remarks

Mr. Chasen stated that he has been pleased by the progress the DAC has made over the past few months and was proud that this convocation marked the first time the DAC meeting was livestreamed. He reviewed the five Key Priorities that the DAC had discussed at the June meeting, including Remote ID, beyond visual line-of-sight (BVLOS) operations, counter UAS (CUAS), the waiver process, and public-private partnerships. Additionally, he explained that three Task Groups were established to work on recommendations for the DAC, focusing on issues that need to be solved before full integration of drones is possible. He reminded the participants that after those Task Groups presented their recommendations, the FAA would issue new Taskings, which would also be due within 90 days.

Mr. Chasen then yielded to Mr. Merkle to introduce the first presenter for the first DAC Tasking on Remote ID, Mr. Gabriel Cox. Mr. Cox was substituting for Mr. Steve Ucci, who could not attend due to a weather-related travel delay.



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## DAC Tasking #1

### Remote Identification (90 Days, beginning on June 6, 2019)

- The Final Rule for Remote ID of UAS is likely up to 24 months away. In the absence of Remote ID of UAS and in consideration of security partners' concerns regarding operations over people and other waived operations under Part 107 in the intervening period, the FAA tasks the DAC to develop recommendations on:
  - 1) What voluntary equipping of Remote ID technologies by UAS manufacturers or operators could occur in the short-term prior to a final rule for Remote ID with the understanding that the requirements finalized in that rule may differ from short-term solutions based on the rulemaking proposal and any comments received during rulemaking?
  - 2) What types of incentives, if any, could be provided by the FAA for operators who voluntarily use UAS equipped in accordance with the recommendations in #1?
  - 3) Are there other drivers that could lead to widespread use of Remote ID prior to the enactment of a Final Rule for Remote ID and finalization of Remote ID requirements?
- The standards referenced by the DAC are:
  - ASTM International:
    - Group F38 (WK27055) - New Practice for UAS Remote ID and Tracking
    - First workgroup meeting in June 2018, currently finalizing the title and scope for the standard
  - SAE International:
    - AIR6388 – Remote Identification and Interrogation of Unmanned Aerial Systems
    - Initiated: March 2017, possibly on hold, pending publication of an NPRM
  - ANSI Consumer Technology Association (CTA):
    - ANSI/CTA-2063 Small Unmanned Aerial Systems Serial Numbers
    - Published April 2017
    - ANSI/CTA-2067 Small Unmanned Aerial Systems – Remote Identification
    - Cancelled October 4, 2018
- TASK GROUP LEAD: Steve Ucci, Senior Deputy Majority Leader, Rhode Island State Assembly



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## **Recommendation & Discussion for DAC Tasking #1: Remote ID Gabriel Cox (on behalf of Steve Ucci), Drone System Architect, Intel Corporation**

Mr. Cox introduced himself and mentioned that he had led one of the two sub-groups (Equipage and Incentives) for this tasking. He also mentioned that he is the Chairman of the ASTM Remote ID Work Group. He then explained the Task Group's approach. While we are awaiting implementation of Remote ID requirements, the group looked at how we can get people to voluntarily adopt Remote ID sooner and what kind of incentives could motivate them. He recalled that the community largely supports the ASTM Remote ID Standards, which specifies performance and protocol requirements. He then explained how the ANSI/CTA developed a serial number format for drones, which the DAC Task Group adopted; the European Commission regulations also use this format. Seeing an error on the displayed PowerPoint, he advised the audience that the F38 Work Group was actually #65041, not #27055.

Mr. Cox then went on to explain more about the equipage requirements recommendations the Task Group gave, which would derive from the ASTM standard. Since the standard itself does not prescribe many specific requirements, the Task Group expects the FAA to add the regulatory overlay with a Minimal Operational Performance Standard (MOPS). The Task Group recommends a minimalistic compliance requirement during the volunteer period, meaning, that if a participant implemented any of the requirements specified in the Remote ID standard using the mechanisms available, they would be considered compliant. Those mechanisms include: Bluetooth 4 or 5, WiFi, and network connection. Whatever mechanism the participant chooses during the volunteer period must function in the area of operation. Furthermore, the participants must support all required fields in the ASTM standard during their implementation. The Task Group anticipates that the FAA will probably develop a more comprehensive MOPS.

Turning to the second issue, Mr. Cox began discussing incentives. As Remote ID changes the field, the Work Group expects that the rules will change and because of that, the FAA should consider a range of incentives. The Task Group considered several options, some of which he recognized could challenge conventional thinking and current FAA approaches. Those options include:

- Contract preferences for federal contracts;
- Part 107 waiver application prioritization;
- Satisfaction of a component for a Part 107 waiver, exemption, or application requirement;
- An online FAA database of manufacturers who have self-declared Remote ID equipage and of the entire self-certified network of Remote ID service providers
- Airspace access to otherwise restricted areas
- Financial rebates in collaboration with Remote ID drone manufacturers or software suppliers to offset the cost of compliance (like the FAA ADS-B rebate)
- Monetary incentive rebate or exemption from registration/permit fees
- Promotion on the FAA website or apps



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Mr. Cox gave examples of how these incentives might work and in what contexts, underlining that Remote ID equipment creates accountability where it did not exist before. Above all, the cost and ease of compliance should be kept at a reasonable level such that operators see that the benefits outweigh the costs of adopting Remote ID. The Task Group also delivered some non-FAA incentives, aimed at industry and other stakeholders, which included:

- Insurance companies: insurance incentive, giving a reduced cost to operators
- State and local governments: additional takeoff and landing locations, and relief from other restrictions
- Other federal agencies: designation of regular or ad hoc locations, dates, and times to allow drone takeoff and landing using Remote ID in locations that are currently restricted
- Industry: recognition with a common logo or slogan

## Discussion on Mr. Cox's Presentation

- Bobby Fraser (FAA): Did you give any thought to redundancy of the system, such as with the loss of cellular coverage in an area where you expected to have it?
  - Cox: Under the voluntary requirement, you would have to use a system that you know functions in the area in which you're operating. But you can use one of the network mechanisms that handles spottiness issues well.
- Gur Kimchi (Amazon Prime Air): One of the concerns we discussed early on was how to ensure that disparate systems will interoperate. It doesn't matter which standards you have if you have too many of them. So we should probably include language about the need for interoperability between different systems regardless of the operation to provide guidance to the FAA on how to structure the input. Additionally, I'd like to point out a comment in the text that focuses on concerns about the initial implementation. Some of us have analyzed how this could be done, especially on certain systems that work better, like WiFi, and on integrity of the channel. We could share that data with the FAA so that we can start with a system that is a lot more robust.
  - Cox: So are you saying that we should figure out a way to incentivize voluntary IDs that are federated and that can talk to each other?
  - Kimchi (Amazon Prime Air): That's more of a UTM concept and, for that, it is absolutely the right approach. But what I'm really saying is that the way the recommendation is written now, you could have three different vendors implementing the standard in a compliant way, but their systems don't talk to each other. So the spirit of interoperability is not maintained.
  - Cox: This is where the federal regulatory overlay comes into the picture. And back to the point on UTM: the skeleton of what's going to be the UTM is basically what is required in order to implement network Remote ID. How the various network Remote ID participants communicate with each other and interoperability were some of the biggest topics we tackled in the standard. The FAA could require that, as they do with the Low-Altitude Authorization and Notification Capability (LAANC), vendors interoperate with each other.



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- Kimchi (Amazon Prime Air): Yes, that would work when you have a network connection, but we want to make sure that you have another construct to use when you don't have a connection that is also interoperable.
- Cox: I understand. The starting mechanisms for dealing with that are the broadcast mechanisms. There's enough detail in the recommendation on how to build a receiver that is compatible with all the broadcast mechanisms.
- Kimchi (Amazon Prime Air): It's more about providing the right high-level requirements that ensure interoperability. And finally, on one other note: many of us participate in developing international standards, like ICAO. I think it's very important that whatever standard or minimal compliance specification is published can be harmonized on an international scale. I expect that the FAA will ensure that we develop a system that can talk to other systems.
- Jay Merkle (FAA): Absolutely, and I compliment ASTM F38 for collaborating with EASA, which is now in a position to adopt the standard that ASTM is publishing for Remote ID. This is the largest piece of international harmonization that we've been able to accomplish to date and we will continue to work with other regulatory and standards bodies on common standards we can all share. The input for these recommendations is so helpful for ensuring interoperability, even though we haven't come out with the NPRM yet. One thing to remember is that F38 built this standard in the absence of the Rule. We can all expect the need to go back and revisit the standard and update it to be consistent with the Rule language.
- Brendan Schulman (DJI): My compliments on the Task Group on this great work. We are all hearing that Remote ID is the key initiative that we need to get done and obviously the forthcoming rulemaking is something we all look forward to but will take time to finalize. So anything we can do to implement these solutions in advance of the rulemaking is a real benefit, not just for the safety and security issues but also those issues that we considered in the original DAC, regarding local concerns about UAS operations. It will provide a means of accountability so that rather than arbitrary, broad restrictions on operations that are sometimes proposed at the local level, we can have accountability. This is a great work product, done in a very short amount of time compared to the earlier work product of the DAC which was also very good, but took a year or two back then. I certainly would encourage every one of my fellow DAC members to vote in favor of this recommendation to go to the FAA.
- Dan Elwell (FAA): Thank you, Brendan. And I know that DJI is doing some ID work in your vehicles, but I'm curious to hear from around the table – show hands or weigh-in verbally – how many are either currently putting some form of ID in their vehicles or plan to in the very near future. [Several hands from industry members went up.] Is there anything in the recommendations for those of you who are doing ID or contemplating ID that give you pause or concern?



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- Greg Agvent (CNN): My compliments as well. As an operator, we've focused mostly over the last couple years on the technical enabling. I think almost as challenging of an issue is going to be the editorial portion of it: what is the identification and who is it identified to? I think folks around the table are going to have very different views on that. And I don't know if it's a function of the DAC to come up with recommendations on who gets to see the license plate and what data is actually contained in the license plate but I think that's going to be as important a part as the technical stuff. We've seen and participated in demonstrations. It's not a question anymore of if it can be done. I think the question now is who are we releasing this information to; how is it consumed; and by whom?
- Elwell: Thanks Greg and you just gave me a thought. Since we're being livestreamed, if you would, please identify yourself when you speak.
- Deborah Flint (Los Angeles World Airports): I've said it at the prior meetings that airports like LAX continue to have hundreds of sightings within our airspace and yet, even by collaborating with Air Traffic Control, we've only been able to pinpoint one operator of UAS in our airspace. Remote ID is a fundamental issue and a very an important issue to move on quickly on behalf of airports and aviation safety and security. I did want to ask about the monetary incentive. It certainly makes sense that access is obviously a key and an attractive incentive to use at a certain point of time that will have some diminishing returns and the monetary incentive will play a bigger role perhaps. Can you say more on how the Task Group thought about monetary incentives particularly the limited funding that is in place today and what effect it could have?
  - Cox: We didn't go too deeply into magnitudes of monetary incentives even though we used ADS-B as a kind of a parallel. The magnitude of the cost of adding Remote ID is nothing like what it is for adding ADS-B, which was \$3,000-\$5,000 per aircraft. For Remote ID, even though the retail products aren't out there yet, it would more likely be tens of dollars up hundreds of dollars or something like that for the actual equipment equipage cost. If you're doing network Remote ID, you might have to pay some subscription cost to a cell phone provider or something similar. Fees for registration or testing could potentially be waived so that would be more of a waiver of cost. Those are just some of the ideas we came up with; we didn't really come up with a dollar amount or anything like. In general the financial burden of Remote ID really isn't the biggest burden that we saw, as you did with ADS-B.
  - Flint: Thanks for your perspective. We'll have to address whether they are federal or local offsets that are being thought of here in terms of an incentive for operators.
  - Cox: That's why we saw the strongest incentive actually being permission to fly in places where they are currently not able to fly. So that's the biggest currency that exists right now.



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- Kimchi (Amazon Prime Air): In our experience, the cost to equip, especially for the ad-hoc layer Wi-Fi is negligible because most of it is software – most all the systems already have Wi-Fi. The cost equipment is really important, not only on the vendor side but also the public sector side, which has to actually get the access to that information. This is where we want to make sure we pick technology that is already available on whatever handset or tool the user already has in their possession. So it's purely a software or service issue as opposed to a situation where you need to get new hardware or equipment.
- Cox: That issue highly influenced the choices that were made – this notion that so many people already have what could be a receiver device without having to purchase a specialized one, considering the limited budgets of many police departments.

Mr. Chasen and Mr. Elwell thanked the Task Group for their recommendations. Since the DAC was running ahead of schedule, Chasen invited DAC Task Group 2 to come up and present instead of going to the scheduled break.



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## DAC Tasking #2

### **Tasking #2: UAS Security Issues (90 Days, beginning on June 6, 2019)**

- The FAA tasks the DAC to 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?
- In 90 days, identify what is the universe of actions that IF relevant industry stakeholders agreed to take them, would substantially reduce the likelihood of unintentional threatening behavior.
- TASK GROUP LEAD: Jaz Banga, Co-Founder and Chief Executive Officer, Airspace Systems, Inc.

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## Recommendation & Discussion for DAC Tasking #2: UAS Security Issues

**Dan Dalton (on behalf of Jaz Banga), Vice President of Operations, Airspace Systems, Inc.**

Mr. Dalton introduced himself and mentioned that he was speaking on behalf of Mr. Jaz Banga, who could not be present due to a family matter. The Task Group focused on key principles, looking primarily at the careless and clueless operators, and less on criminal operators, as well the perceived security threats in the world of UAS. They also looked at the technical solutions that could be used to diminish security threats. The group, he explained, was able to offer more on the technical capabilities that could be used and less on policy. They also focused on the aircraft and the operational aspects versus the operator. Finally, they looked at reducing unintentional, threatening behavior of some operators.

To explain their key assumptions, Mr. Dalton listed the three central points they worked around: the airspace, the aircraft, and the operator. He explained that their Task Group received input from several sources, especially original equipment manufacturers (OEMs). Dalton noted that issues around air operators was left to the FAA to decide. Referring to earlier discussion in the day, he reiterated that UTM systems will be another important method to address airspace and operational security in the future. Lastly, Dalton explained that the Task Group focused on ensuring that the proposed security improvements also supported the safety goals of the FAA.

The Task Group looked at five core scenarios to develop their recommendations. Mr. Dalton explained what each of these scenarios could look like and the priority for each. These included:

- Scenario 1 - Flight in the vicinity of airports
- Scenario 2 - Flight in the vicinity of Temporary Flight Restrictions (TFR)
- Scenario 3 - Flight in the vicinity of mass gathering events
- Scenario 4 - Flight in the vicinity of other aircraft
- Scenario 5 - Compliant UAS flight near critical infrastructure or sensitive law enforcement or emergency response activity.

Running through these scenarios with various technical solutions helped the group rank their recommendations in terms of the greatest improvement to security with the least amount of cost or effort to implement. Many of these recommendations hinged upon their understanding of the OEMs varying capabilities and motivations. Mr. Dalton noted that this variation leads to a stratified spectrum of implementation and compliance and advised the DAC to look more into this in the future.

In the meantime, the Task Group offered the following recommendations:

1. OEMs should equip their UAS with geofencing capabilities.
2. The federal government should make available a consolidated, standardized, and up-to-date database for critical infrastructure and TFRs issued, which is machine processable.



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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.
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.
5. OEMs should explore the voluntarily enablement of automated UAS flight performance limitations – such as altitude limitations, return-to-home features, and decrease in UAS speed or maneuverability – while in or near sensitive flight areas.
6. OEMs should explore the voluntarily development and equipage of UAS with performance-based detect and avoid (DAA) technology, for collision/obstacle avoidance, on the airframe, using acoustic, optical, and/or other sensors, as well as robust DAA algorithms.

Regarding geofencing, Mr. Dalton explained that the Task Group defined it as automated flight limitation for a predefined area – basically, it’s keeping a drone from flying into a restricted place. The Task Group recommended that the goal should be for OEMs to voluntarily standardize the way they do geofencing; but in order for them to do that, the FAA needs to have highly accurate and maintained critical infrastructure maps and TFR maps. He stressed that the industry should lead in figuring out ways to get OEMs to do this themselves; he cited AUVSI’s Trusted Operator Program as an example. Dalton reiterated that the other three recommendations build off of the first since geofencing is the first step.

Per the second recommendation, Mr. Dalton explained that a centralized database run by the federal government is necessary to help OEMs access the required data. Mr. Dalton explained that some of the existing systems have data that is not machine-readable, thus requiring human input, which ultimately slows the process. Commercial Unmanned Aerial Vehicles (UAV) manufacturers need access to automated systems with frequently updated data, like pop-up TFRs. In addition, he noted the benefit of having an API available to enable further automation.

Regarding the third recommendation about an alert system, Mr. Dalton gave a practical example. Since most drones today are operated with a mobile device of some sort or, if they are not, because drone operators often have a mobile device on their person somewhere, the Task Group envisioned having some sort of pop-up come up on the operator’s mobile device screen when they’re approaching a TFR or controlled airspace. Dalton reiterated that this is fairly easy to do and costs very little. In the future, this type of mitigation would be helpful in a multitude of scenarios where the operator may encounter manned aircraft, such as along an approach corridor.

On the fourth recommendation, Mr. Dalton explained how having an “ADS-B In” capability could alert the UAS operator of an approaching aircraft and then in the more distant future, having an airborne collision avoidance system could provide the operator with a recommendation to avoid a conflict with an aircraft.



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For recommendation five, he moved on to sketch out the idea of performance limitations. This would be useful in the scenario where a clueless or careless operator approaches a geofence. Ideally, the drone would then start to slow down, descend, or show some sort of behavior that not only informs the clueless operator that something is not right, but also keeps the drone from going into sensitive areas. In other words, this suggestion supports the idea of enabling a UAS beginner mode around a TFR.

And finally, the ultimate recommendation would be to have DAA. This technology would enable the drone to avoid objects on the ground or in the air, whether or not the operator is aware of those objects.

To contextualize these six recommendations, Mr. Dalton then showed examples of a recent event (Fleet Week in San Francisco) where his company observed, during a TFR, and mapped the drone activity in the vicinity. He explained that, had many of the Task Group's recommended technical solutions been in place at that time, there would have been improved safety and security during the event. Furthermore, even though the TFR alert is available to operators through the B4UFLY app, having updated TFR information available at the OEM level would be optimal for situations such as this.

Continuing on, Mr. Dalton warned that the Task Group had not delved too deeply into what implementation and incentivization might look like, but provided some thoughts about what would need to be considered as the DAC looked at next steps. He also noted that much of the implementation and incentivization would hinge upon Remote ID.

## Discussion on Mr. Dalton's Presentation

Mr. Chasen thanked Mr. Dalton and opened the floor for questions and discussion.

- Chris Anderson (3DR): Is the Low-Altitude Authorization and Notification Capability (LAANC) infrastructure an appropriate place to message these notifications?
  - Dalton: Yes, I absolutely think it is.
  - Merkle (FAA): But I would go back to your fundamental point, which is that the TFR information has to be available. So whether it's LAANC or some other API, I think is an implementation detail to be worked out later on. Above all, the point is that OEMs need the TFR information in a machine-readable application program interface.
  - Anderson: As an OEM, we've already implemented LAANC so, I think, if the FAA provides the TFR information, too, it will work as well.
  
- Agvent (CNN): I have two questions. Was there discussion or consensus within the group of the half-dozen recommendations of which was the highest hurdle? And can geofencing be defeated?



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- Dalton: I'll answer the second question first. The answer is yes: especially in these early days, geofencing can be defeated, particularly by a nefarious actor or an operator who is trying to modify their out-of-the-box drone. But to go back to your first question: the Task Group ranked the recommendations in order of easiest and quickest to the more challenging items. That is why you see DAA at the end of the list.
- Captain Joseph DePete (Air Line Pilots Association [ALPA]): I'd just like to state that our members fully support this endeavor and agree that these technical solutions are foundational and will be transformative and the doorway to full integration. And on another point, LAANC is a really great foundational concept, but because of the way it's being used right now (without Remote ID woven in), it's more like a reservation system. But unfortunately, there's nothing FAA's Air Traffic Office can relate to us as pilots when we're in close proximity to the airport. So, again, we're fully supportive of this work and are excited to move this forward, particularly with geofencing, which will really help. It's hard to predict all the things that the bad guys might do, but we have to move toward mitigations. Thank you and great job on this work.
  - Dalton: Thank you; that was a lot of good points. There are always going to be cases where you can't defeat the problem, but we aimed for recommendations that addressed as many as possible. It's important to help operators understand more about what they can and cannot do or should or should not do. Education is obviously a big part of this work. As for reporting unsafe operations, I agree that this is absolutely a concern.
  - Captain DePete: I want to add that, I agree that this is like a second space race and we all have a vested interest in doing this correctly, especially when we think about safety concerns for pilots and passengers who are sharing the airspace with drones. I really appreciate the Task Group's work on this and think the priorities you gave will push us in the right direction.
- Mayor Wade Troxell (National League of Cities; Mayor of Fort Collins, CO): I think we need to broaden our understanding of deconflicting in lower airspace. Additionally, I'd like to suggest that we add children to this category we think of as "careless, clueless, or criminal".
- George Kirov (L3Harris): Great work; it was a very extensive set of recommendations. I was especially interested in recommendations four and six and agree with both of them; we see that it can be useful in Airborne Collision Avoidance Systems. But I wanted to add that I see no need to exclude ground and terrestrial base solutions for both surveillance and DAA. In many areas of congested traffic, ground solutions can add an important dimension to the technology and effectiveness of the system. So we should not exclude one and the other; probably a combination of both will be much more efficient.
  - Dalton: Agreed, and to your point, we see that DAA from the ground will probably be the first thing to happen. This is because the infrastructure already



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exists in part and because it will probably be much easier to do that from the ground.

- Captain Houston Mills (UPS): Has the Task Group thought about how to do altitude caps for the geofencing? When you think about the clueless and careless, I think about how the first time a child gets a drone, they want to see how high it can go. So I think we should all see if there is a way to potentially geofence a cap to basically segregate it to the greatest extent possible from the ATM until we advance faster. That would probably help us reduce risk faster.
  - Dalton: That's an interesting point. The 400 foot AGL relative floor is a good place to start. The Task Group did not get into that idea of a ceiling at a national airspace level, but I think it's an idea that deserves further investigation.
  - Schulman (DJI): To answer Houston's technical question: yes, you can geofence or limit altitude but there are some challenges because there's no widely available ground measurement tool onboard the drones that are in the market today. But there's a need for flexibility because you're not necessarily measuring the ground, say, if you're in a mountainous terrain. Actually, I have a really great geofencing story. I was in St. Louis a few weeks ago and I walked by the Gateway Arch and noticed on the other side of the field that there were a couple of people with the drone on the ground, ready to take off. And they were scratching their heads, confused as to why it wasn't working. That's because we had geofenced that location. So there was a great first-hand example of that type of mitigation actually making a difference in a real world environment and preventing a security response.

When it comes to TFRs, there are some challenges if you send out a geofence on a temporary basis because you're affecting all the drones that might receive it. If some of those drones are being used by fire and rescue officials, first responders, or news gatherers, we wouldn't want to lock down the functionality of a drone without notice. And to Dan's point, we really do need an easy machine-readable digestible TFR system so we support getting the FAA's help with this so we can better implement those TFRs.

Also, regarding the Fleet Week example, I want to point out that we have to be a little careful with observations because, as we know, drones may be detected over the radio system because they are turned on, but are not actually in flight due to geofence. And sometimes, we also know, sightings are really not drones, but rather birds, bags, and balloons. So I advise that we keep in mind that there should be a balance between geofencing and other mitigations and letting those with authority to fly do so. Maybe the DAC can look at this more in due time.

- Anderson: Brendan, can you say more about your St. Louis story. What was the communication on the screen that explained why they couldn't fly there?



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- Schulman: They would have received a message saying that you're in a no-fly zone and you basically need to contact us to fly there. So to continue that story: they scratched their head for a few minutes. Then they gave up, got in their car, and left. Now what's really interesting was that one of them was wearing a Canada T-shirt so it's quite possible that they were tourists. So I think that was a good story. Of course, if they were authorized to be there, we would unlock them and they could go ahead and do their operation.
- Captain DePete: Much of what we're talking about here really revolves around the concept of a safety culture and building this type of a mentality. It may be worth consideration to have a Task Group that is solely dedicated to education and developing that kind of mindset.
  - Merkle: In fact, last week the FAA signed [Order 8040.6, our SRM order for unmanned aircraft system](#), so that's a big step toward developing the safety culture associated UAS. In so far as it is based on international standards, the Specific Operations Risk Assessment (SORA) methodology, and the Joint Authorities for Rulemaking on Unmanned Systems (JARUS), it has the ability to promote safety culture here and also align with developments from around the world. Furthermore, the work that the UAS Safety Team has been doing is moving in that direction. Where possible, if the DAC could encourage that work, it would be very beneficial.
- Kimchi (Amazon Prime Air): This is a great report and I have a few comments. I completely agreed that we need to publish this data in a consumable form. I encourage the FAA to collaborate to make sure not only is the data available but also that it's in the right form and cannot be misused. Regarding the ADS-B comment, I think it's important that the recommendation speaks about ABS-B or an equivalent technical capability. One comment on automated deconfliction: it's easier if you have Remote ID in a sort of modern autopilot. I think we should look more at how to allow collaborative vehicle-to-vehicle deconfliction. Regarding the language around a beginner mode, we should be careful about using that word "beginner" because so many people don't want to think of themselves as beginners and will ignore it. Perhaps we should call it a "safety assured" more or something like that so people won't turn it off so easily.

And switching tracks to a critical question I have, who is responsible for violations, assuming we build all this infrastructure and have Remote ID? I'm thinking particularly about more complex arrangements, such as people who operate on behalf of others using third party equipment, or those flying outside the country of origin etc. I think we should develop some opinions as an industry on how we link the owner/operator responsible, the pilot-in-command, and the equipment manufacturer, etc. I think it's a complex question that demands our attention. Thank you.

- Chasen: You raised a lot of good points on key items that we're going to have to address as we continue to move this discussion forward.



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Mr. Chasen thanked the Task Group for their recommendations and announced a 20-minute break, asking the DAC to return to their seats by 10:50 a.m. before continuing with the third Task Group presentation. He reminded the DAC that after that, they would be voting on making these taskings formal recommendations to the FAA, using one motion.

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## DAC Tasking #3

### Tasking #3: 107 Waivers (90 Days after receipt of framework document from FAA)

- The FAA tasks the DAC to review the framework of the existing 107 waiver process provided by the FAA and develop recommendations on improving this process.
- TASK GROUP LEAD: Brian Wynne, President and Chief Executive Officer, Association for Unmanned Vehicle Systems International

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## **Recommendation & Discussion for DAC Tasking #3: 107 Waivers** **Brian Wynne, President and CEO, Association for Unmanned Vehicle Systems** **International (AUVSI)**

Mr. Michael Chasen welcomed the DAC back from the break and introduced Mr. Brian Wynne to present the third Task Group's recommendations. The group looked at ways to improve the waiver process under Part 107, given the regulatory strictures around it. Mr. Wynne noted that it's not a scalable process and is not meant to be; he also put forth that the path to extended operations inevitably leads to more regulation, considering these limitations.

Mr. Wynne then explained the approach the Task Group took, first by surveying the FAA and then by surveying the industry. They began with a briefing on Part 107 application processing from a subset of FAA and from there, developed a questionnaire on the processing. This was then sent to a larger group at the FAA. Simultaneously, they created a survey for industry members. Through this research, the Task Group was able to gain clarity on the FAA's perspective in how it handles applications, how its analysts are trained, and what guide materials they use. The group also looked at the current denial and appeals process, as well as the assessment criteria for operator competency. For the industry survey, for which they collected 632 total responses, they focused on the operator's understanding of the process and the criteria for the application. To determine the operator's experience, they relied on technical feedback and advice from the FAA regarding application results. They also analyzed the overall time spent on the application. Respondents anonymously provided comments, and those surveyed represented a mix of approved and rejected applicants. Wynne mentioned that the survey results were included in the group's report.

Using the survey results, the Task Group formulated the following recommendations:

1. Expiring waivers should auto-renew unless there is a compliance issue or change in regulations, thereby reducing administrative burden and limiting re-submissions.
2. The FAA's DroneZone should be modified to allow the operator to update nonconsequential information without having to file an application for an amendment to their waiver.
3. The FAA should create a checklist to inventory appropriate examples of satisfying safety cases for complex waiver approvals, like BVLOS. This could then be used to provide constructive feedback to those applicants that do not meet the required thresholds and direct the applicant to specific examples that would have satisfied the requirement.
4. a.) The FAA should consider a streamlined automated approval for those applicants trained by another operator who has flown under an existing waiver for at least 1 [or X years] year and complies with all waiver requirements; or, an operator who has received a Special Airworthiness Certificate-Experimental Aircraft from a UAS Test Site.  
b.) The FAA should consider automated approval for applicants who leverage the work of programs like the Unmanned Aircraft Safety Team (UAST), AUVSI's Trusted



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Operator Program (TOP), and industry standards etc., and give operators credit for undergoing audits, certification and other training beyond Part 107 compliance.

5. The FAA should consider a streamlined process for groups of operators applying for waivers of the same type of operations for a business use case.
6. The FAA should increase transparency and accountability of Part 107 analysts by creating a pathway for applicants to learn who reviewed their application and why it was not approved.
7. The FAA should require Part 107 waiver inspectors to attend a structured program similar to that mandated by AIR-900 Enterprise Operations Division program that provides FAA ASIs and UAS Designated Airworthiness Representatives the background, key policies, and procedures.

For several of the recommendations, Mr. Wynne spoke more in depth about the rationale the Task Group gave, as well as the anticipated benefits they saw. By implementing the first three recommendations, they believed the FAA could clarify the waiver processes and criteria, promote transparency, and increase efficiency. More specifically, regarding the first recommendation, Mr. Wynne explained further that because of the anticipated tsunami of needed renewals that will come due in the next year, the FAA should consider auto-renewal as an option. He pointed out that this solution deals with the larger problem of fixing the scalability of Part 107, encouraging that automation is key here. On to the third recommendation, Wynne urged the FAA to share more about what it is looking for, so applicants don't have to guess each time. He underlined the need for better customer service by citing examples of applicants who reported submitting an application one time and getting it approved, only to submit the same language in another application and have it be rejected.

On the rationale behind the fourth recommendation, Mr. Wynne explained that there was an opportunity for the FAA to promote collaboration and safety practices within industry groups by streamlining approvals in certain instances. He pointed out that the work operators have done with the Test Sites and IPP helped define the good practices and collect the data points the FAA is using for safety cases. Additional testing programs from the industry have also created a tiered group of vetted operators who have gone beyond the minimal required training. Speeding up automated approvals for operators such as these strengthens partnerships between the FAA and industry.

Similarly, for the final three recommendations, the benefits would improve FAA and industry relations by increasing consistency, transparency, and fairness in the waiver process. Mr. Wynne encouraged the FAA to leverage the work that has already been done to develop new means of improving the existing process. At the same time, he cautioned that everyone should be realistic about the limited scalability of the waiver process and again pointed out the need for more specific regulations covering extended operations.



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## Discussion on Mr. Wynne's Presentation

Mr. Chasen thanked Mr. Wynne and the Task Group for their recommendations. He echoed Wynne's thoughts on the need for more regulation in the next few years and the increasingly important place the Part 107 waiver process has in the lead up to that time, especially as more businesses seek to innovate with drones. Chasen then opened the floor for questions and discussion.

- Anderson (3DR): My understanding was that the FAA is trying to move away from waivers and exemptions and move toward longer term, more transparent rules. If so, aren't automatic renewals just preventing this transition? Perhaps this is a question for Jay Merkle.
  - Merkle (FAA): Yes, you're right. But in the meantime, as we move toward rulemaking that does away with the need for exemptions and waivers, we do want to enable operations so we can learn what needs to go into the rules. There are other opportunities for approving operations within the current regulatory framework that we could maybe take advantage of that possibly better align with the complex operations of beyond visual line-of-sight than 107, which was created as a Visual Line-of-Sight rule with what was a 333 exemption and is now a 44807 exemption. What we're seeing through all the operations is that there probably is a need to start moving more of the community to other parts of the regulatory framework. We saw the two very history-making exemptions that happened this year – one with Wing, one with UPS Flight Forward – and we learned a lot from that about how to manipulate other parts of our regulatory framework as well but that being said these are good. So we shouldn't ignore this topic and just wait for something better that will come in the future.
  - Captain Mills (UPS): Thanks to this Task Group as well for your great work, especially for the 90-day timeframe. I wanted to echo Jay that I think there's an opportunity to leverage some of the learnings that we've had from the IPP program. The FAA has demonstrated the ability to run really fast and work with operators to move things forward so I think this could work with regards to the waiver process, too.
- Thomas Karol (National Association of Mutual Insurance Companies): I was a member of this Task Group and want to compliment Brian on his great leadership. And to illustrate a practical example on recommendation #5 (streamlined process for groups of operators in the same type of business), I'll share that we have 1,400 property casualty insurance companies that use drones, mostly to review roofs before and after damage. But they need exemptions for operating over people. If we could better advise our members on what they have to do to get this type of exemption rather than burdening the FAA with 1,400 different exemptions, it would be a tremendous benefit both to the FAA and to us.



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- Captain DePete (ALPA): That brings up the issue of the number of exemptions and the lack of transparency that follows. I understand that we're learning along the way and that the aim is towards an established regulatory process that we all abide by. Putting concerns about competition aside as we look ahead, if we had a little bit more transparency into how and why the exemptions are granted, companies and industry groups wouldn't need hundreds of exemptions. Essentially, this supports the idea of performance-based standards.
- Merkle: Thank you, Joe. Just a point of clarification: The 107 are waivers. And we have provided examples of successful waivers on our website to try to be more transparent and provide that kind of information. The exemptions against 135 are a slightly different activity. We've received feedback from the community that it is somewhat easier to deal with an exemption because with that, you're taking things away from the Part versus a waiver where you're asking someone to demonstrate they can safely operate but you don't provide them with the objectives. So that's one of the challenges we see with the two methodologies.
- Anderson: Would the FAA consider posting examples of unsuccessful waiver applications, perhaps anonymized as well, and explaining why they were rejected?
- Merkle: We would, if the DAC recommended that.
- Senior Corporal Mark Colborn (Dallas Police Department): What I found interesting about the survey was that most of the respondents were very happy with the controlled airspace authorization process. So my question is there going to be any consideration anytime soon to extending LAANC to those who have night waivers?
  - Merkle: I would have to defer to my colleagues in the Air Traffic Organization as to where that is in their prioritization. I know they work with the cadre of service suppliers to do that public-private partnership work, so I would recommend addressing it through that office.
- Schulman (DJI): My compliments to this Task Group, especially on reaching out to the smaller and medium operators out there, from which we could benefit to hear more. These suggestions would certainly help cut down the FAA's workload, since many of the applicants are from these smaller operators. On social media and small business forums, we're seeing those small businesses struggling to understand what they need to know to have successful applications. This might be the most useful and actionable recommendation we've heard today so I hope we can see it actually put and realize the benefits of small UAS across the country.
- Merkle: One final comment since we mentioned the [website page where we provide information on waivers](#) and since we also have [webinars on applications for waivers](#), we'll provide links to both of those in the public record that we send out.



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Mr. Chasen thanked all three of the Task Groups for their recommendations and proceeded to formally recommend their input to the FAA. He made a motion to approve each of the Task Group's recommendations in turn. Each motion was seconded and unanimously approved.

Merkle thanked everyone and stated that the FAA would provide feedback on the three sets of recommendations at the January 2020 DAC meeting. Chasen and Merkle agreed to push forward with another presentation since the DAC was still running ahead of schedule.

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## FAA Update: Remote Identification

Jay Merkle, Executive Director, FAA's UAS Integration Office

Mr. Merkle reminded the DAC that the FAA is still in the process of the review of the Notice of Proposed Rulemaking so he could not go into the details of what's actually in the Rule.

Currently, the Rule is under review in the Office of Information and Regulatory Affairs at the White House's Office of Management and Budget. Remote ID, as discussed earlier in the day, is necessary for enabling more complex operations, addressing safety and security concerns, and laying the foundation for UTM. It's also the key to unlocking safety, as well as security and defense functions, especially for BVLOS operations. The FAA has begun working on a Remote ID implementation plan to start to put together all the components so that we can ensure we move fast on this Rule when it's ready.

Mr. Merkle gave more background information about the Rule's formation and current status. He explained how the ASTM standard on Remote ID will likely be a potential means of compliance, and added that it includes broadcast and network. The industry assisted in drafting the standard and the ballot was sent out on September 16, due to come back in 30 days. With only a few negative comments to adjudicate, Merkle expected it to be published by the planned November 2019 timeframe. Regarding the ASTM Remote ID conceptual overview, Merkle advised the DAC to look not just at the aircraft but also at the role of the control station as an important communicator of Remote ID, particularly in the network mode.

Regarding next steps, Mr. Merkle announced that the FAA expects to publish the Rule on December 20, which will initiate the public comment period. The FAA anticipates a number of comments to come in because there has been significant progress in the industry since the development of the Rule. Merkle also foresaw the need later on for an update to the standard for the Rule.

### Discussion on Mr. Merkle's Presentation

- Kimchi (Amazon Prime Air): I'll make the same comment I made before that there's a need for high-level requirement which is potentially outside the Rule but describes what the rule should address, which is interoperability. Are these requirements clear enough at this point that able to do the work?
  - Merkle: Without being able to speak on what's in the Rule, I can say that the FAA's philosophy on UAS Traffic Management (UTM) is that it has to be a federated, interoperable system. So your concern is directly in line with the FAA's objectives for implementing UTM.
  - Kimchi: Is there a mechanism by which the requirements can be shared ahead of time to make sure we're all aligned in specifically the areas that are trying to be addressed by the Rule and which areas are not addressed by it?
  - Merkle: In some scenarios, you would see industrial standards sequentially informing a rule later in time, but because we've been moving in parallel with the



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development of this rule, we will have to catch up at the end. I can't say much more on that, however.

- Flint (Los Angeles World Airports): I just want to call out a reference to the Blue Ribbon Task Force report where we identified that part of Remote ID is ensuring that airports, local jurisdictions, and federal agencies all have a shared but very specific and time-sensitive responsibility to engage and take action via some sort of response mechanism. I hope that is something that is going to be addressed either through the NPRM or quickly thereafter.
  - Merkle: This afternoon there will be an update on the federal efforts in terms of UAS security.

Mr. Merkle then suggested that he could go ahead and give the FAA update on Section 349 and recreational flyers. Chasen approved the agenda change.

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## **FAA Update: Recreational Flyers (Section 349)**

**Jay Merkle, Executive Director, FAA's UAS Integration Office**

Mr. Merkle reviewed the history of the FAA's activities in the past year. He highlighted, using a chart, two significant accomplishments since the DAC's last meeting: the expansion of the LAANC application to include recreational users and the request for information (RFI) on the Knowledge Test. The FAA is reviewing the RFI now and is on schedule to provide that knowledge test by December. He also mentioned that the FAA is working on the national policy on recreational users in both controlled and uncontrolled airspace.

Additionally, Mr. Merkle stated that the DroneZone had also been updated and that a new Advisory Circular (91-57C) was underway, which will define a community-based organization. With this, the FAA is approaching the end of the work that remained for implementing 349. In closing, Merkle remarked that the FAA is on schedule to complete those tasks.

Mr. Chasen dismissed the DAC for lunch and requested that everyone return at 1:10 p.m.



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## Department of Transportation (DOT) Update

Joel Szabat, Acting Under Secretary, DOT's Transportation Policy Office

Mr. Merkle welcomed back the DAC and introduced Mr. Joel Szabat.

On behalf of the Department of Transportation, Mr. Szabat thanked the DAC for all their hard work, naming UAS as one of the department's top priorities. He mentioned that Transportation Secretary Elaine Chao has been working with the FAA Administrator Steve Dixon and Deputy Administrator Dan Elwell to pursue the safe integration of UAS into the national airspace. Mr. Szabat noted that Secretary Chao and Deputy Secretary Steven Bradbury wished to have been present for the DAC, and shared that he was pleased to serve in their stead.

Mr. Szabat briefly reviewed the DOT's work on UAS and on safely enabling innovation, while also addressing public concerns about safety, security, and privacy. He reaffirmed the department's appreciation for the DAC, noting how valuable its recommendations will be for enabling more operations. Safety for every operation of every aircraft is the DOT's first priority, even as operations become more complex or potentially risky. He urged the DAC to continue helping the FAA to improve its processes, innovate solutions, inform the public about how to safely operate drones, and maintain the security of operations. The transformational nature of drone technology, he added, is difficult for government regulatory agencies, making the need for an industry-led advisory committee all the more important.

Touching on the importance of collaboration more broadly, Mr. Szabat spoke on the Integration Pilot Program (IPP). This program works with state, local, and aviation industry partners and helps to gather new data, create new partnerships, and actively collaborate with communities to find ways to improve FAA processes for enabling UAS operations through lessons learned. Szabat then reviewed some of the IPP's successes from its Lead Participants from around the country and how the benefits realized by enabling more operations reach will reach throughout the economy.

Thanking the DAC again, Szabat closed by stating that the safe integration of UAS is truly an historic undertaking and the committee plays a crucial part in the story. On behalf of the DOT, he said leadership looked forward to reviewing the DAC recommendations. He ended by sharing candidly some anecdotes about his encounters with drone entrepreneurs, and sketched out the challenges he sees ahead for all stakeholders. Finally, Szabat charged the DAC to continue in its charge to help solve the most difficult of those challenges.

### Discussion on Mr. Szabat's Presentation

- Captain Mills (UPS): The IPP has been very successful and with the three-year process coming to a close, can you elaborate on what's next? Do you see an extension of the existing IPP and an expansion for others to participate?



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- Szabat: I can say that there will be a follow-up because the IPP was a success but what we don't want to do is to duplicate what we've already done so we're incorporating the lessons learned and in conjunction with the FAA we will be rolling out a follow-up.
- Mayor Troxell (National League of Cities; Mayor of Fort Collins, CO): I think one of the things that needs to happen in the follow-on is having engagement and maybe a working group for deconfliction. I'd also like to encourage more conversations to address issues such as privacy, accountability, safety, and security.
  - Szabat: Thank you; you make a salient point. One of the biggest challenges that we're grappling with is the line between local control and national standards when it comes to drone use. I believe that it's better to have local communities at the table to begin with. Regarding your suggestion for a working group, while I think it has merit, I will defer to Jay Merkle and Dan Elwell and the folks at the FAA who actually have to run the mechanism of the process. Your concern, though, is valid and it's something we absolutely have to tackle if we're going to have a successful integration of drones into airspace.
  - Troxell: Thank you and I'll add that we also have to think about the highly complex contextual situations where we see drones in our communities. I gave an example earlier of a park opening where children were running after a drone – one with a 15-minute battery life – and it couldn't land while the children were underneath it. So, it's not just about regulating and control drones in the airspace; it's also about how drones show up in our communities on a daily basis.
  - Szabat: Agreed; and one thing we know is that the situations vary widely from local community to local community so we need to have a system in place that is not one-size-fits-all, but rather allows for local governments to tailor their regulations to the needs of the community. That's an important outcome we're looking for.
- Schulman (DJI): Thank you for your update. We've seen how important it is to get the new framework right on the recreational operations including the knowledge testing and I know the FAA is working to make sure that that test covers the safety rules that are necessary to fly, while ensuring that they are not a substantial impediment to enterprising and beginner flyers who are still getting to know the technology. And with respect to the concern you mentioned about privacy, I'd think the cases of drones being used for good far outweighs the edge case of misuse. To date, DJI counts 292 people who have been rescued using drone technology, including the six-year-old boy in the news this week who was lost in a cornfield in the middle of a cold Minnesota night. He was rescued by a volunteer drone pilot using a drone with a thermal camera. The benefits are greater than the hypothetical risks of misuse, which, of course, will be remedied particularly when there's Remote ID. At that point, you can use an existing privacy statute and the voluntary Remote ID coming soon, per the DAC's recommendations, and still foster innovation in the flying community.



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- Szabat: Thank you for those observations. The U.S. Department of Transportation, the Federal Aviation Administration, and the overall administration all agree with you that the benefits far outweigh the negative uses. Having said that, as a regulatory agency, part of our job is to be prepared for any eventuality. Ensuring the safety and security of everyone as we integrate drones is one of the most difficult challenges we face. But it is not insurmountable.

After Mr. Szabat spoke, Mr. Chasen welcomed then Acting Assistant Administrator Bobby Fraser from the FAA's Office of Communications to speak on National Drone Safety Awareness Week.

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## FAA Update: National Drone Safety Awareness Week

**Bobby Fraser, then Acting Assistant Administrator, FAA's Office of Communications**

Mr. Fraser expressed his excitement to share about some of the work coming out of the FAA Office of Communications, as well as some news about Drone Safety Week. He briefed the DAC on the role his office has in helping to educate the public about drone safety, as well as the Integration Pilot Program, through digital content, social media, webinars, and videos. They reach audiences on multiple platforms and have generated 16 million impressions through drone-related content.

Turning to speak on National Drone Safety Awareness Week, Mr. Fraser pointed out the sets of Drone Safety Week stickers available at the DAC tables. He reminded them that the inaugural awareness event would be held on November 4-10 and noted the supporting partners, the Know Before You Fly team and the UAS Safety Team. He explained that this educational initiative is an opportunity for the drone community to help educate the public and highlight how key sectors are using drones. The week-long campaign is also an opportunity to engage with students and teachers about using drones in STEM classes.

The focus of each day during the week is as follows:

- Monday: Public Safety
- Tuesday: Business Focus – photography, real estate, insurance
- Wednesday: Business Focus – infrastructure and agriculture
- Thursday: Business Focus – package delivery
- Friday: Education and STEM
- Saturday and Sunday: Recreational Flyers

Mr. Fraser then shared several ideas on how the DAC members could help promote the cause. Describing what the FAA had already done in this effort, Fraser mentioned the email campaign that had gone out to half a million stakeholders for each focus areas, as well as downloadable graphics and the Stakeholder Playbook, which advises users on how to engage with their local communities.

In closing, Mr. Fraser encouraged DAC members to visit the [faa.gov/UAS](http://faa.gov/UAS) website, follow the FAA on social media, and to use #DroneWeek in their online posts so the FAA could amplify their efforts. He thanked the DAC for their time and also for Mayor Troxell's support, who had shared his plan to make a Drone Safety Week proclamation for Fort Collins.



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## FAA Update: UAS Security

**Angela Stubblefield, then Deputy Associate Administrator, FAA's Office of Security and Hazardous Materials Safety (ASH)**

Chasen then introduced Angela Stubblefield, the Deputy Associate Administrator of the FAA's Office of Security and Hazardous Materials Safety, to give the update on UAS Security.

Ms. Stubblefield greeted the DAC and gave special thanks to Task Group 2 for their work. Following on her briefing at the June DAC meeting, Stubblefield reminded the group that by taking a holistic look, we can see the full spectrum of prevention and deterrence for unauthorized operations. To that end, the FAA has engaged with interagency and industry partners over the past year.

In the 2018 FAA Reauthorization Act, Section 372, Ms. Stubblefield recalled the directive to take on a pilot program for Remote ID and detection technologies, and look for ways to increase the FAA's investigation into unauthorized drone operations. Regarding detection, her office focused on finding out what is already being used by government agencies, as well as by critical infrastructure owners, to detect and hopefully identify operators of unauthorized drones. For those interested in gaining that airspace awareness, she also sees an opportunity for promote safety outreach. For the FAA, partnering with those who are pursuing detection technologies also offers the possibility of data-sharing, which could help operating them to develop investigations and either education and/or enforcement actions. They have begun partnering with a variety of stakeholders who own or run different types of venues in which detection technology is being used.

Recently, they worked with the Albuquerque International Balloon Fiesta, which takes place annually over an 8-day period. The FAA worked with the Albuquerque Police Department, the event sponsor, and a number of other local folks who were using a detection system over the event. There were 20 TFR violators; and eight operators were identified in that case. They worked with the Albuquerque PD to locate the operator and get those unauthorized drones out of the sky, giving the FAA the opportunity for outreach. Ms. Stubblefield stated that the FAA will be looking for additional venues in the near term to engage and extract appropriate information on how to potentially identify operators and proceed with education and enforcement.

Moving on to discuss Section 383 of the Act, Ms. Stubblefield spoke on how the FAA could perhaps host some of that testing. She added that Congress gave the FAA additional authorities and relief from some of the legal statutes that can constrain the use of certain detection systems and mitigation technologies. This means that the FAA will be able at least to evaluate systems in the airport environment. The FAA is developing the timelines and milestones for this next phase of the pilot program.

Additionally, the FAA is charged with developing the standards for detection and mitigation technologies to be used in the National Airspace System. To do this, the FAA will convene an



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Aviation Rulemaking Committee to come up with a plan for enabling the use of these technologies, which it is already using alongside the four federal partners who have that authority. One goal will be to ensure that these technologies don't present an interference or an obstruction in the airport environment and that the operational response plans are risk-based and are proportionate. While this work is under development, the FAA is working with its interagency partners to devise how to implement the pilot program testing and evaluation activity.

The third and final topic that Ms. Stubblefield presented on was the Core 30 Concept of Operations (CONOPS), which is the national response plan for a persistent UAS disruption at the Core 30 airports. At issue, right now, is the fact that no one has the authority in a steady state to provide counter UAS protection at airports. So there is a need to use existing authorities in the airport environment to address that risk as quickly and capably as possible. Stubblefield reminded the DAC that the CONOPS is in the final steps of approval within the National Security Council, after all the partner agencies had a chance to weigh in. While it is waiting for final approval the FAA and TSA have been working very closely with airport sponsors to start the dialogue for what those tactical response plans will look like in the core 30. This include the point where you determine the UAS is a persistent threat and need to invoke the assistance of the federal government and then also what unified command will look like and who the involved stakeholders should be.

## Discussion on Ms. Stubblefield's Presentation

- Captain Mills (UPS): Thank you for the update. Could you expand more on the CONOPS and whether this is something that could be duplicated in other areas for other communities? Is there a plan to expand it to other areas as well?
  - Stubblefield: Right now, in terms of the federal agencies that have authority and capability, we don't have a lot deployed out there so there is a volume issue. We wanted to focus first on those airports that, if disrupted would have the biggest impact across the system. But as we develop tactical response plans, lessons learned, and templates, those things can absolutely be duplicated for other airports. We also have to look at CONOPS as part of the continuum of dealing with UAS risks in the airport environment.
- Mayor Troxell (National League of Cities; Mayor of Fort Collins, CO): In terms of interagency cooperation, are you also engaging research universities?
  - Stubblefield: Absolutely, we are. We are leveraging the work of our federal partners who are looking at these technologies in one form or another, specifically, DOD, DHS, DOJ, and DOE. And there are certainly educational institutions involved in that work, too.
- Kimchi (Amazon Prime Air): I would like to point out that usually people will go to where it is easiest to do what they want, where there is the least amount of capability to detect and mitigate, so understanding how to apply these technologies in the private



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sector, too, is important. If there's a standard, then I think we should all be able to eventually use the same set of standards. On another note, on the statistic that 98% of the time nothing is done when there is a sighting: it's not clear to me that 98% of the time the thing seen was actually a drone. We know that many times these turn out to be a plastic bag or something else. So how do we get to the point where we actually know the true baseline for the sightings?

On operators who are permitted to operate counter UAS systems. I assume there will have to be a requirement on how they connect with UTM and support Remote ID, is that right? We need to verify them, separating the good operators from the bad, and only then allowing them to take action. It's important that we be extremely disciplined in how we do it.

Finally, you had mentioned testing an anti-GPS system, for example, which is actually not legal. So I think you need the right regulatory support and to anticipate side effects. So what will the training requirement be for this? Thank you; I know this is an incredibly difficult topic.

- Stubblefield: Thank you. So I'd like address all three points. We have struggled with how to validate sightings. Remote identification will help with that. I will make one point though about the statistics on the unvalidated sightings that we're seeing: year over year from 2016 to 2018, there has been an increase of sightings every year but that increase has been 50% less every year. That attests to the education and outreach we're doing is working. Those reports are coming to use mostly from pilots, and when we have Remote ID, we'll have much better validation.

On your second point, as we think about UTM and talk with our national security partners about what that construct looks like, it's about getting all of that data together so you can make an informed decision. With Remote ID and LAANC, we'll see this become more like a layering of data.

On your third point, I agree with you. My Air Traffic Organization colleagues are most intimately involved with this activity. The four federal departments I mentioned earlier regarding CONOPS are starting at the very beginning with defining "threat", what constitutes a threat, etc. That is part of what we do in getting to the place where they can actually turn the system on and go operational. The kind of authority to use those type of systems requires that the operator is well-trained, has good tactics techniques and procedures, as well as rules of engagement. The FAA is trying to support this level of coordination, but we cannot connect with every law enforcement agency in the country. So as we continue to think about whether and which additional entities should have the authority to use mitigation tools, training standardization needs to be part of the conversation.



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- Chasen: In light of the time, we can only take one more question before we take a break.
- Marily Mora (Reno-Tahoe Airport Authority): Thank you, Angela. The detection and mitigation issue is paramount for airports and fast-tracking those standards for detection equipment is really important to us. On the question about CONOPS being focused on the Core 30 airports: I don't think there's anything preventing airports from going ahead and developing a plan in concert with a Federal Security Director.
  - Stubblefield: You're absolutely right and we encourage airports to be thinking about that under your Part 139 and 1542 requirements so you can address safety and security hazards by developing those operational response plans with your local stakeholders at the airport. We hope that the work we're doing will support that work so that each airport doesn't have to reinvent the wheel for themselves. Thank you.

Mr. Chasen thanked Ms. Stubblefield for her presentation and dismissed the DAC for a 15-minute break to reconvene at 2:40 p.m. for the presentations on the industry-led technical topics.



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## Industry-Led Technical Topics

Michael Chasen, DAC Chair

Mr. Chasen welcomed the DAC members back and began the final section of the meeting. He remarked on the importance of livestreaming the meeting to increase transparency and promote discussion on drone-related topics among even more stakeholders.

Mr. Chasen then turned to the industry-led topics and explained the format for the following discussion and how it would tie into the next set of DAC taskings. After introducing each topic, Chasen explained that he pause for a brief discussion on before going ahead and assigning the new, related Task Group who would have 90 days to prepare their recommendations to the committee.

### Recap on FAA Facility Maps

Introducing the first topic, Mr. Chasen provided a quick overview of what the FAA Facility Maps are and how they are used. These maps show the maximum altitude around airports where the FAA may authorize Part 107 operations without additional safety analysis. Drone operators rely on these maps to understand whether they are likely to get approval to fly drones near airports. He remarked that drone operators have noticed pain points with these maps (like where the altitude restrictions don't match the actual risks) and the demand for airspace access is only increasing. Chasen clarified that the related DAC Tasking would focus on identifying how industry and FAA can collaborate to improve these maps and safe airspace access.

Before moving to set up the Task Group, Mr. Chasen first opened the floor to the DAC to see if they had or needed any overarching directions or clarifications on what the Task Group should be sure to address.

### Discussion on the FAA Facility Maps

- Kimchi (Amazon Prime Air): I assume that the long-term idea is for all the data to be provided for the UTM data provider interface. But right now, there is an assumption that the FAA has to be the curator for this entire set of data. So I think one important thing to clarify is how this relates to the UTM topic and the federated data providers underneath the UTM. Likewise, how do you discover which data layers are important for a specific population?
  - Chasen: Thank you. We'll go ahead and add to this Task Group the management of and access to this data, as well as who actually owns the data, who needs to provide it, etc.
- Rich Hanson (Academy of Model Aeronautics): Just to make sure we're on the same page, are we talking about what is also referred to as the LAANC grids?



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- Merkle (FAA): Yes, the UAS Facility Maps are the underlying data structure that supports the LAANC application and some people might call them that. But officially, they're the UAS Facility Maps. They're available online and are used by the UTM Service Suppliers (USS). And to go back to Gurs' comment to clarify the difference between two kinds of maps here: these maps are not intended to be the sole data source for UTM and I think Gurs' question may be for something broader. What we've heard from the community that uses these maps and how they'd like for us to improve the maps, specifically to support automatic authorizations versus more generic information which could include aeronautical information, GIS information, TFRs, NOTAMs, and a wide range of similar data. In a mature UTM, you would have access multiple providers who would have access to all that in a machine-readable format. Essentially, these are two different things.
- Mariah Scott (Skyward): Is this only looking at the facility map, not other information that might be included or is it about expanding the coverage of that?
  - Chasen: Yes, I want to make sure that the committee groups have a streamlined focus so that it's not too open here.

## Recap on BVLOS

Mr. Chasen then turned to present on the next topic: beyond visual line-of-sight. He recalled that the FAA had initiated research focused on solving BVLOS challenges more than a year before Part 107 was in place. Under the Pathfinder Program, partners BNSF and PrecisionHawk conducted research for three years and received the first BVLOS waivers in 2016. Today, BVLOS research efforts continue under the UAS Integration Pilot Program. There are been over 50 BVLOS waivers approved, however, a BVLOS rule is still a few years away. Chasen advised the DAC that it needs to focus its efforts to position FAA to create policy and regulations for BVLOS. And to do that, the DAC should identify what challenges remain, and how best to address them moving forward.

Mr. Chasen acknowledged that this topic involves not only policy, but also a lot of technology. He opened it to the committee for any thoughts about what this Task Group needs to specifically focus on regarding BVLOS operations.

## Discussion on BVLOS

- Anderson (3DR): Do you think they should include one-to-many operations – that is, breaking the one-to-one ratio?
  - Chasen: I think that's something that can be addressed. We'll put that down for the Task Group to look at.



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- Kimchi (Amazon Prime Air): I think that's maybe a parallel topic and if we agree that it's important then we should prioritize it. However, I have two observations. I think there's work that we spoke earlier on around defining the technical standards for vehicle-to-vehicle collaborative deconfliction – this is “low-hanging fruit”, building on top of Remote ID. NASA has already demonstrated doing automated deconfliction and it is very inexpensive to implement. What I think is important, though, is to have much better clarity on how “well-clear” relates to vehicle-to-vehicle deconfliction because it really depends on different entities interacting with a drone. A heftier topic that we need to pick up and address is the known collaborative commercial pilot equivalent performance specification and how it relates to “well-clear” for sensor-based detection.
  - Chasen: Thank you; we'll make sure those items are on the agenda.
- Schulman (DJI): I think there's a real opportunity here to try to do something about operations that are only hyper technically BVLOS, but are not actually posing an added risk. One example is when you're on top of a bridge and you need the drone to inspect the underside; technically, it's BVLOS, but it's right underneath and there's no other air traffic even possible to be there, so I don't think that's the risk that the BVLOS restriction is intended to address
  - Merkle: This is a great conversation and it's exactly why, as the DFO, we value advice from the DAC. The breadth of topics that were brought up, both from the regulatory and the airspace management operations side, are all questions that we need advice on. We all have limited resources so it's helpful to hear what you think the priorities are in terms of solving BVLOS. And I think Gur made a good point that it's everything from DAA to how that works with “well-clear”. Is it a priority to start looking at the intersection of some of these safety cases between safety mitigation trade-offs and “well-clear” and DAA intersecting with airspace integration.
- Captain Mills (UPS): We should look at this issue in different segments. So of course that includes what capabilities the aircraft needs to effectively mitigate risk. But we perhaps should also consider the operational control piece like Brendan Schulman brought up.
- Lorne Cass (American Airlines): Agreed. When we expand drone operations with BVLOS and they become really commercialized there's an opportunity to make sure that we do consider the tenets of operational control for the future.
- Mayor Troxell (National League of Cities; Mayor of Fort Collins, CO): I'll raise that broader issue of deconfliction at low altitudes and suggest that we think not only about the operator, but also try to understand the context in which they are flying since there will be conflicts that need to be addressed.
- Bob Brock (Kansas Department of Transportation): One of the things I'd like us to think about in this Task Group is to consider contextual models where it might be permissible



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to do things instead of in a one-size-fits-all regulatory schema. We should consider how different, interim solutions work for urban and rural environments.

- Chris Penrose (AT&T): I would echo this. Defining use cases will help shape a lot of this work.
- Kimchi: I fully support this. The target level of safety formulas that FAA is using is probably a preferred way in that it isn't mission-specific. If the FAA now has to pick up the work to make the mission permissions. If everybody is using the same model then it is much easier to get permission to fly.
- Kirov (L3Harris): In my corner of the world, we see this is the biggest impediment to massive investments by the aerospace industry. The key issue is standards if you want to open up the investments and we know a lot of good work is being done at the standards development organizations right now and that a lot of work is going to be coming out soon in the next few months. We should have more clarity from FAA on a policy point-of-view regarding how the interaction of these standards with technology will enable BVLOS. I agree with Gur and would add to the DAA discussion that Command and Control and spectrum issues are important. That means the FCC has to somehow be a part of that work.
  - Kimchi: I agree for the most part. Command and control is important, but where you implement it is unique and distinct to each platform. Command is important for us but it's not safety critical so I suggest that we leave the flexibility for different equipment manufacturers to place the technology where they see fit.
- Chasen: I think these are some great items and we'll make sure all these get listed for the Task Group to dive into and report back to this group.

## Recap on Unmanned Traffic Management

Mr. Chasen then turned to present on the next topic: Unmanned Traffic Management. UTM will be required for widespread BVLOS operations in complex airspace. He provided background on how NASA pioneered UTM research years ago, working alongside many industry stakeholders. Many industry players have developed and tested components of UTM, including Remote ID, which is an early building block. The FAA released a UTM Concept of Operations in 2018, which laid out a framework and vision for UTM deployment. The FAA is asking the DAC to identify priorities for UTM development and deployment so that it can make a plan for safely rolling out UTM. The FAA would also like to hear where we should be focusing our efforts on the standards (including but not limited to those coming out of ASTM on UTM). Chasen then asked the committee for ideas on what this Task Group needs to consider.



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## Discussion on Unmanned Traffic Management

- Kimchi (Amazon Prime Air): I think the topic of discovery and who is actually in the Federal Register is incredibly important. Just because it's possible to have a federal architecture doesn't mean that everybody actually can be a certified operator in that so there's a follow-on issue of how do you remain in compliance as an operator. Furthermore, I think it's very important on the control side that you do not give a permanent blanket permission to operate, if you need to eject someone from the system. There's probably some NASA tasking data, especially on the ATM research group and simulation that we can learn from. They know how to run large-scale simulations right and I think they're ready to do that work but they're waiting for the tasking from the FAA.
  - Chasen: Thank you. We'll make sure that gets included.
- Captain Mills (UPS): Ultimately what you want in a UTM is something that's going to be sustainable. So I think the Task Group should look at the financial aspect – how are you going to pay for it and how do you make it something that everyone is going to participate in?
  - Kimchi: If I remember correctly, a previous version of the DAC a year-and-a-half ago did some of this work. Could we start by taking a look at that and seeing what data is missing?
- Chasen: While many of the issues being raised are certainly good ones, I think we need to reign in the discussion a little. As a reminder, when we are putting together these Task Groups, it's not to talk about the blue sky opportunities. It's about figuring out what we need to take the next actionable step with that next set of policies. So with some ideas that come up during the discussion, we'll put a pin in them for now.



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## New Business/Agenda Topics/Review Taskings

Jay Merkle, Acting DFO, Executive Director, FAA's UAS Integration Office

Michael Chasen, DAC Chair

Mr. Michael Chasen opened the last agenda item and handed it over to Jay Merkle, as the Acting DFO. Mr. Merkle summarized the DAC taskings one-by-one and Chasen, in turn, asked for motions to recommend each group's chair. The DAC Chair also asked for a motion to adopt the proposed Task Groups. Each motion was seconded and unanimously approved. Some DAC members expressed interest in sharing ideas for future DAC Task Groups. Chasen appointed the following: Marily Mora as the chair for the FAA Facility Maps group; Todd Graetz as the chair of the BVLOS Task Group; and David Silver as the chair of the Unmanned Traffic Management Task Group. Chasen instructed anyone on the DAC interested in joining the Task Groups to email him and Diana Cooper (PrecisionHawk). Each Task Group will have 90 days to deliver their work to the DAC. For the third Tasking on UTM, Merkle clarified that the version of the UTM Concept of Operations that is available is version 1.0, not 2.0. He stated that the FAA expects version 2.0 to be out by the end of 2019 and advised the DAC that, if it is available while the Task Group is doing their work, they should use it.

## Discussion

- Mayor Troxell (National League of Cities; Mayor of Fort Collins, CO): I would like to propose a task force on deconflicting low-altitude airspace.
  - Merkle: We would like to talk with you afterwards and get your ideas on exactly what that would look like and then we'll get back to the DAC on a potential new task next time.
  - Kimchi (Amazon Prime Air): When we say "deconfliction" at least in the technical context, we usually mean something slightly different than what I think you are referring to. But in some discussion on related items at previous DAC meetings, we were unable to come to some conclusion so I think it deserves another attempt.
  - Chasen: Agreed, let's touch base after this meeting for some potential discussion.
  - Schulman (DJI): I would advise that we not ignore the very thorough research that the DAC did on this topic in the past. I wouldn't want us to try to redo the work that's already been done and delivered to the FAA.
  - Chasen: Point taken, although I don't want to shut down any potential discussion. We can look to see if the past research still makes sense for this committee to either update or address again. Thank you, Brendan.
  
- Matthew Zuccaro (Helicopter Association International): I just want to bring up the fact that legislators continue to bring up bills about airspace rights, segregation of the airspace, and whether the FAA should control low-level altitude airspace. It's something that you're going to have to deal with. I think these voices should be heard because



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everybody has a place at the table, we all have a stake in this. But no one besides the FAA should be writing regulations and providing surveillance and oversight.

- Merkle: Thank you. As a reminder to the entire DAC, ideas may be shared but it is the job of the DFO to task the DAC.
  
- Kimchi: I think the topic of how we demonstrate fully interoperability – that these technical standards and performance standards actually ready to be operationalized – is really important. Someone has to take a leadership position on this. It can be industry, a standard body, or the FAA tasking NASA, but we need to have continuity in the domain.
  
- Cass (American Airlines): I do think will be helpful for the group maybe to get a better understanding of the safety management system that the FAA has employed successfully over the years. Perhaps at the next meeting, somebody could come in and talk about that.
  - Merkle: I would love to come back and talk about FAA Order 8040.6 on safety risk management for UAS. We would be happy to put that on the agenda next time.

## Closing Remarks

Mr. Merkle thanked the DAC members for their time and hard work, especially with the Task Group recommendations. He stated that the FAA would carefully look at those recommendations and provide feedback at the next DAC meeting. Mr. Merkle also thanked Mr. Chasen for his leadership. Chasen also expressed his appreciation for the group's work and adjourned the meeting.

## Adjourn

The meeting ended at 4:00 p.m. Eastern Time.



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## 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
Deborah	Flint	Chief Executive Director, Los Angeles World Airports	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
Marilyn	Mora	President and CEO, Reno-Tahoe Airport Authority	DAC Member



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Christopher	Penrose	Senior Vice President of Emerging Devices, President of Internet of Things, AT&T	DAC Member
Robie	Samanta Roy	Vice President of Technology, Lockheed Martin Corporation	DAC Member
Brendan	Schulman	Vice President of Policy and Legal Affairs, DJI Technology	DAC Member
Mariah	Scott	President, Skyward (a Verizon company)	DAC Member
David	Silver	Vice President for Civil Aviation, Aerospace Industries Association	DAC Member
Michael	Sinnott	Vice President Product Development and Strategy, Boeing Commercial Airplanes	DAC Member
Wade	Troxell	Mayor of Fort Collins, CO, and the National League of Cities	DAC Member
Brian	Wynne	President and CEO, Association for Unmanned Vehicle Systems International	DAC Member
Matthew	Zuccaro	President and Chief Executive Officer, Helicopter Association International	DAC Member
Dan	Elwell	DAC Designated Federal Officer, FAA Deputy Administrator	Government
Jay	Merkle	Executive Director, FAA UAS Integration Office	Government
Kristin	Alsop	FAA	Government
Erik	Amend	FAA	Government
Tim	Arel	FAA	Government
Chris	Brown	FAA	Government
Paul	Campbell	FAA	Government
Larry	Cowles	FAA	Government
Bill	Crozier	FAA	Government
Teresa	Denchfield	FAA	Government
Bailey	Edwards	FAA	Government
Liz	Forro	FAA	Government
Mary	Foreman	FAA	Government
Bobby	Fraser	FAA	Government
Arjun	Garg	FAA	Government
Joshua	Holtzman	FAA	Government
Kate	Howard	FAA	Government
Nyarre	Hudson	FAA	Government
Tiffany	Jackson	FAA	Government



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Tammy	Jones	FAA	Government
Cassandra	Jordan	FAA	Government
Winsome	Lenfert	FAA	Government
Allison	LePage	FAA	Government
Peter	Lewis	FAA	Government
Lirio	Liu	FAA	Government
Landon	Long	FAA	Government
Claudio	Manno	FAA	Government
Julie	Marks	FAA	Government
Michael	McCrabb	FAA	Government
Joe	Morra	FAA	Government
Arun	Murthi	FAA	Government
Jessica	Orquina	FAA	Government
Lorelei	Peter	FAA	Government
Genevieve	Sapir	U.S. Department of Transportation	Government
Jeannie	Shiffer	FAA	Government
Angela	Stubblefield	FAA	Government
Gretchen	Tressler	FAA	Government
Adrienne	Vanek	FAA	Government
John	Coffey	National Oceanic and Atmospheric Administration	Government Observer
Gzim	Ocakoglu	European Union Delegation to the United States	Government Observer
Brian	Soper	National Transportation Safety Board	Government Observer
Mark	Aitken	DJI Technology Inc.	Observer
Brandon	Allen	International Association of Fire Chiefs	Observer
Boron	Appelboim	Amazon	Observer
Justin	Barkowski	American Association of Airport Executives	Observer
Stacey	Bechdolt	The Moak Group	Observer
Darby	Becker	GE Aviation	Observer
Chris	Brown	Consultant	Observer
Shawn	Bullard	Duetto Group	Observer
Jonathan	Capriel	Washington Business Journal	Observer
Sean	Cassidy	Amazon Prime Air	Observer
Rachael	Chambers	National League of Cities	Observer
Drew	Colliate	Association for Unmanned Vehicle Systems International	Observer



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Christopher John	Cooper	Aircraft Owners and Pilots Association	Observer
Diana	Cooper	PrecisionHawk	Observer
Gabriel	Cox	Intel Corporation	Observer
Anastasia	Crist	Class G, Inc.	Observer
Joseph	d'Hedouville	Vigilent-Inc.	Observer
Jonathan Harris	Daniels	Praxis Aerospace Concepts International, Inc.	Observer
Joe	Darden	Iridium	Observer
James Lawrence	Davis	uAvionix Corporation	Observer
Jeff	Dygert	AT&T	Observer
Robert J.	Ehrich	Slipstream Strategies	Observer
Lisa	Ellman	Hogan Lovells US, LLP	Observer
Matt	Fanelli	Skyward, a Verizon company	Observer
Max	Fenkell	Unmanned and Emerging Aviation Technologies	Observer
Ian	Gansler	O'Neill and Associates	Observer
Dean E.	Griffith	Jones Day	Observer
Karan	Hofmann	RTCA, Inc.	Observer
Chris	Julius	American Airlines	Observer
Randy	Kenogy	Air Line Pilots Association International	Observer
Philip	Kenul	ASTM F38 Committee	Observer
Bob	Lamond, Jr.	AeroSolutions	Observer
Maureen	McLaughlin	Iridium	Observer
Terry	McVenes	RTCA, Inc.	Observer
David	Messina	FPVFC	Observer
Jeff	Mort	Los Angeles World Airports	Observer
Margaret	Nagle	Wing (an Alphabet company)	Observer
Mitch	Narins	Strategic Synergies, LLC	Observer
Aaron	Pierce	Pierce Aerospace	Observer
Jenny Charlotte	Rancourt	Association for Unmanned Vehicle Systems International	Observer
Elizabeth Lynn	Ray	BNSF	Observer
Mark	Reed	Air Line Pilots Association International	Observer
Paul Joseph	Rossi	Nine Ten Drones, LLC	Observer
Jacob	Ruytenbeek	AirMap, Inc.	Observer



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Matthew	Satterly	AirMap, Inc.	Observer
Ken	Stewart	AirXos	Observer
Michel	Susai	Independent Observer	Observer
Anne	Swanson	Wilkinson Barker Knauer, LLP	Observer
Clifford Charles	Sweatte	Akin Gump Strauss Hauer & Feld LLP	Observer
Frank	Taylor	National Agricultural Aviation Association	Observer
Ryan	Terry	Lockheed Martin Corporation	Observer
John	Thomas	Kasowitz Benson Torres LLP	Observer
Justin	Towles	Akin Gump Strauss Hauer & Feld LLP	Observer
Stella	Weidner	The Boeing Company	Observer
Steve	Weidner	National Air Traffic Controllers Association	Observer
Raymond	Young	NY UAS Test Site	Observer
Brian	Garrett-Glaser	Avionics International	Press
Catherine	Jackson	Dispatcher	Press
Jeff	Rose	Sinclair Broadcast Group	Press