Drone Advisory Committee

eBook

**DAC Member (Public) Information for the
October 17, 2019 DAC Meeting • Washington, DC**

Drone Advisory Committee

10/17/2019 DAC Meeting • Washington, DC

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Logistics

Schedule

Thursday, October 17, 2019 National Transportation Safety Board Boardroom and Conference Center 420 10th Street SW, Washington, DC 20594	
9:00 a.m. – 10:20 a.m.	**DAC Meeting Begins and First Morning Session** *(Coffee **will not** be provided BEFORE the meeting)*
10:20 a.m. – 10:35 a.m.	**Break** *(Water will be available)*
10:35 a.m. – 11:40 a.m.	**DAC Meeting Second Morning Session**
11:40 a.m. – 1:10 p.m.	**Open Lunch and Networking** *(Lunch **will not** be provided, a food court is upstairs from the meeting location)*
1:10 p.m. – 2:05 p.m.	**DAC Meeting First Afternoon Session**
2:05 p.m. – 2:20 p.m.	**Break** *(Water will be available)*
2:20 p.m. – 4:00 p.m.	**DAC Meeting Second Afternoon Session**
4:00 p.m.	**Meeting Adjourned**

Transportation and Parking

Parking
• Paid self-parking is available on site: https://aceparking.com/lenfant/

Metro and Trains
• **L'Enfant Plaza Station** is serviced by Blue, Orange, Silver, Yellow, and Green Line trains, as well as Virginia Railway Express

Questions/Comments: Jessica Orquina (jessica.orquina@faa.gov or 202-267-7493)

Confirmed FAA/DOT Attendees

Name	Title	Org.
1. Dan Elwell	Deputy Administrator and DAC DFO	FAA
2. Danny Blum	Senior Advisor to the Deputy Administrator	FAA
3. Ali Bahrami	Associate Administrator for Aviation Safety (AVS)	FAA
4. Jay Merkle	Executive Director, UAS Integration Office (AUS)	FAA
5. Bill Crozier	Deputy Executive Director, UAS Integration Office (AUS)	FAA
6. Erik Amend	Manager, Executive Office, UAS Integration Office (AUS)	FAA
7. Joe Morra	Director, Safety & Integration Division, UAS Integration Office (AUS)	FAA
8. Julie Marks	Deputy Director, Safety & Integration Division, UAS Integration Office (AUS)	FAA
9. Jessica Orquina	Senior Communications Specialist, UAS Integration Office (AUS)	FAA
10. Gretchen Tressler	Technical Writer, UAS Integration Office (AUS)	FAA
11. Teresa Denchfield	Logistics Coordinator, UAS Integration Office (AUS)	FAA
12. Bobby Fraser	Acting Assistant Administrator, Office of Communications	FAA
13. Jeannie Shiffer	Deputy Assistant Administrator, Office of Communications	FAA
14. Arjun Garg	Chief Counsel	FAA
15. Lorelei Peter	Assistant Chief Counsel for Regulations	FAA
16. Bailey Edwards	Assistant Administrator for Policy, International Affairs and Environment	FAA
17. Kate Howard	Deputy Assistant Administrator for Government and Industry Affairs	FAA
18. Claudio Manno	Associate Administrator for Security and Hazardous Materials Safety	FAA
19. Angela Stubblefield	Deputy Associate Administrator for Security and Hazardous Materials Safety	FAA
20. Joshua Holtzman	Executive Director, Office of National Security Programs and Incident Response, Office of Security and Hazardous Materials Safety	FAA
21. Tim Arel	Deputy Chief Operating Officer, Air Traffic Organization	FAA
22. Winsome Lenfert	Deputy Associate Administrator for Airports	FAA
23. Genevieve Sapir	Senior Attorney, Office of the Secretary	DOT

Drone Advisory Committee

October 17, 2019 DAC Meeting • Washington, DC

Public Meeting Agenda

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

	Start	Stop	
1.	9:00 a.m.	9:01 a.m.	**Greeting from FAA**
2.	9:01 a.m.	9:05 a.m.	**Official Statement of the Designated Federal Officer**
3.	9:05 a.m.	9:15 a.m.	**Review of Agenda and Approval of Previous Meeting Minutes**
4.	9:15 a.m.	9:30 a.m.	**Opening Remarks from DAC Chairman**
5.	9:30 a.m.	10:15 a.m.	**DAC Recommendation and Discussion: Tasking #1 – Remote Identification**
6.	10:15 a.m.	10:25 a.m.	**Break**
7.	10:25 a.m.	11:10 a.m.	**DAC Recommendation and Discussion: Tasking #2 – UAS Security Issues**
8.	11:10 a.m.	11:55 a.m.	**DAC Recommendation and Discussion: Tasking #3 – 107 Waivers**
9.	11:55 a.m.	1:10 p.m.	**Lunch and Networking**
10.	1:10 p.m.	1:25 p.m.	**FAA Update: National Drone Safety Awareness Week Update**
11.	1:25 p.m.	1:35 p.m.	**FAA Update: Remote Identification**
12.	1:35 p.m.	1:50 p.m.	**FAA Update: Exception for Limited Recreational Operations of Unmanned Aircraft**
13.	1:50 p.m.	2:05 p.m.	**FAA Update: UAS Security**
14.	2:05 p.m.	2:20 p.m.	**Break**
15.	2:20 p.m.	2:50 p.m.	**Industry-Led Technical Topics**
16.	2:50 p.m.	3:50 p.m.	**New Business/Agenda Topics/Review Taskings**
17.	3:50 p.m.	4:00 p.m.	**Closing Remarks**
18.	4:00 p.m.	4:00 p.m.	**Adjourn**

RSVP Required: Email DACmeetingRSVP@faa.gov providing your full name and
organization (if representing an organization).
Questions/Comments: Contact Jessica Ann Orquina, Senior Communications Specialist
(jessica.a.orquina@faa.gov or 202-267-7493).

Drone Advisory Committee

DAC Membership – As of 9/20/2019

Stakeholder Group	Members
Designated Federal Officer	**Dan Elwell**, Acting Administrator, Federal Aviation Administration
Chair	**Michael Chasen**, Chief Executive Officer, PrecisionHawk USA, Inc.
Airports and Airport Communities	**Deborah Flint**, Chief Executive Director, Los Angeles World Airports **Marily Mora**, President and Chief Executive Officer, Reno-Tahoe Airport Authority
Labor (controllers, pilots)	**Trish Gilbert**, Executive Vice President, National Air Traffic Controllers Association **Joseph DePete,** President, Air Line Pilots Association (ALPA)
Local Government	**David Greene**, Bureau of Aeronautics Director, Wisconsin Department of Transportation **Wade Troxell**, Mayor of Fort Collins, Colorado, and the National League of Cities **Bob Brock,** Director of Aviation and UAS, Kansas Department of Transportation **Mark Colborn,** Senior Corporal, Dallas Police Department **Michael Leo,** Captain, New York City Fire Department **Steve Ucci,** Senior Deputy Majority Leader, Rhode Island State Assembly
Navigation, Communication, Surveillance, and Air Traffic Management Capability Providers	**George Kirov**, Vice President and General Manager, Commercial UAS Solutions, Harris Corporation **Christopher Penrose**, Senior Vice President of Emerging Devices, President of Internet of Things, AT&T **Mariah Scott,** President, Skyward (a Verizon company)
Research, Development, and Academia	**Robie Samanta Roy**, Vice President of Technology, Lockheed Martin Corporation
Traditional Manned Aviation Operators	**Mark Baker**, President and Chief Executive Officer, Aircraft Owners and Pilots Association **Houston Mills**, Vice President, Flight Operations and Safety, United Parcel Service (UPS) **Matthew Zuccaro**, President and Chief Executive Officer, Helicopter Association International **Lorne Cass,** Vice President, Operations / Industry Affairs, American Airlines (AA) **Vacant**
UAS Hardware Component Manufacturers	**Phil Straub**, Executive Vice President and Managing Director, Aviation Division, Garmin, Ltd. **Vacant**
UAS Manufacturers	**James Burgess**, Chief Executive Officer, Wing (an Alphabet company) **Michael Chasen**, Chief Executive Offier, PrecisionHawk USA Inc. **Gur Kimchi**, Co-Founder and Vice President, Amazon Prime Air **Brendan Schulman**, Vice President of Policy and Legal Affairs, DJI Technology **Michael Sinnett,** Vice President Product Development and Strategy, Boeing Commercial Airplanes
UAS Operators	**Greg Agvent**, Senior Director of National News Technology, CNN **Todd Graetz**, Director, Technology Services, UAS Program, BNSF Railway
UAS Software Application Manufacturers	**Jaz Banga**, Co-Founder and Chief Executive Officer, Airspace Systems, Inc. **Chris Anderson,** Chief Executive Officer, 3DR **Vacant**
Other	**Rich Hanson**, President, Academy of Model Aeronautics **Brian Wynne**, President and Chief Executive Officer, Association for Unmanned Vehicle Systems International

Stakeholder Group	Members
	Thomas Karol, General Counsel, National Association of Mutual Insurance Companies **David Silver,** Vice President for Civil Aviation, Aerospace Industries Association

Proposed Tasking #1: Facility Maps

- Proposed Tasking Question:
    - What are options for better FAA/industry collaboration to update and improve UAS facility map and airspace access for all operators?
- Proposed Tasking Summary
    - Have the DAC provide information about pain points or areas where they feel UAS operations may be possible either given restrictions or during limited times. For example, opening up operations in along streets areas where they are currently prohibited as long as the UAS remain at or below the level of the highest buildings. This would allow drone work for surveys of building facades or streets.
    - Consider possibilities for a layered or dynamic approach to allowing operations to ares where drone operations are currently prohibited, like close to airports based on what airspace is not being utilized by manned aviation given the current active runways.
- Proposed Justification:
    - This tasking will provide ideas and information for creating future facility maps and creating a more dynamic airspace system to accommodate increased traffic, both UAS and traditional manned aviation.

Proposed Tasking #2: BVLOS Challenges

- Proposed Tasking Question:
    - What are the remaining BVLOS challenges that the DAC sees?
- Proposed Tasking Summary:
    - Have the DAC provide information about what they think are the remaining challenges for BVLOS. This can help inform upcoming decisions on what comes after IPP, PSPs, etc. and future FAA work plans.
- Proposed Justification:
    - Information gained from this tasking will help prioritize FAA and resources and work to meet the requirements of expanded BVLOS operations.

Proposed Tasking #3: UTM

- Proposed Tasking Question:
    - Provide industry comment on the UAS Traffic Management (UTM) Concept of operations v2.0.
    - Provide industry prioritization of UTM capabilities.
- Proposed Tasking Summary:

- Have the DAC comment on the UTM ConOps 2.0 concept and provide information about what is most important for them for UTM capabilities. This can help inform FAA priorities and planning as we work toward building UTM capabilities and fully integrating UAS into the National Airspace System.
- Proposed Justification:
  - 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.

Drone Advisory Committee Tasking 1: Remote Identification
**Equipage Subgroup**

Equipage Subgroup Scope
In the absence of Remote ID of UAS and in consideration of security partners' concerns regarding operations over people and other waivered operations under Part 107 in the intervening period, the FAA tasked the DAC to develop recommendations on: What voluntary equipage of remote identification technologies by UAS manufacturers or operators could occur in the short-term prior to a Final Rule for remote identification.

The Equipage Subgroup was formed to provide recommendations to the FAA DAC with team members experience from municipalities, UAS operators, industry and public organizations. Members of the Subgroup had representatives from: Airmap, Ariascend, AT&T, DJI, FPVFC, Intel, National League of Cities, NUAIR, Verizon/Skyward, and Wing. Several members also participated or led the ASTM Committee F38 on Unmanned Aircraft Systems which proved essential to the recommendations.

Voluntary Remote ID Equipage Recommendations
The entire Task 1 group unanimously agreed to recommend the ASTM Remote ID (RID) standard to the DAC as the equipage basis for the voluntary program. The RID standard has a scope that includes various means to perform Remote ID.
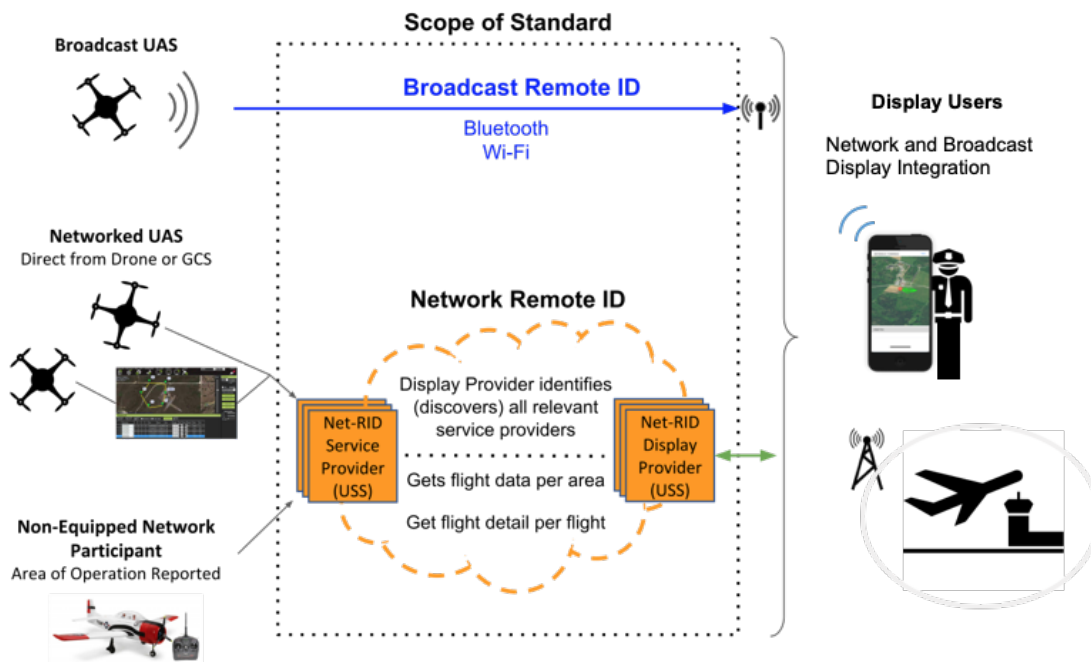
The standard is intended to be a world-wide adaptable standard. Therefore, it is expected that a regulator would add a regulatory "overlay" and Minimal Operational Performance Standard (MOPS) on top of the ASTM standard as part of regulatory implementation. As with other ASTM references by the FAA, this overlay may specify requirements for certain fields and may override other standard requirements.
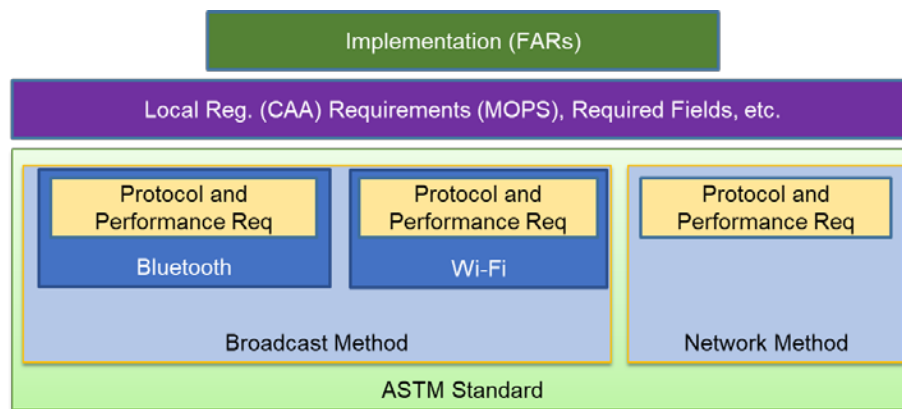
As such, the equipage workgroup, agreed on an "initial MOPS" for the volunteer program as a recommended starting place for the FAA.

Minimum Operational Performance Standard (MOPS) for Voluntary Participation Program:

- To participate in the voluntary Remote ID Program, the UAS must perform Remote ID according to the ASTM Standard using any one of the following methods outlined in the standard:
    - Broadcast: Bluetooth 4 or 5
    - Broadcast: Wi-Fi
    - Network
        - Through a connected UAS, or,
        - Non-Equipped Network Participant
- The method used must function in the area of operation.
- Participants must support all required fields in the ASTM standard. Optional fields may be used at participant's discretion.

Drone Advisory Committee Tasking 1: Remote Identification
Incentives Subgroup

Incentive Subgroup Scope
In the absence of Remote ID of UAS and in consideration of security partners' concerns regarding operations over people and other waivered operations under Part 107 in the intervening period, the FAA tasked the DAC to develop recommendations on: *What types of incentives, if any, could be provided by the FAA for operators who voluntarily use UAS equipped with Remote ID?*

The Incentives Subgroup was formed to answer this question and provide the FAA incentivization concepts that would promote voluntary Remote ID equipage. This subgroup was composed of representatives from: Wing, PrecisionHawk, Rhode Island State Representative, TriVector Services & ASTM, Airmap, DJI, New York City Fire Department, Skyward, Intel, National League of Cities, Air Line Pilots Association, Alliance for Drone Innovation, Wiley Rein LLP, National Press Photographers Association, Boeing, Amazon, Fort Wayne Court System, Fort Wayne Police Department, A-Cam Aerials, Aircraft Owners and Pilots Association, Flyte, and the Dallas Police Department. It is an assumption of this subgroup that safety cases may need to be developed for some of these proposals.

Voluntary Remote ID Equipage Incentives Recommendations

Ease of compliance
- The cost and ease of compliance should be kept at a reasonable level such that commercial and recreational operators see that the benefits outweigh the cost of adopting Remote ID

Incentives Provided by FAA

Contract Preference
- The FAA and other government agencies procuring contracts for UAS services or systems should give preferential treatment to operators or systems that have Remote ID

Waiver Application Preference
- The FAA should prioritize Part 107 waiver applications from operators who have Remote ID and provide accelerated processing of their applications

Satisfy a Component of Waiver, Exemption, or Application Requirement
- Remote ID should help mitigate the security concerns surrounding anonymous flying for operations over people or beyond visual line of sight waivers
- Night operations should be facilitated through a blanket waiver when the operator has Remote ID and operates consistent with the "Operation of Small Unmanned Aircraft Systems Over People" proposed rule requirements that relate to night operations

Acknowledgement of Equipage
To raise awareness and acceptance of Remote ID for consumers, manufacturers and service providers, the FAA should:
- Create an online database of manufacturers who have self-declared Remote ID equipped drones
- Create an online database of self-certified network Remote ID service providers

Airspace Access

- The FAA should partner with security agencies to allow Remote ID equipped UAS operations that are otherwise compliant with FAA rules and regulations in the outer ring (between the 10 and 30 NM ring) of a 14 CFR 91.141 VIP Temporary Flight Restriction (TFR)
- In cooperation with other security agencies, the FAA should grant access to allow Remote ID equipped UAS operations in other airspace areas that are restricted due to security concerns
- FAA should promote voluntary Remote ID equipage via future rulemaking efforts, such as Section 2209, that promote improved airspace access
- In many locations, the LAANC grid squares indicate a 0-foot allowable altitude for automatic LAANC approvals. The FAA should evaluate raising the allowable altitude for automatic LAANC approvals from 0 ft up to 100 ft in those locations for Remote ID equipped UAS operations if such an increase does not create a material decrease in safety for manned aircraft operations

FAA Rebate
- The FAA should provide a financial rebate in collaboration with Remote ID drone manufacturers or software suppliers to offset the cost for compliance, similar to the FAA ADS-B rebate

Monetary Incentive
- Operators who have taken the Part 107 knowledge exam should be eligible for some amount of reimbursement provided they utilize a UAS with Remote ID
- The FAA should provide a discount on FAA UAS Symposium or other FAA events with associated costs
- The FAA should waive future drone registration fees for additional UAS or renewals after the initial application

Other Drivers to Incentivize Equipage

Insurance Incentive
- If Remote ID is seen to decrease risk by insurance providers, a monetary discount should be given from insurance companies to operators utilizing Remote ID

Advertisement on FAA Apps
- FAA applications such as B4UFLY should list incentives available for Remote ID equipped drones

Enabling Local and State Privileges
- Local municipalities and states should consider providing UAS fliers using Remote ID access to additional takeoff and landing locations, and should consider Remote ID as satisfying policies that require notification of takeoff or landing activities
- Working with the FAA, local municipalities and states should consider adjusting their local and state drone restrictions for operators who voluntarily use Remote ID

Partnership with Federal Agencies
- Federal Agencies should provide UAS fliers using Remote ID access to additional takeoff and landing locations as well as allowing flight in "no-drone zones," and should use Remote ID to satisfy policies that require notification of takeoff or landing activities
- Federal Agencies, including the National Park Service, should work collaboratively with the FAA to examine how to designate regular or ad-hoc locations, dates, and times to allow drone takeoff and landing using Remote ID, in locations currently restricted

Industry Recognition

- Industry should establish a marketing sticker or slogan promoting Remote ID, which should be amplified through FAA and industry websites, social media channels, and during the National Drone Awareness Week
- Manufacturers or operators who equip their UAS with Remote ID should be incentivized to do so through positive recognition such as through positive articles or industry rating reviews

FEDERAL AVIATION ADMINISTRATION
DRONE ADVISORY COMMITTEE
UAS SECURITY TASK GROUP
UAS Security Task Group Recommendations and Findings
4 September 2019

BACKGROUND

The Federal Aviation Administration (FAA) commissioned the Drone Advisory Committee (DAC) to serve as a broad-based, long-term advisory entity that provides the FAA with advice on key Unmanned Aircraft Systems (UAS) integration issues by helping to identify challenges and prioritize improvements. The committee helps to create broad support for an overall integration strategy and vision. Membership is comprised of CEO/COO-level executives from a cross-section of stakeholders representing the wide variety of UAS interests, including industry, research and academia, local government and first responders, retail, and technology.

The DAC subsequently established the UAS Security Task Group ("Task Group"). Specifically, the purpose of the Task Group was twofold: first, to identify what currently existing or near term technical solutions at the aircraft or operational limitation/capability level could make it less likely that "careless" and "clueless" operators could operate UAS in ways that could be perceived as posing a safety or security threat; and second, to identify the universe of actions which, if relevant industry stakeholders agreed to do them, would substantially reduce the likelihood of unintentional threatening behavior.

The Task Group used, as a central assumption, the precept that National Airspace System (NAS) security is comprised of three core pillars: airframe security, airspace/operational security, and airmen/operator security. To be clear, it is outside the scope of this Task Group to address UAS operator-based security issues, a subject which the FAA more broadly has accepted the responsibility of addressing. Rather, the Task Group focused on UAS airframe security and airspace and operational security, at large. Within operational security, the group would like to highlight that Unmanned Traffic Management (UTM) systems, in concert with the below recommendations, will be another important method to address airspace and operational security in the future. This distinction is important because, by its very nature, comprehensive UAS ecosystem security necessitates whole-of-system security (i.e., layered security-by-design). Therefore, the Task Group believes UAS operator security is still an essential part of the overall UAS security ecosystem, even if addressing the issue is specifically outside the scope of this Task Group.

Another important observation is that careless and clueless UAS operators are generally a separate demographic from malicious and ill-intentioned UAS operators. Both present challenges to

airspace security at large, but the focus of the Task Group was to address only those operators considered careless and clueless. Finally, it should be noted that increased safety is an overarching goal of industry, local government and first responders, and the FAA, and it is the intent of this group to ensure that efforts to increase security in the NAS enhance safety, as well.

The Task Group met five times. The Task Group drew upon a number of resources, including the members' own expertise and input, the Blue Ribbon Task Force on UAS Mitigation at Airports July 2019 Interim Report, and others. Members of the Task Group included representatives from the following entities: Lockheed Martin Corporation; The Boeing Company; The Moak Group; the Aircraft Owners and Pilots Association; the National League of Cities; the City of Fort Collins, Colorado; the Air Line Pilots Association; Dallas Police Department; Wing; Slipstream Strategies; New York Fire Department; New York Police Department; the Aerospace Industries Association; DJI; American Airlines; McLuskey, McDonald & Hughes, P.A.; PrecisionHawk; and Major League Baseball. The Task Group was led by the CEO of Airspace Systems, Jaz Banga.

FINDINGS

As discussed above, the Task Group strove to focus primarily on industry-led airframe and operational security measures rather than policy recommendations. The Task Group used five broad scenarios to help guide the discussion of technical solutions to the challenges outlined in the group tasking. Toward that end, the Task Group identified six recommendations which are explained in detail below. These recommendations are listed in rank order of those that will make the greatest improvements in security with the lowest amount of effort/change required for implementation. This section will contextualize those recommendations and discuss specific challenges or caveats.

In general, the solutions to most UAS security threats posed by careless and clueless operators are similar across many different threat scenarios. Further, the recommendations of the Task Group will, if implemented, contribute to an overall improved UAS security environment, including nefarious and ill-intentioned UAS operators, despite the fact that security threats posed by such operators are outside the scope of this Task Group. This is not to say that distinct situations do not present unique security challenges. Rather, it is a recognition of the fact that, when discussing airframe and operational security, only so much can be done in the absence of critical enabling technology like remote identification across a diverse industry spanning commercial UAS delivery to model remote-controlled aircraft.

In considering recommendations, it is important to consider the varying levels of technical and production aptitude of UAS Original Equipment Manufacturers (OEMs). At one end of the spectrum, a multi-national UAS manufacturing company with extensive resources and experience may have little to no trouble implementing the technical recommendations of the Task Group, if it is not already doing so on its own accord. On the other hand, a significant number of home-made UAS already exist in the United States, created by hobbyists with varying levels of ability or interest to equip their aircraft per the recommendations below. Further discussion is needed to determine how basic model airplanes with limited flight capability will adhere (or not) to the recommendations outlined in this report. The result of this variety of aircraft builders is a spectrum of UAS compliance and security measures in the NAS in the near-term which, though better than uniform noncompliance, must be addressed to eventually create the integrated blanket of security desired.

Although the Task Group primarily focused on technical, industry-led solutions, the technical recommendations include policy to some extent, or at least reference policy solutions. This is because, in some cases, policy solutions necessarily predate the technical measures the Task Group suggests. For example, though a technical airframe solution might include voluntary equipage of geofencing to prevent flight over critical infrastructure, such a solution cannot be effectively implemented if critical infrastructure databases administered by the federal government are not

kept updated for integration into UAS airframes and flight software. Similarly, additional policy guidance should be considered to define performance-based recommendations, such as distances UAS must stay away from sensitive areas, as well as performance-based distance metrics for restricting UAS from large public gatherings. Articulating these, and other, policy concerns will help make the technical recommendations captured in this report more effective and efficient.

Finally, even when consensus was reached within the Task Group, an entirely different challenge became clear—how to implement the recommendations. This is because the Task Group found the difficulty of implementing the recommendations to increase even as the recommendations themselves became ever clearer. It is not explicitly within the scope of this Task Group to address the methods of implementation the government or relevant stakeholders might employ, nor is implementation the expertise of most Task Group members. Nevertheless, the Task Group became increasingly convinced that the real challenge moving forward would be the implementation of these recommendations rather than their identification.

The Task Group is confident that the recommendations presented below will lead to a safer and more secure NAS for all users – recreational to commercial. This does not mean, however, that these recommendations will address all concerns, or that such a rollout will be free of difficulty or challenges. There is no silver bullet, turnkey solution, or single policy or technology solution that will address the breadth and depth of UAS security issues. The diversity of airframes, purposes, and capabilities within the broad category of UAS means that there will inevitably be unforeseen challenges in maintaining a secure UAS ecosystem. Such challenges should not encourage stakeholders to abandon efforts like those presented below. Instead, it is important to recognize that this report represents a starting point to build upon, not a comprehensive, end-all be-all security plan. It will be the next step to unlocking the potential of UAS to enhance our economy, society, and nation.

The following scenarios assisted the Task Group in determining what, if any, technological solutions could be applied to UAS airframe and/or operations to mitigate the risk identified in the group tasking. The draft scenarios were also presented to the FAA, Federal Bureau of Investigation, and the Department of Defense, and all comments provided by these agencies are incorporated in the final set of scenario language below.

Overview: Each scenario is presented with:
- A "Problem" describing the concern, and
- "Sub-problem" for those scenarios that have additional nuanced concerns

Scenario 1 - Flight in the vicinity of airports
- Problem: UAS operator is flying UAS within controlled airspace of an airport without proper authorization:
    - Sub-problem: operator is flying UAS within an arrival/departure corridor
    - Sub-problem: operator is flying UAS near or over airport property but is not directly interfering with air traffic operations.

Scenario 2 - Flight in the vicinity of Temporary Flight Restrictions (TFR)
- Problem: UAS operator is flying UAS around, and then within, a TFR, without proper authorization:
    - Sub-problem: UAS operator begins to fly over a high-risk facility (e.g., stadium with an on-going sporting event covered under Public Law 108-199).
    - Sub-problem: UAS operator begins to fly in airspace being used by first responder operations.
    - Sub-problem: UAS operator begins to fly in airspace overlying a national security sensitive facility or asset (e.g., military base or vessel).

Scenario 3 - Flight in the vicinity of mass gathering events
- Problem: UAS operator is flying UAS around or over people at mass-gather events, but not in restricted or controlled airspace:
    - Sub-problem: UAS operator begins to "buzz" audience
    - Sub-problem: UAS operator loses control of UAS while flying near a crowd (e.g., due to pilot inexperience, loss of communication link, etc.)

Scenario 4 - Flight in the vicinity of other aircraft
- Problem: UAS operator is flying a UAS dangerously close to other aircraft (e.g., near en-route general aviation or commercial aircraft) without FAA authorization:
    - Sub-problem: <none defined>

Scenario 5 - Compliant UAS flight near critical infrastructure or sensitive law enforcement or emergency response activity.
- Problem: UAS operator is flying UAS within vicinity of critical infrastructure or other security-sensitive location or activity, is compliant with regulations, but displaying what could be considered disturbing behavior very close to facility/activity:
    - Sub-problem: This operation flying in airspace to which security driven flight restrictions have not been implemented and is in compliance with regulations, but is behaving in ways causing concern by security personnel (e.g., repetitious flight adjacent to security fence lines at a fixed site)
    - Sub-problem: This operation flying in airspace to which security driven flight restrictions have not been implemented and is in compliance with regulations, but is behaving in ways causing safety or security concern to Law enforcement or first responders (e.g., following a ground convoy transporting local law enforcement officers carrying out a tactical movement)
    - Sub-problem: are there differences in mitigation approaches if the facility/asset is covered by a TFR versus not covered by a TFR, presuming all suspicious activity is occurring outside any flight restricted area? Attendance stadium events under automatic threshold of 30,000 persons seating capacity.
    - Sub-problem: VIP security event

I.   OEMs should equip their UAS with geofencing[1] capabilities

Rationale: Geofencing is one of the most immediate and scalable technology solutions that can be quickly fielded to help reduce the security risks posed by careless and clueless UAS operators.

- Encourage the standardization of voluntary OEM geofencing around permanent critical infrastructure and fixed assets.
- Encourage OEMs to use the most up-to-date critical infrastructure information in UAS software (*see Recommendation III*).
- Encourage industry-led geofencing compliance, similar to AUVSI's Trusted Operator Program.
- The federal government should consider contracting with geofencing-compliant systems.
- It is critical to note, ***many of the following recommendations require geofencing or build on safety controls implemented by geofencing***.

II.   The federal government should make available a consolidated, standardized, and up-to-date database for critical infrastructure and TFRs issued, that are machine processable

Rationale: Industry and operators have consistently faced challenges staying up to date on critical infrastructure locations due to the general pace of government, as well as differing data sources. Additionally, with the exception of Recommendations IV and VI, the success of the Task Group's recommendations require industry's access to a well maintained, easily understandable, and accessible database for critical infrastructure and TFRs.

- TFRs are issued with varying degrees of uniformity, within and across the FAA and Department of Interior databases, making it challenging for industry to accurately and automatically interpret and use TFR contents.
- FAA should require periodic and transparent updating of such databases to instill public and industry confidence in the critical infrastructure and TFR data.
- To lower implementation cost and difficulty, government database containing this information should be made available online with an application program interface (API) designed to easily extract the data.

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

Rationale: Clueless/careless operators often do not understand or know that they may be operating near sensitive facilities, areas, etc. Providing some form of pop-up alert

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[1] Geofencing is defined in this report as some form of automated flight limitation that prevents the UAS from entering a pre-defined area (e.g. airspace around a sensitive facility/location)

(e.g. on the user display being used to fly the UAS) will give the operator situational awareness of the area of operations the UAS is about to enter and allow them to take corrective action.

- FAA should work with Industry to standardize performance-based distances from sensitive flight areas at which the UAS operator should receive an alert
- For operators flying a predetermined route that takes the geofence into account (such as one generated by a UTM system), the operator should be alerted if the UAS is off course and approaching a sensitive flight area, TFR, etc.
- OEMs should assist operators in ensuring the latest critical infrastructure/TFR database (*see Recommendation II*) is loaded into the UAS software before flight. Many UAS utilize smartphone or tablet apps for flight controls, so a pop-up alert, based on the latest critical infrastructure/TFR database on the controlling device, would be no different from the notification of an incoming text message.

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

Rationale: Allowing UAS operators to receive ADS-B transmissions would alert operators of nearby manned aircraft flight, allowing the UAS operator to take action to avoid a conflict. The addition of an Airborne Collision Avoidance System (ACAS) or UAS-based, ADS-B In conflict resolution recommendation system would provide the UAS operator with recommendations for resolving airborne conflicts. Note that the conflict resolution notifications should primarily be for the UAS operator (not the manned aircraft operator).

- Even outside the airport environment, ADS-B receivers would provide situational awareness for careless and clueless pilots operating within the broader NAS.
- Additionally, voluntary equipage of ACAS or an ACAS-like system goes beyond simply knowing the location of an airborne threat but provides the UAS operator with a recommended evasive action to resolve the conflict. A UAS operator without this type of warning might make a flight control input that increases the potential for a collision.

V. 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.

Rationale: UAS automated flight performance limitations represent a less extreme version of geofencing—whereas with geofencing, a UAS would be unable to fly in a certain area, with UAS flight performance limitations the UAS would still have the

capability to fly in such areas, it would simply have decreased capabilities when doing so.

- FAA and industry must collaborate to conduct research to ensure this security recommendation does not compromise safety. Care must be taken that the automated flight performance limitations do not prevent the UAS operator from operating the UAS safely, including for contingency actions, such as evading objects while in flight (e.g., manned aircraft, a structure, etc.).
- As a UAS approaches a TFR, covered asset, or some other sensitive flight area, using automated flight performance limitations serves two purposes:
  - First, it can limit a clueless/careless operator's ability to unknowingly engage in dangerous or threatening behavior by impairing the UAS's capabilities.
  - Second, it can inform a clueless/careless operator of the UAS's location in an area where it is not supposed to be.
- Some OEMs already offer automated flight performance limitations in the form of "beginner mode."
- This recommendation is only possible with a UAS software modification similar to geofencing, combining both the geolocation abilities of a UAS with updated information on sensitive flight areas.

VI.   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.

Rationale: Providing careless and clueless operators with detect and avoid technology would likely further reduce the potential harm such operators can cause.

- UAS with detect and avoid technology will allow for safer interaction between UAS and other objects in the NAS, be it other UAS or manned aircraft flight.

END

FEDERAL AVIATION ADMINISTRATION
DRONE ADVISORY COMMITTEE
Task Group 3 – 107 Waiver Application Process
Task Group 3 Findings and Recommendations
4 September 2019

BACKGROUND

The Federal Aviation Administration (FAA) commissioned the Drone Advisory Committee (DAC) to serve as a broad-based, long-term advisory entity that provides the FAA with advice on key Unmanned Aircraft Systems (UAS) integration issues by helping to identify challenges and prioritize improvements. The committee helps to create broad support for an overall integration strategy and vision. Membership is comprised of CEO/COO-level executives from a cross-section of stakeholders representing the wide variety of UAS interests, including industry, research and academia, retail, and technology.

TASKING

The FAA tasked members of the FAA DAC Task Group 3 to provide recommendations on improvements to the processing of Part 107 applications. The Part 107 waiver process is known by the UAS community to be cumbersome, inconsistent, and non-conforming to the evolving nature of waiver requests. Members of the Task Group personally experienced inconsistency in waiver application processing including arbitrary approval and denial of identical applications with the same safety case justification. For these reasons the Task Group decided to collect data to best inform recommended improvements to the existing Part 107 application or waiver process. The Task Group developed a set of questions submitted to the FAA for response in addition to a survey also generated by the Task Group.

PROCESS

The Task Group ultimately executed three primary work products to reach the below recommendations. A subset of the Task Group received a baseline briefing from the FAA on the process of analyzing Part 107 waivers requests. From that briefing the Task Group developed a question set designed to better understand specific aspects of the internal processing of the Part 107 waivers. The question set consisted of seven questions which the FAA responded to in writing and the results of which are provided as Appendix I below.

Second, the Task Group developed a survey to collect data from appropriate stakeholders with experience navigating the application process. This survey was distributed to UAS pilot communities through social media channels, AUVSI chapters, and other UAS pilot community communication methods. The survey consisted of 24 questions to gauge the experience of the UAS Community and their experiences in the Part 107 waiver process. Most questions were either check the box, or yes or no answers. Three questions in the survey allowed respondents to enter written comments. 632 total responses were received and included many interesting and informed comments. The results of which are provided in Appendix IV below.

FAA QUESTION SET

Seven questions in total were posed to the FAA in writing with discussion points accompanying each question to provide additional context. The questions and responses are summarized below.

-Questions 1and 2 ask about specific guide materials and training provided to the analysts with the intent of understanding what protocols are in place to maintain consistency of waiver processing. The FAA's response included general discussion already known or assumed regarding the waiver process, general training of analysts, and documents made available to analysts.

-Question 3 inquires about the lack of appeals process for applicants who receive a denial determination. The FAA's response does not address the actual question and instead describes an internal appeals process briefly mentioning the applicant can resubmit their application or request more information if denied.

-Question 4 inquires if all waiver applications originate in Drone Zone, even complex Part 135 or 121 operation. The FAA's response states that all Part 107 waivers originate within Drone Zone and all other waivers are routed through the appropriate process.

-Question 5 inquires how the FAA is utilizing the voluntary pilot education program, WINGS, in the evaluation of applications. The FAA is considering using the WINGS program to satisfy certain risk mitigation measures when determining whether to grant a waiver application.

-Question 6 inquires about the determination of operator competency in the evaluation of a waiver application. The FAA's response explains that the operator competency is determined based on the materials submitted with the application and that additional questions may be asked of the applicant to determine their competency level.

-Question 7 inquires about the impact of posting representative waiver applications on the FAA website to assist applicants in application process. The FAA states that the application for waivers under Part 107 has increased since posting the sample applications.

SURVEY RESULTS - FINDINGS

Application Process

Seven questions were worded in a way to gauge respondent feelings and experiences about the Waiver Application Process:

-The first question (Q1) asked respondents the type of waiver they applied for. The majority of waivers requested were Part 107.29 Daylight Waiver exemptions (79%).

-Question 2 asked what resources were reviewed during the waiver application preparation. 307 respondents stated they used representative waiver examples on the FAA website. But it was clear from the responses that multiple sources (including past experiences) were used to prepare applications; such as FAA webinars, FAA presentations, competitive company filings, Internet searches and sources including YouTube videos and corporate webinars. Drone U webinars were mentioned often in the comments.

Q3 - 60% of respondents stated they had their waiver(s) approved.

Q4 – Did the FAA ask for additional information (called a Request For Information, or RFI)? 60% said they did not receive an RFI from the FAA, which validated Q3 above.

Q5 – If respondents received RFIs, how long did it take for the FAA to send one? Less than one week, less than a month, less than 2 months, and more than two months were the choices. The split was nearly even across all four timeframes.

Q6 - The 40% who did get an RFI did not find the request helpful for providing more information.

Q7 – Most respondents did not receive multiple RFIs. Only 45 indicated they received 2, and 16 indicated they received 3. Only 10 applicants received more than 3 RFIs.

Rejections

Q8 - For the 40% who were rejected, it was evenly split in agreement/disagreement that the FAA provided sufficient information on missing or deficient elements.

Q9 - Respondents were split 50/50 on their understanding of the FAA's rejection letter.

Q10 and Q11 - Overwhelmingly, respondents felt the rejection letters were not helpful, but conversely, they were split 50/50 on whether they agreed or disagreed with the FAA's explanation of the rejection.

The Waiver Process

Q12 and Q13 – Less than 5% of respondents hired a professional service to handle their application. Those who did hire a service did not believe that it influenced the outcome.

Q14 and Q15 – When asked if respondents that received multiple waivers experienced a consistent process, 60% answered in the affirmative. Most applicants received a final determination on their application in one month or less (36%). Only 10% took more than 5 months.

Q16 – Applicants were evenly split in their satisfaction with the status updates provided by the FAA throughout the process.

Q17 and Q18 – 60% of respondents relied on industry standards in writing their waiver applications. Respondents were allowed to choose between eight (8) different industry standards, or select that they did not reference any standard. The FAA and ICAO standards were used the most.

Q19 thru 24 – Questions framed to gauge the demographics of the respondents, and for Task Group 3 internal discussions.

Written Comments

-Many respondents expressed their general displeasure with the FAA's Part 107 waiver process. Some of the written complaints receive had valid arguments - but some not so valid.

-Despite many negative comments about the Part 107 operational waiver process, many respondents seem happy with the FAA's process for gaining approval for flying in controlled airspace.

-Many comments reflected that respondents never got their waivers approved, nor did they receive any comments at all back from the FAA, thus wondering if their applications were lost.

TASK GROUP 3 MEMBERS

Members of the Task Group 3 convened 5 times and included representatives from the following entities: Air Line Pilots Association (ALPA), Association for Unmanned Vehicle Systems International (AUVSI), CNN, City of Orlando, Dallas Police Department, L3Harris Corporation, National Association of Mutual Insurance Companies (NAMIC), Drone U, Praxis Aerospace Concepts International (PACI), UPS, ASTM, Skyward, Wing, Lockheed Martin, Cherokee National Technologies, Pierce Aerospace, and PrecisionHawk. The Task Group was led by the President and CEO of AUVSI and DAC member, Brian Wynne.

RECOMMENDATIONS

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1.   Expiring waivers should auto-renew unless there is a compliance issue or change in regulations to reduce administrative burden and limit re-submissions. If this is not possible, then only require entry of renewal dates or other changes, not re-entry of the entire waiver application. Rationale: Reduce administrative burden.

2.   Modify Drone Zone to allow the operator to update non consequential information without having to file an application for an amendment to their waiver, i.e. change responsible person, office address etc.. Rationale: Avoid duplication and reduce administrative burden.

3.   FAA should create a checklist inventorying appropriate examples of satisfying safety cases for complex waiver approvals, like BVLOS, which is then used to provide constructive feedback to those applicants that do not meet the required thresholds pointing the applicant to specific examples that would have satisfied the requirement. Additionally, the FAA should consider creating a testing procedure for 107.29, 107.39, 107.41 (above UASFM AGL), 107.31. 107.31 that should be graduated (< 2SM w. clear view of airspace, >2SM or restricted view of airspace). By providing an online test and guidelines for automatic waiver approvals, Waiver Office Personnel waiver quantity and work load would be significantly improved.

4. **a**. The FAA should consider a streamlined automated approval for those applicants trained by an 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. Rationale: Avoids duplication, promotes consistency within the FAA, and reduces administrative burden for processing waiver.

b. The FAA should consider automated approval for applicants who leverage the work of programs in UAST, TOP and industry standards etc., and give operators credit for undergoing audits, certification and other training beyond part 107 compliance. This normalizes the use of consensus-based industry standards (See attached table) as mandated by National Technology Transfer and Advancement Act (NTTAA; United States Public Law 104-113). Rationale: reduce administrative burden and compliance with USPL 104-113.

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. Current Drone Zone processes actively discourage the shared use of templates or flow-down procedures. Rationale: Reduce administrative burden.

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. There is currently no effective way to pose questions or communicate with Part 107 analysts other than the organizational email. Rationale: Increases transparency and accountability.

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. Rationale: This training already exists and would serve to reduce inconsistencies in waiver evaluation.

<div align="center">END</div>

Appendix I

1. **Is there an internal or unpublished standardized job guide (or similar document) that provides reviewers guidance for implementing Order 8900.1 CHG 625, Volume 16 Unmanned Aircraft Systems, Chapter 4 Operational Requirements and Approval, Section 3 Issue a Certificate of Waiver to the Provisions of Part 107?**

   The waiver intake process is standardized in DroneZone. Once submitted, waiver applications are received in DroneZone by the FAA, assigned a work flow, evaluated by an analyst, recommendation reviewed, disapproval letter or waiver forwarded for management signature, and applicant notified through an email sent by DroneZone automation.

   Waiver analysts are provided with information to assist them in analyzing waiver applications. This information includes general waiver guidance published in the Flight Standards Information Management System FAA Order 8900.1; access to previously granted waivers and safety cases; meetings to standardize responses and waiver application review; current UAS research; and templates to standardize external communications with waiver applicants. The waiver review process is not automated, as analysts must review each waiver application to determine whether the application fulfills the standard codified at 14 CFR § 107.200. As described in the FAA's guidance concerning applications for waiver and in § 107.200, the FAA evaluates each waiver request to determine whether it fulfills the requisite level of safety. As the *Operation and Certification of Small Unmanned Aircraft Systems* final rule described, the waiver evaluation process generally does not lend itself to automation. In that final rule, the FAA stated as follows:

   > The FAA expects that the amount of data and analysis required as part of the application will be proportional to the specific relief that is requested. Similarly, the FAA anticipates that the time required for it to make a determination regarding waiver requests will vary based on the complexity of the request. For example, a request for a major deviation from part 107 for an operation that takes place in a congested metropolitan area with heavy air traffic will likely require significantly more data and analysis than a request for a minor deviation for an operation that takes place in a sparsely populated area with minimal air traffic. If a certificate of waiver is granted, that certificate may include

additional conditions and limitations designed to ensure that the small UAS operation can be conducted safely.
81 FR 42064, 42072 (June 28, 2016).

As noted above, the FAA issues waivers in accordance with 14 CFR § 107.200, which requires the FAA to evaluate applications for waiver to determine whether (1) the application fully describes the proposed operation, and (2) the operation can be safely conducted. Altering that regulation would involve the rulemaking procedure codified at 5 U.S.C. 553.

Permitting operations that are currently prohibited by regulation, in the absence of reviewing the proposed operation in accordance with the standard that applies to waivers at § 107.200, would involve changing the regulation itself. The FAA adheres to this standard when evaluating requests for waivers.

When answering, please consider the following discussion points:

a. Is the waiver intake process standardized?
b. What is the internal process map or steps that received waivers are processed?
c. Is there an existing rubric that the reviewers use to evaluate waiver requests?
d. If the FAA uses a rubric to evaluate waiver requests, can that be released to the public?
e. Is that rubric automated in software or able to be automated in software?
f. Does the FAA have an internal Service Level Agreement for responses?
g. Can the waiver process be changed without going through the NPRM process?
h. What is the official method for changing the way waivers are granted?
i. Is there a procedural system in place that we can use to build off of in order to assist the FAA?
j. Is the FAA willing to replace the waiver application system with a "check box" type system that allows for some waivers to be easily granted? i.e. a list of what to do in order to fly at night, over people, BVLOS at limited distance (2 miles?), altitude to "X"AGL, visibility minimums with "X" distance from RP?

2. **Does the FAA require Part 107 waiver inspectors to attend a structured program similar to the one mandated by AIR-900 Enterprise Operations Division that provides FAA ASIs and UAS DARs the background, key policies, and procedures necessary to issue special airworthiness certificates in the experimental category to unmanned aircraft systems, optionally piloted aircraft, and aircraft flown as either UAS or OPA?**

FAA analysts are trained and qualified Aviation Safety Inspectors who have received training in waiver policy, evaluation and issuance. Prior to processing specific waiver applications, analysts undergo specific training on using DroneZone and receive training on the job until able to evaluate waiver applications independently using critical thinking skills and interdependently with other subject matter experts to reach consistent results. They provide recommendations on approval or disapproval to FAA officials who are authorized to issue decisions.

For the purpose of responding to this inquiry of how inspectors ensure consistency, the FAA presumes the term "new type of waiver" means an application for waiver that presents precedent setting issues or complexities the FAA has not previously considered. In this regard, FAA's Flight Standards Service ensures experts and agency leadership are informed of decisions on these type of waiver applications. Flight Standards informs experts in other offices of Flight Standards, and in lines of business/staff offices such as the Office of Chief Counsel, UAS Integration Office, Aircraft Certification Service, and Air Traffic Organization, to ensure the appropriate leaders and staff are aware of these types of waiver decisions.

When answering, please consider the following discussion points:

    a. What training is provided to waiver inspectors on how to assess waivers?
    b. Is there standard criteria the FAA uses for the selection of the reviewers?
    c. How do inspectors ensure consistency across assessments of similar applications?
    d. Once a new type of waiver has been approved, is it reviewed by or explained to all other inspectors?
    e. How do analysts stay educated about the learnings from research programs like Pathfinder, UAS IPP and PSPs?
    f. How do they incorporate this research into their waiver assessment process?

3. **Why does the current waiver process, which is subjective and evolving, lack a method for applicants to seek redress or appeal after receiving a denial letter?**
Waiver analysts are provided with information to assist them in analyzing waiver applications including waiver guidance published in the Flight Standards Information Management System, FAA Order 8900.1, access to previously granted waivers and safety cases, meetings to standardize responses and waiver application review, briefings and decisions on risk acceptance by the agencies executives, access to UAS research, templates to standardize external communications with waiver applicants and briefings and meetings on UAS programs including Partnership for Safety Program and Integration Pilot Program. Individual waiver reviewers do not have authority or delegated authority to set new or different risk acceptance levels for the Agency. If an internal disagreement

arises between Inspectors who review an application, there is an internal process which includes the ability to present the application to the Agency's management and/or executive leadership to make the final approval/disapproval decision.

Applicants who receive a denial in response to their application for waiver may request more information from the FAA concerning the rationale for the denial. In providing relevant information in response to these requests, the FAA reminds applicants they may submit a new application for waiver.

When answering, please consider the following discussion points:

a. How do inspectors ensure consistency across assessments of similar applications?
b. How much delegation of authority or discretion do those reviewers have?
c. If there is a difference of opinion on whether an application should be approved by two inspectors who review it, how is this difference of opinion resolved?

4. **Are all UAS operational waiver applications, even those submitted for Part 135 or 121 operations, initially started using Drone Zone, or are those (because of their complexity) done using a different process that is not described in Order 8900.1 CHG 625, Volume 16 Unmanned Aircraft Systems, Chapter 4 Operational Requirements And Approval, Section 3 Issue a Certificate of Waiver to the Provisions of Part 107?**

DroneZone is currently applicable only for operational waiver applications that would occur under the rules prescribed in 14 CFR Part 107. Operational waiver applications under 107 must be submitted via DroneZone. Requests outside of 107 are routed through those appropriate processes (e.g. 7711-2, exemption requests, CAPS, etc...)

When answering, please consider the following discussion points:

a. How do inspectors ensure consistency across assessments of similar applications?
b. Once a new type of waiver has been approved, is it reviewed by or explained to all other inspectors?
c. How do they incorporate this research into their waiver assessment process?

5. **To address accident causal factors associated with common pilot errors, lack of proficiency, and faulty knowledge, the FAA developed a draft voluntary pilot education and proficiency program (i.e., WINGS) and made it available via the Internet to all pilots at all certificate levels. Given the success of the WINGS Pilot Proficiency Program, and its expansion into Aviation Maintenance Technicians, how**

has the FAA taken advantage of such education and proficiency programs in the evaluation of applications?

The FAA is considering implementing WINGS or programs similar to WINGS for pilots who hold, or seek to hold, a remote pilot certificate. Once completed, the agency may consider the completion of certain WINGS or similar courses as risk mitigation measures that the FAA would consider in determining whether to grant a waiver application. The FAA may also consider using other programs once the FAA develops appropriate standards.

When answering, please consider the following discussion points:

a. Has the FAA considered implementing a WINGS Remote Pilot Proficiency Program to address the same accident causal factors within UAS operations, including, but not limited to, reducing the government burden on training requirements imposed by the published Waiver Safety Explanation Guidelines for Part 107 Waiver Applications (ie, knowledge to recognize and overcome visual illusions caused by darkness and understand physiological conditions which may degrade night vision, qualifications for Operations-over-People, etc)?

b. If the answer to the previous question is yes, what is the timeframe for implementing this program on the WINGS web portal?

c. Would the FAA consider using other available safety and compliance programs, (such as the Trusted Operator Program), or other sufficient safety programs, as an acceptable means of compliance or vehicle to address the issues of remote pilot proficiency, knowledge and competency gaps.

6. **In the waiver process briefing, the waiver team discussed the importance of assessing operator competency when reviewing applications. As 14 CFR Part 119 specifically excludes both Part 107 operations (Part 119.1(e)(11)) and the majority of aerial work (14 CFR 119.1(e)(4)), what minimum standards are Part 107 waiver inspectors using to evaluate operator competency for specific types of operations and how are those requirements being made available to applicants?**

Each application should provide a safety case that considers the airman, the aircraft, and the environment. It is incumbent on the applicant to demonstrate in their waiver application that any person participating in the operation has obtained the necessary skills, knowledge, and experience to perform safely the operation the applicant proposes to conduct. Inspectors who evaluate requests for waiver first assess the level of risk the proposed operations will entail. Inspectors then determine whether operator competency

is a key component in mitigating the overall level of risk especially to the extent that the proposed operations would require specialized skills. In evaluating applications for waiver the FAA takes note of statements in applications that suggest the applicant lacks basic knowledge of the requirements of part 107 The FAA also determines based on a review of the application and any supporting documents whether the application indicates the applicant does not understand risk mitigation strategies or appreciate the importance of risk mitigations measures. In such cases, the FAA might ask further questions of an applicant to determine the application is not eligible for an approval based on a lack of adequate information or the lack of sufficient risk mitigation measures.

As the above question correctly notes, 14 CFR part 107 does not apply to air carrier operations. See 14 CFR 107.1(b)(1). As such, part 107 operations do not occur in accordance with any type of operator certificate. Therefore, the FAA does not use standards listed in part 119 and 8900.1 guidance associated with part 119 for evaluations of waiver applications.

When answering, please consider the following discussion points:

a. Once a specific type of application is approved, are all future applications that look the same approved? If yes, what is done to ensure future like applications are approved? If not, what other factors are considered in determining a different outcome?

7. **The FAA has posted several representative waiver applications on its website to assist applicants in understanding what is required to receive an approval. Has this positively impacted the metrics of approved applications?**

Since the posting of the waiver applications in accordance with Section 352 of the FAA Reauthorization Act of 2018, Public Law 115-254 (Oct. 5, 2018), the approval rate of applications for waiver under part 107 has increased. We are unable to determine the source of the increase. Some portion of the increase could be due to the FAA posting exemplar applications, while other portions of the increase could be the result of education and outreach efforts performed by the FAA during the same timeframe. Since the implementation of DroneZone, 14% of all waiver applications have received a request for additional information; of those applications, 55% have resulted in an approval. Of all applications submitted in DroneZone, approximately 70% contain minimal or no risk mitigation measures for the FAA to evaluate in the waiver application or pursue further information with an RFI..

For analysis purposes amended waiver applications are effectively processed as if they are new applications. The previously issued waiver number is rescinded instead of amended. FAA doesn't believe tracking amendments in this fashion skews processing data to the extent necessary to change the system.

When answering, please consider the following discussion points:

a. What percentage of applications receive an RFI?
b. Of the applications that receive an RFI, what percentage are approved?
c. Why did the FAA start treating amendments (i.e, Responsible Person name or other change) as a new waiver and stop issuing amended waivers (i.e., numbered as 107W-2019-01234 A)? Doesn't this skew the accuracy of the reported processing metric?

Figure 1. *Total Waivers Procssed.* *(adapted from FAA presentation "The Good The Bad and the Ugly").*
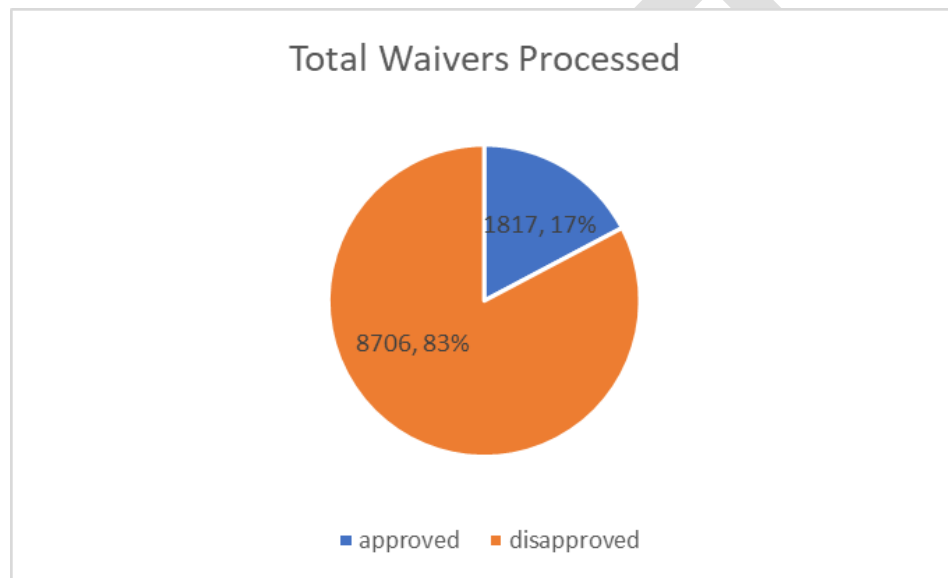
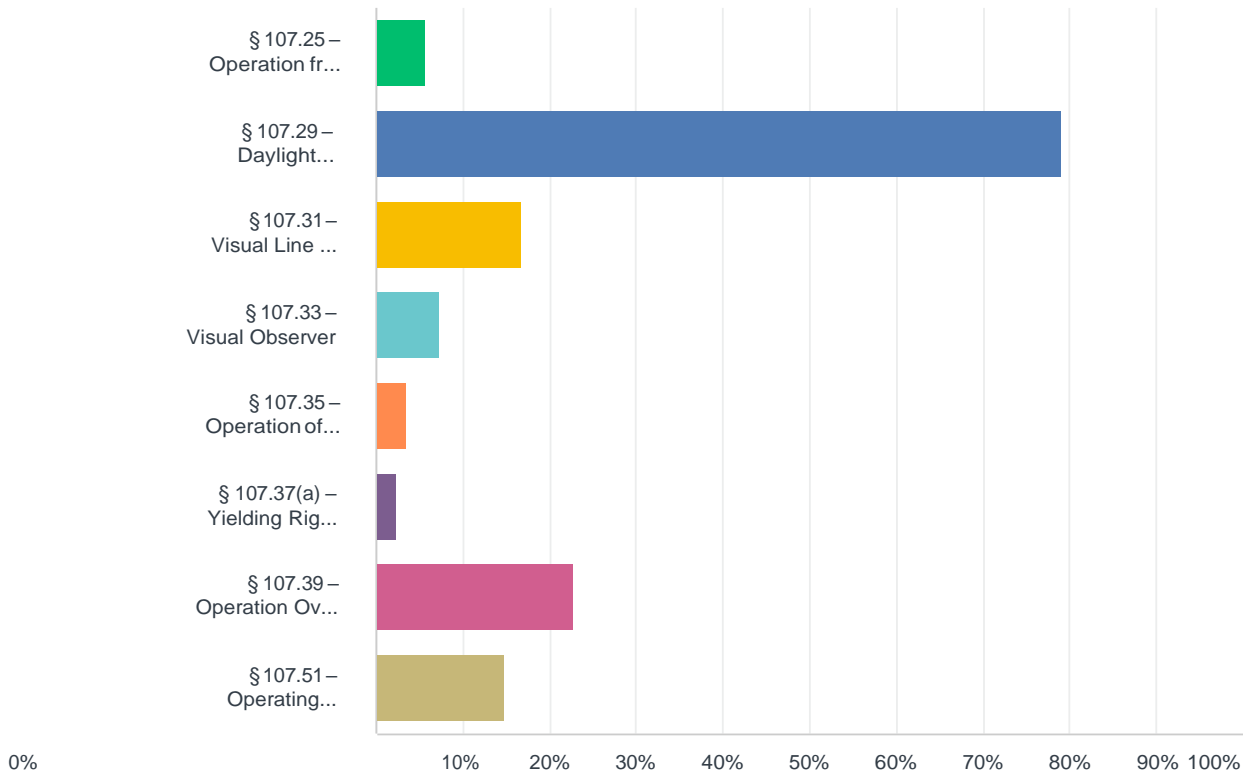|	14 CFR Part 107 (Baseline)	§ 107.25 – Operation from a Moving Vehicle or Aircraft	§ 107.29 – Daylight Operations	§ 107.31 – Visual Line of Sight Aircraft Operation	§ 107.33 – Visual Observer	§ 107.35 – Operation of Multiple Small UAS	§ 107.37(a) – Yielding Right of Way	§ 107.39 – Operation Over People	§ 107.51 – Operating limitations for Small Unmanned Aircraft
Unmanned Aircraft Flight Manual	F2908-18	F2908-18	F2908-18	F2908-18	F2908-18	F2908-18	F2908-18	F2908-18	F2908-18
Remote Pilot Training Training and the Development of Training Manuals for the UAS Operator	F3266-18	F3266-18, F3330-18	F3266-18, F3330-18	F3266-18, F3330-18	F3266-18, F3330-18	F3266-18, F3330-18	F3266-18, F3330-18	F3266-18, F3330-18	F3266-18, F3330-18
Maintenance and Inspection Procedures/Manual	F3366-19	F3366-19	F3366-19	F3366-19	F3366-19	F3366-19	F3366-19	F3366-19	F3366-19
Design, Construction, and Verification of Unmanned Aircraft Systems (UAS)	F2910-14	F3298-19	F3298-19	F3298-19, F3201-16 or F3269-17	F3298-19	F3298-19, F3201-16 or F3269-17	F3298-19	F3298-19	F3298-19
Small Unmanned Aircraft System (sUAS) Parachutes	N/A							F3322-18	
Quality Assurance	N/A	F3003-14, F3364-19, F3365-19	F3003-14	F3003-14, F3364-19, F3365-19	F3003-14	F3003-14, F3364-19, F3365-19	F3003-14, F3364-19	F3003-14, F3364-19, F3365-19	F3003-14, F3364-19
Production Acceptance Tests	N/A			F2911-14e1		F2911-14e1			F2911-14e1
Continued Airworthiness	F2909-14	F2909-14	F2909-14	F2909-14	F2909-14	F2909-14	F2909-14	F2909-14	F2909-14
Manufacturer's Assembly Instructions [Kit builders only]	F2908-18							F3366-19	
Operation Specific				F3196	F3196				

ASTM STANDARDS

F2851-10(2018) Standard Practice for UAS Registration and Marking (Excluding Small Unmanned Aircraft Systems)
F2910-14 Standard Specification for Design and Construction of a Small Unmanned Aircraft System (sUAS)
F2911-14e1 Standard Practice for Production Acceptance of Small Unmanned Aircraft System (sUAS)
F3002-14a Standard Specification for Design of the Command and Control System for Small Unmanned Aircraft Systems (sUAS)
    See also WK49440 proposed revision
F3003-14 Standard Specification for Quality Assurance of a Small Unmanned Aircraft System (sUAS)
F3005-14a Standard Specification for Batteries for Use in Small Unmanned Aircraft Systems (sUAS)
    See also WK66135 proposed revision
F3201-16 Standard Practice for Ensuring Dependability of Software Used in Unmanned Aircraft Systems (UAS)
F3269-17 Standard Practice for Methods to Safely Bound Flight Behavior of Unmanned Aircraft Systems Containing Complex Functions
    See also WK65056 proposed revision
F3298-18 Standard Specification for Design, Construction, and Verification of Fixed-Wing Unmanned Aircraft Systems (UAS)
    See also WK63678 proposed revision
    See also WK64619 proposed revision
F3322-18 Standard Specification for Small Unmanned Aircraft System (sUAS) Parachutes
F2849-10(2019) Standard Practice for Handling of Unmanned Aircraft Systems at Divert Airfields
F2909-14 Standard Practice for Maintenance and Continued Airworthiness of Small Unmanned Aircraft Systems (sUAS)
    See also WK63991 proposed revision
F3178-16 Standard Practice for Operational Risk Assessment of Small Unmanned Aircraft Systems (sUAS)
F3196-18 Standard Practice for Seeking Approval for Beyond Visual Line of Sight (BVLOS) Small Unmanned Aircraft System (sUAS) Operations
    See also WK60746 proposed revision
    See also WK62344 proposed revision
F2908-18 Standard Specification for Unmanned Aircraft Flight Manual (UFM) for an Unmanned Aircraft System (UAS)
F3266-18 Standard Guide for Training for Remote Pilot in Command of Unmanned Aircraft Systems (UAS) Endorsement
F3330-18 Standard Specification for Training and the Development of Training Manuals for the UAS Operator
F3365-19 Standard Practice for Compliance Audits to ASTM Standards on Unmanned Aircraft Systems
WK61764 Training for Public Safety Remote Pilot of Unmanned Aircraft Systems (UAS) Endorsement
WK62416 Standard Terminology for Unmanned Aircraft Systems
WK60659 UAS Maintenance Technician Qualification
WK61763 Training for Remote Pilot Instructor (RPI) of Unmanned Aircraft Systems (UAS) Endorsement
F3364-19 for UAS Operator Independent Audit Programs
F3365-19 Compliance Audits to ASTM Standards on Unmanned Aircraft Systems
WK62734 Specification for the Development of Maintenance Manual for Lightweight UAS
WK62741 Training UAS Visual Observers
F3366-19 General Maintenance Manual (GMM) for a Small Unmanned Aircraft System (sUAS)
WK62744 General Operations Manual for Professional Operator of Light Unmanned Aircraft Systems (UAS)
WK63407 Required Product Information to be Provided with a Small Unmanned Aircraft System
WK65042 Operation Over People
WK59317 Vertiport Design
WK65041 UAS Remote ID and Tracking
WK63418 Service provided under UAS Traffic Management (UTM)
WK56338 Safety of Unmanned Aircraft Systems for Flying Over People
WK60937 Design of Fuel Cells for Use in Unmanned Aircraft Systems (UAS)
WK62668 Detect and Avoid Performance Requirements
WK62669 Detect and Avoid
WK62670 Large UAS Design and Construction
WK67357 Light Unmanned Aircraft System Manufacturers Quality Assurance System

Online Link to Results: https://www.surveymonkey.com/results/SM-BS3SZQFY7/

Q1 What waivered applications have you applied for?

Answered: 535   Skipped: 97

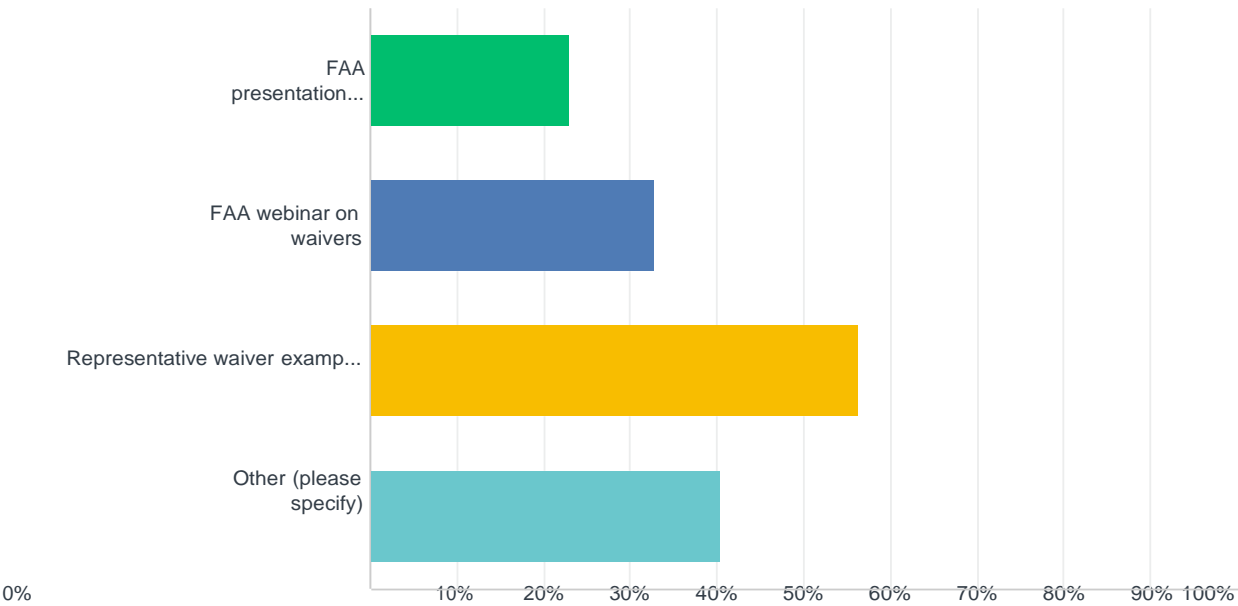| ANSWER CHOICES	RESPONSES

§ 107.25 – Operation from a Moving Vehicle or Aircraft	5.61%	30
§ 107.29 – Daylight Operations	79.07%	423
§ 107.31 – Visual Line of Sight Aircraft Operation	16.64%	89
§ 107.33 – Visual Observer	7.29%	39
§ 107.35 – Operation of Multiple Small UAS	3.55%	19
§ 107.37(a) – Yielding Right of Way	2.24%	12
§ 107.39 – Operation Over People	22.80%	122
§ 107.51 – Operating limitations for Small Unmanned Aircraft	14.95%	80

Total Respondents: 535

Q2 In preparing your waiver application, what resources did you review?

Answered: 550   Skipped: 82
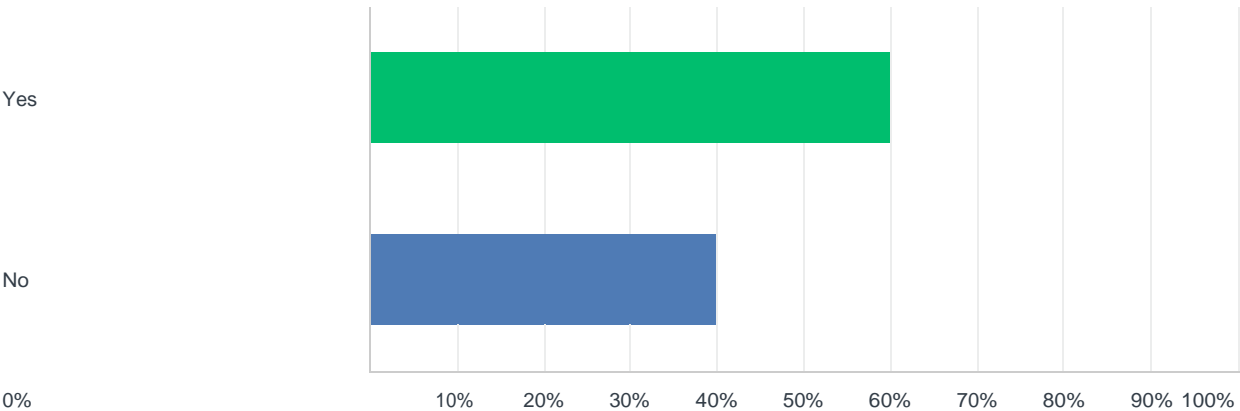

ANSWER CHOICES	RESPONSES	
FAA presentation on waivers at the FAA Symposium	23.09%	127
FAA webinar on waivers	32.91%	181
Representative waiver examples on FAA website	56.18%	309
Other (please specify)	40.36%	222
Total Respondents: 550		

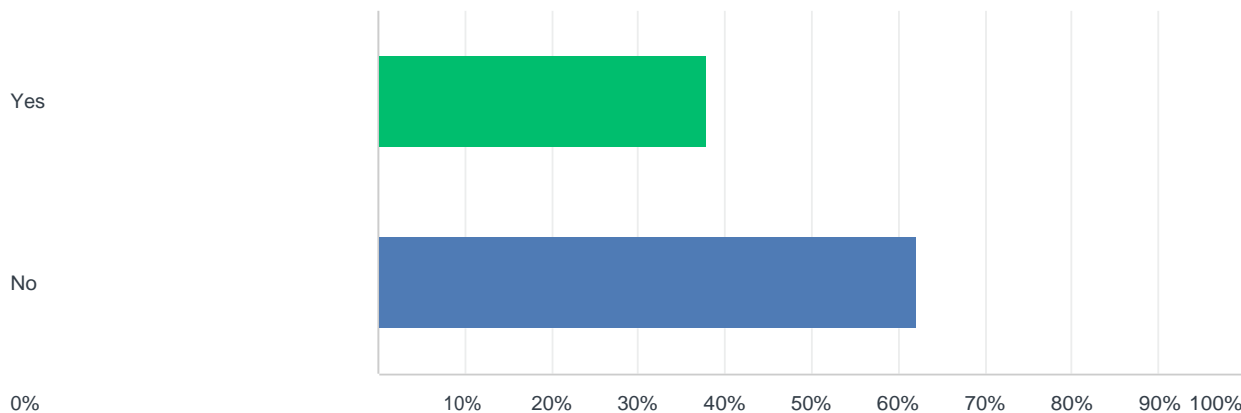# Q3 Was you application(s) approved?

Answered: 548   Skipped: 84

ANSWER CHOICES	RESPONSES	
Yes No	60.04%	329
	39.96%	219
TOTAL		548

Q4 Did the FAA ask for additional information (called, 'request for information' RFI) during the waiver process?
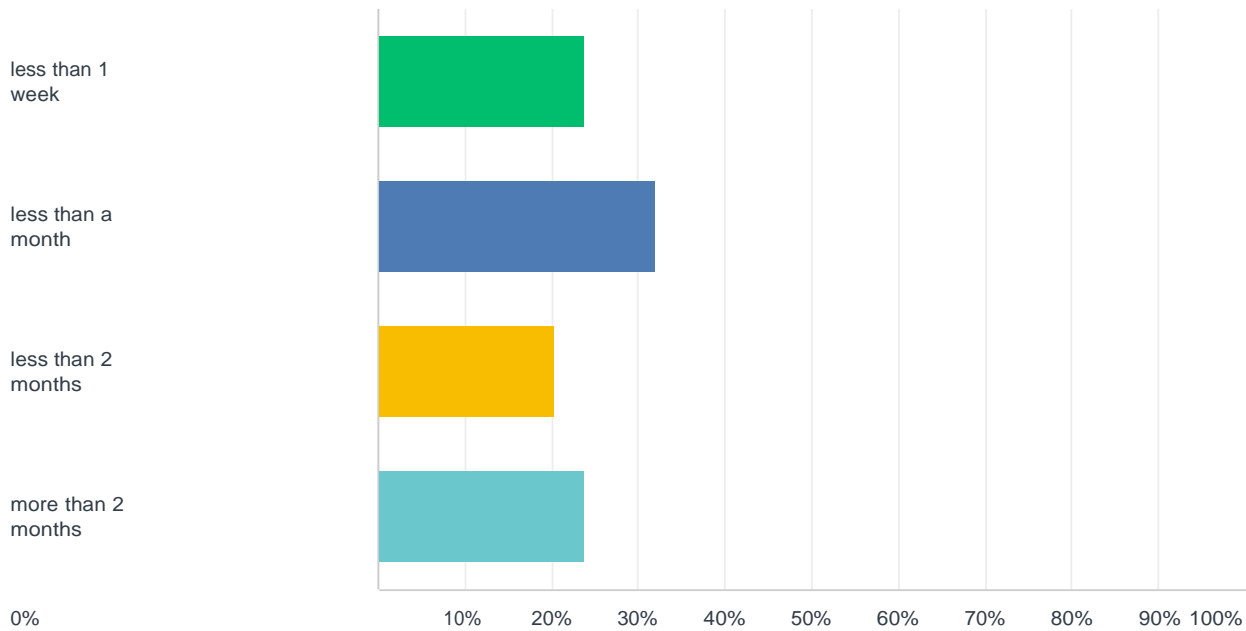
Answered: 545   Skipped: 87

ANSWER CHOICES	RESPONSES	
Yes No	37.80%	206
	62.20%	339
TOTAL		545

43

Q5 If you received an RFI, how long did it take for the FAA to send you the RFI?

Answered: 353   Skipped: 279

ANSWER CHOICES	RESPONSES	
less than 1 week less	23.80%	84
than a month less than	32.01%	113
2 months more than 2	20.40%	72
months	23.80%	84
TOTAL		353

Q6 If you received an RFI, did you find it helpful?

Answered: 294 Skipped: 338

	0	1	2	3	4	5	6	7	8	9	10
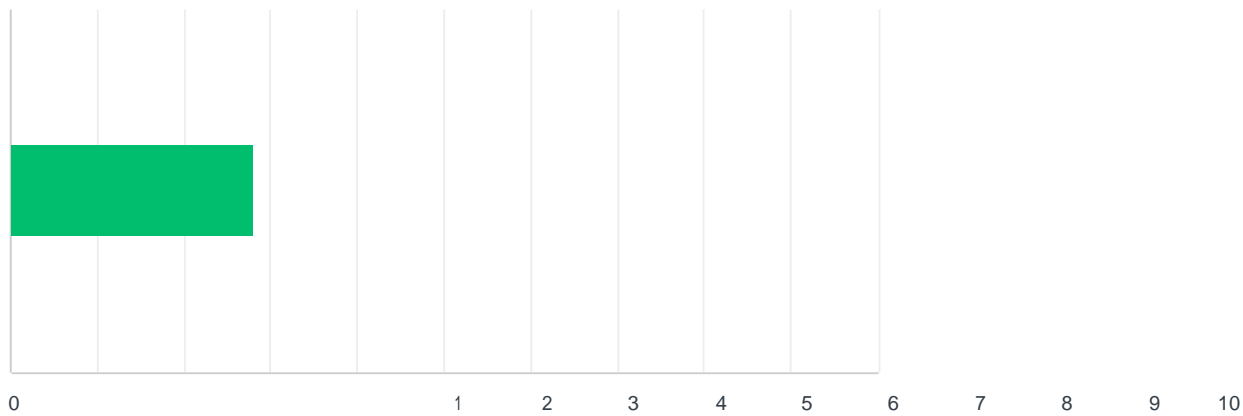
ANSWER CHOICES	AVERAGE NUMBER	TOTAL NUMBER	RESPONSES
3		825	294
Total Respondents: 294			

Q7 Did you receive multiple RFI's, if so how many?

Answered: 461   Skipped: 171
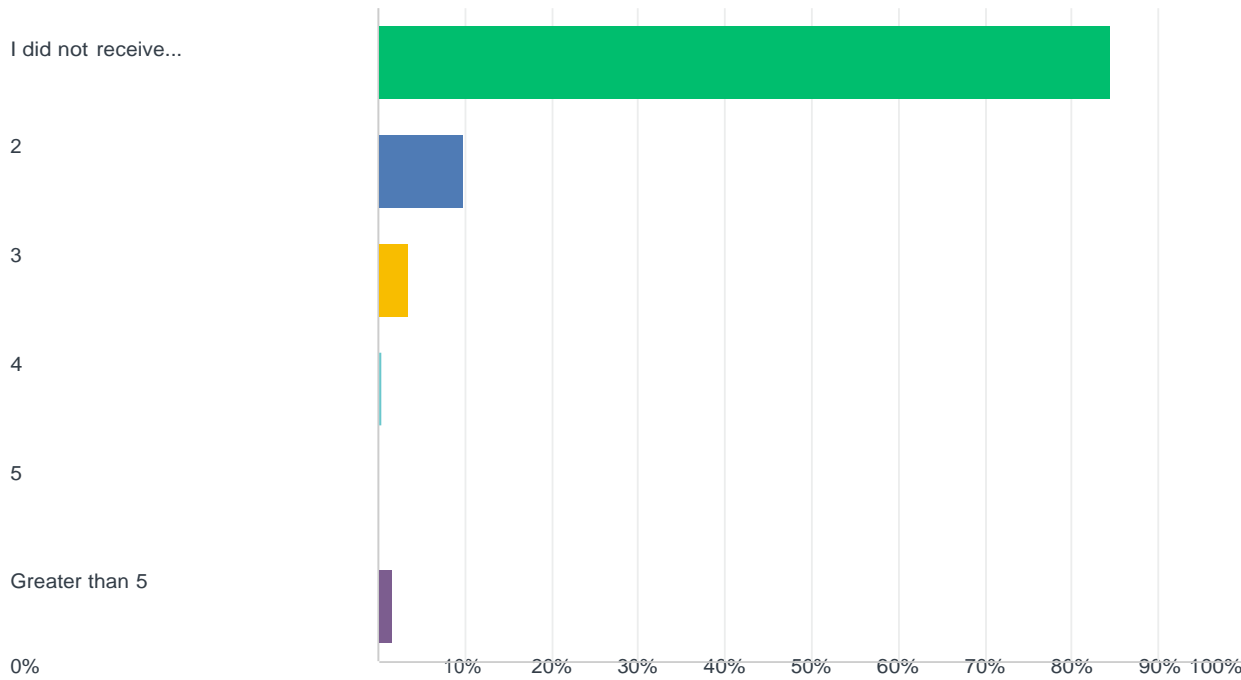
ANSWER CHOICES		RESPONSES	
I did not receive multiple RFI's 2		84.60%	390
3		9.76%	45
4		3.47%	16
5		0.43%	2
Greater than 5		0.00%	0
		1.74%	8
TOTAL			461

Q8 If your waiver was rejected, did the FAA provide you information on the elements that were missing or deficient?
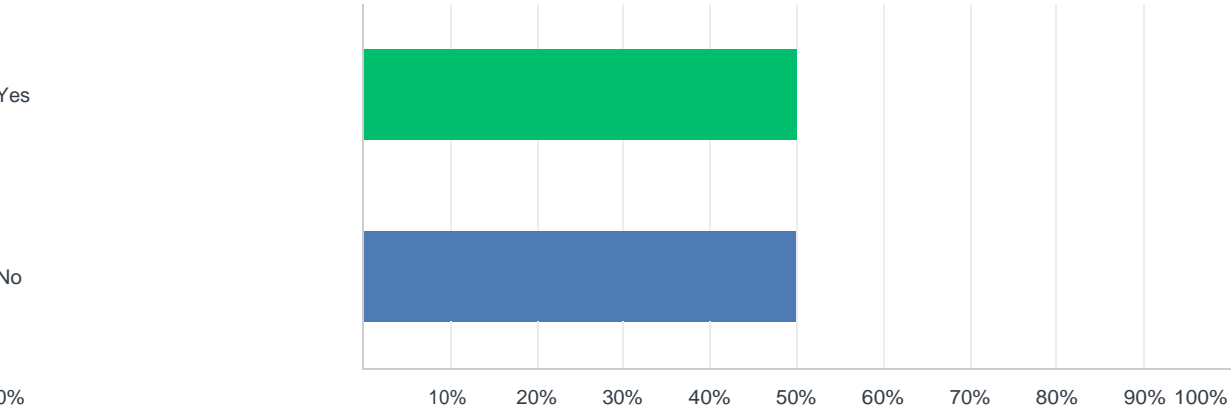
Answered: 529   Skipped: 103
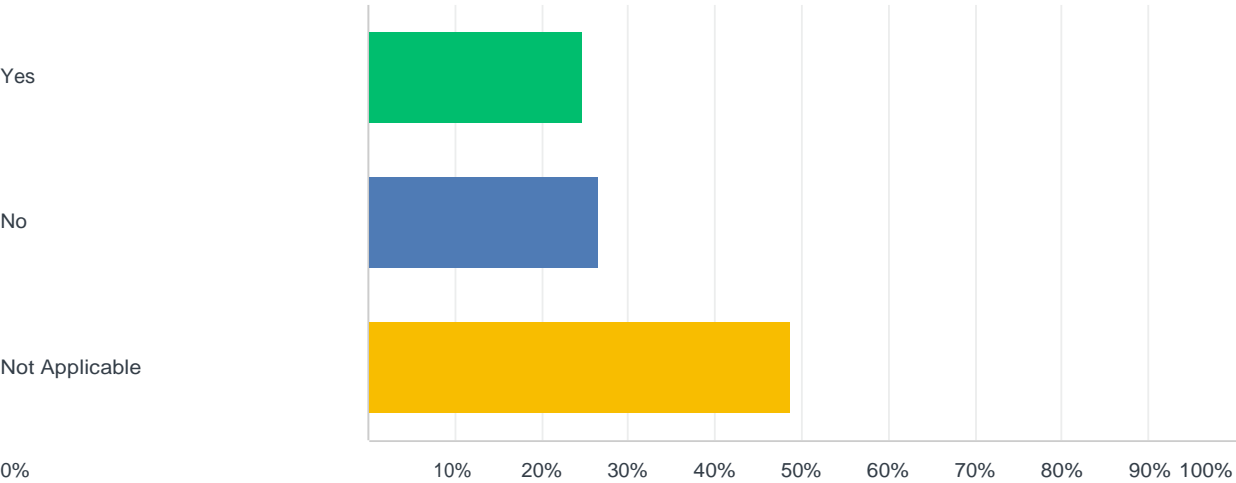
ANSWER CHOICES	RESPONSES	
Yes No	24.76%	131
Not Applicable	26.47%	140
TOTAL	48.77%	258
		529

Q9 If the FAA provided an explanation for the rejection, did you understand the explanation?

Answered: 380   Skipped: 252

ANSWER CHOICES	RESPONSES	
Yes No	50.79%	193
	49.21%	187
TOTAL		380

Q10 If you received a rejection, did you find it helpful?

Answered: 331   Skipped: 301

0		1	2	3	4	5	6	7	8	9	10
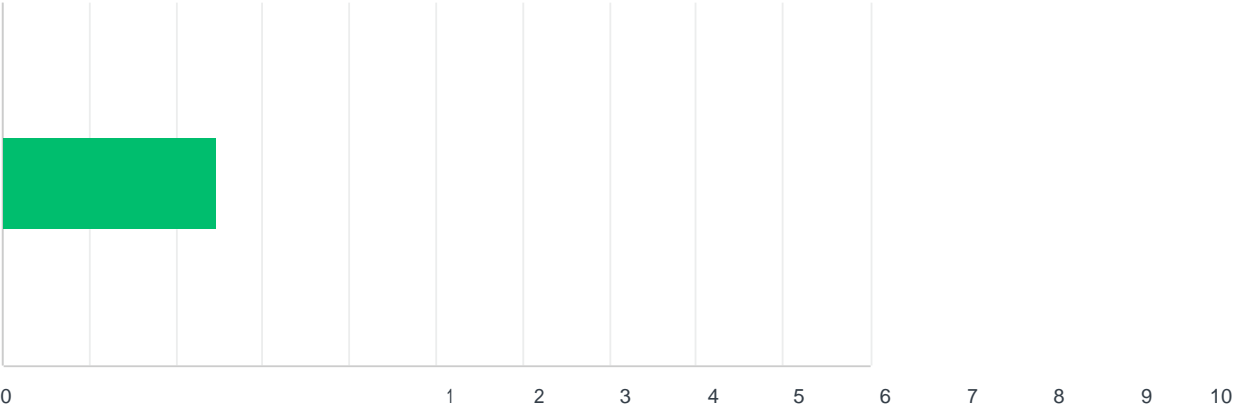
ANSWER CHOICES	AVERAGE NUMBER	TOTAL NUMBER	RESPONSES
2		818	331
Total Respondents: 331			

Q11 Did you agree with the FAA's explanation?

Answered: 384   Skipped: 248
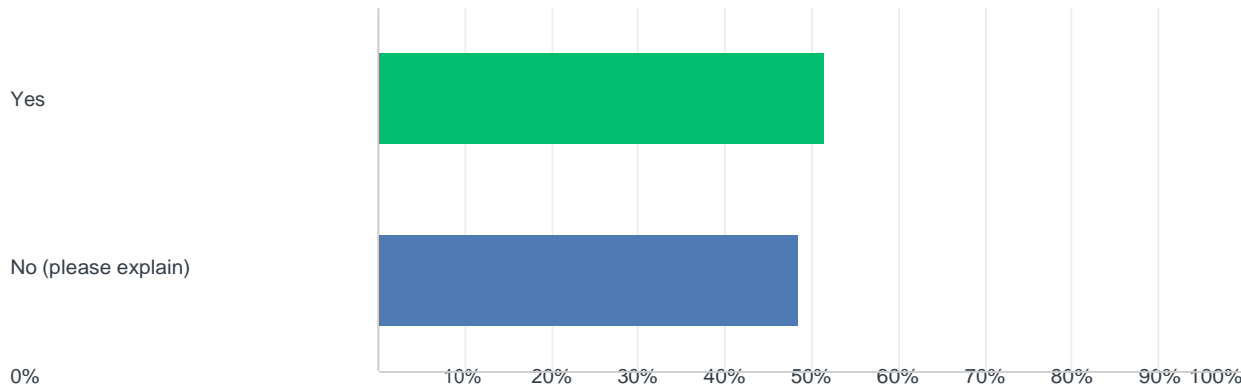
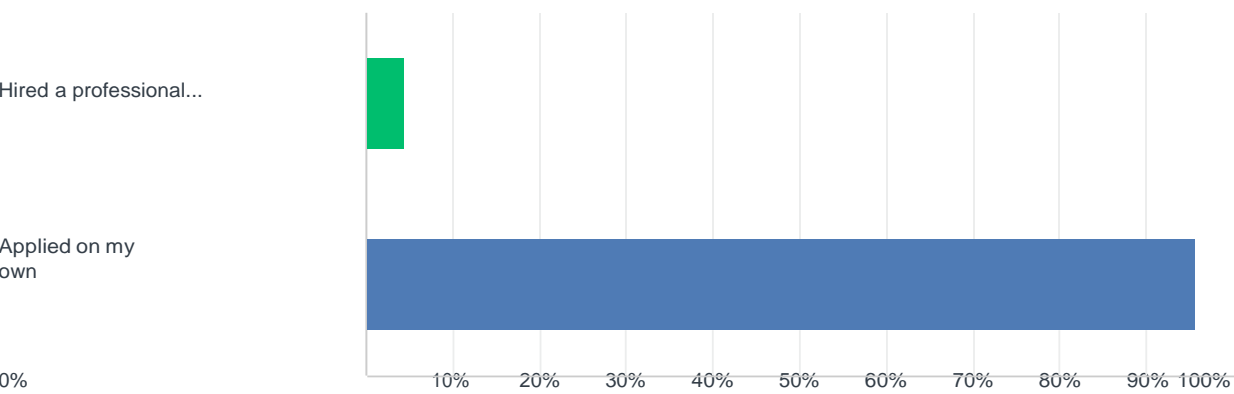| ANSWER CHOICES	RESPONSES	
Yes	51.56%	198
No (please explain)	48.44%	186
TOTAL		384

Q12 Did you apply for the waiver on your own or did you hire a professional service?

Answered: 535   Skipped: 97

ANSWER CHOICES	RESPONSES	
Hired a professional service Applied	4.49%	24
on my own	95.51%	511
TOTAL		535

Q13 If you hired a professional service, do you think it influenced the outcome?

Answered: 213   Skipped: 419
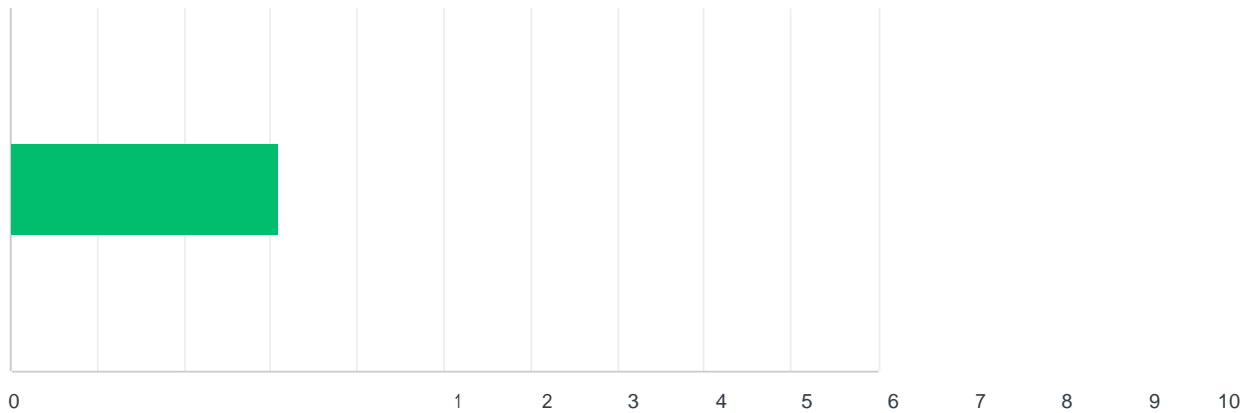
ANSWER CHOICES	AVERAGE NUMBER	TOTAL NUMBER	RESPONSES
3		658	213
Total Respondents: 213			

Q14 If you received multiple waivers, did you experience a consistent process?

Answered: 313   Skipped: 319
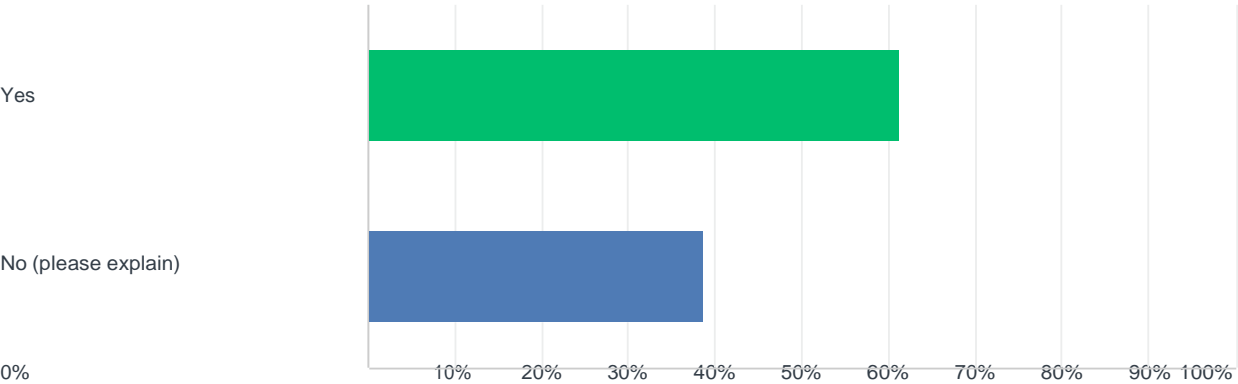
ANSWER CHOICES	RESPONSES	
Yes	61.34%	192
No (please explain)	38.66%	121
TOTAL		313

Q15 How long did it take for the FAA to make a final determination on your application?

Answered: 523   Skipped: 109
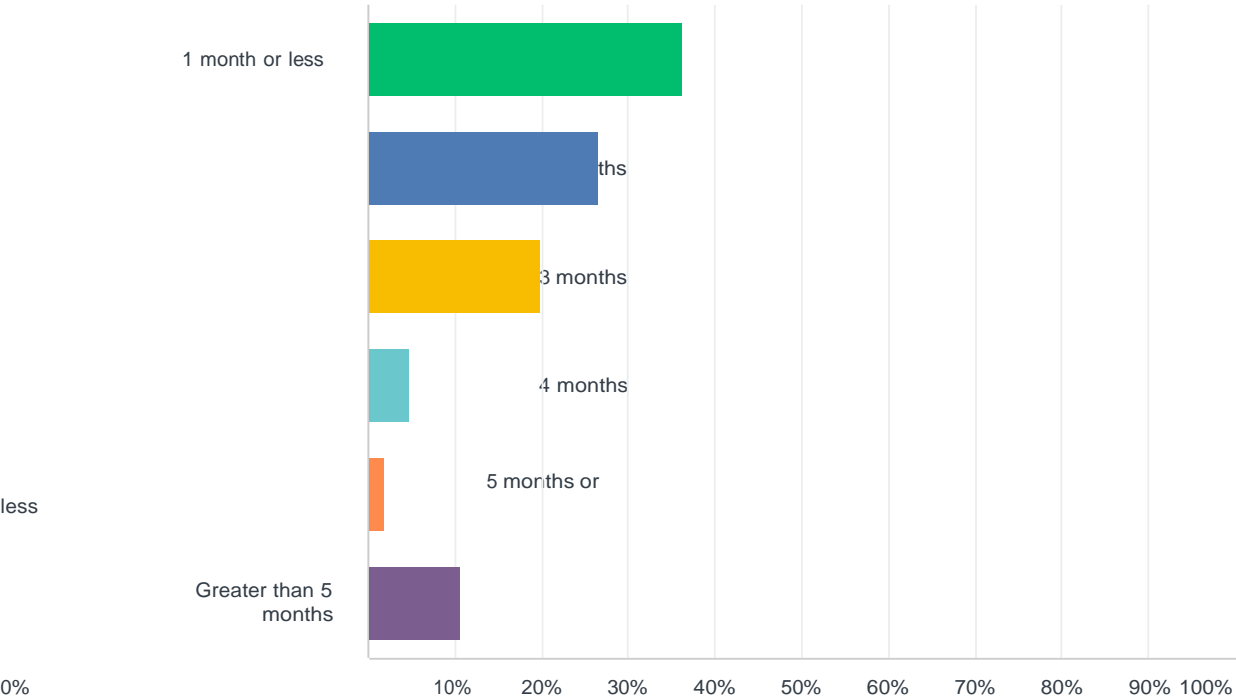
ANSWER CHOICES	RESPONSES	
1 month or less 2	36.14%	189
months	26.58%	139
3 months	19.89%	104
4 months	4.78%	25
5 months or less	1.91%	10
Greater than 5 months	10.71%	56
TOTAL		523

Q16 Were you satisfied with the application status updates provided by FAA throughout the process?

Answered: 526   Skipped: 106
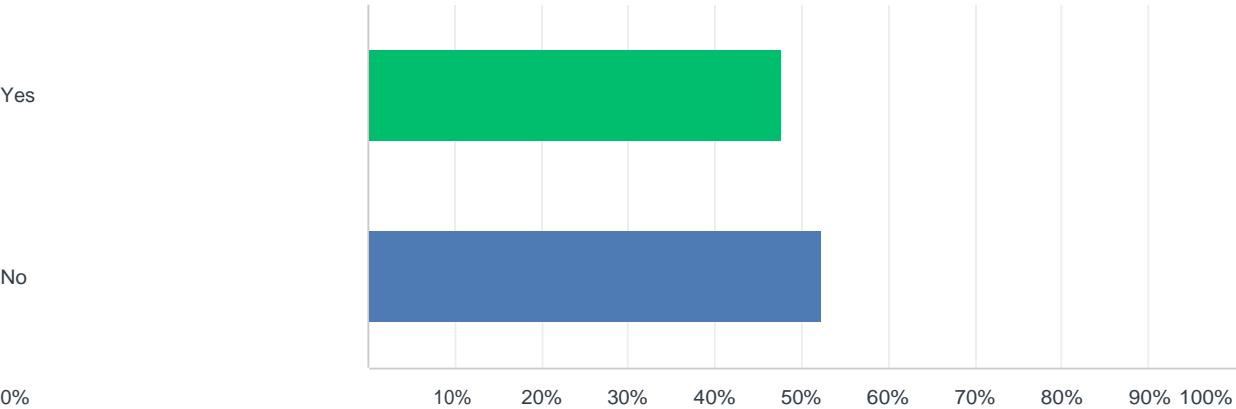
ANSWER CHOICES	RESPONSES	
Yes No	47.72%	251
	52.28%	275
TOTAL		526

Q17 Did you rely on any industry standards to assist you in writing your waiver application?

Answered: 535   Skipped: 97
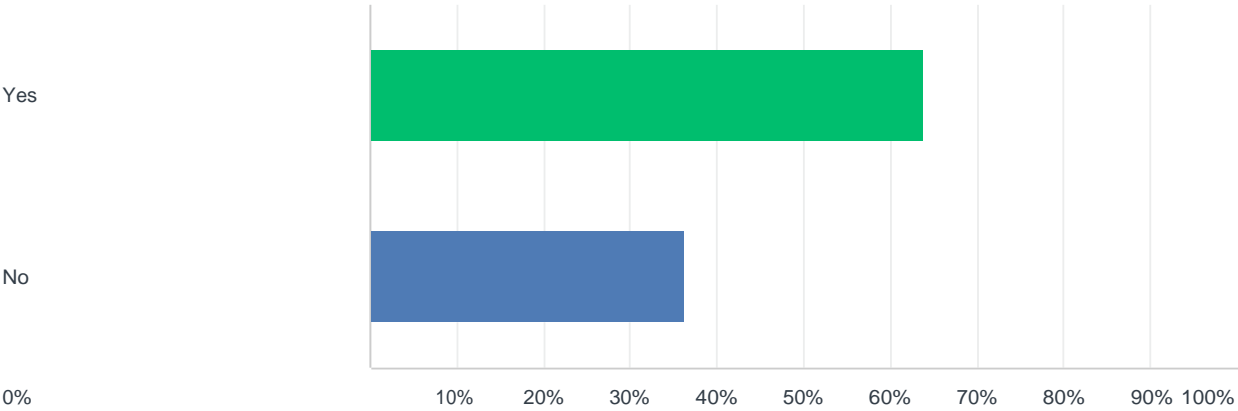
ANSWER CHOICES	RESPONSES	
Yes No	63.74%	341
	36.26%	194
TOTAL		535

Q18 If you used industry standards assist your waiver application, please select which ones.

Answered: 499   Skipped: 133

ANSWER CHOICES	RESPONSES	
ASTM ISO	6.41%	32
NFPA, NIMS, FAA	3.41%	17
or ICAO	2.61%	13
Standards referenced in the ANSI standards collaborative The	47.29%	236
Trusted Operator Program	6.41%	32
All of the above	6.61%	33
A private (i.e, non-ANSI or ISO accredited) organization's standard I	8.02%	40
did not reference any standards	16.63%	83
Total Respondents: 499	33.87%	169
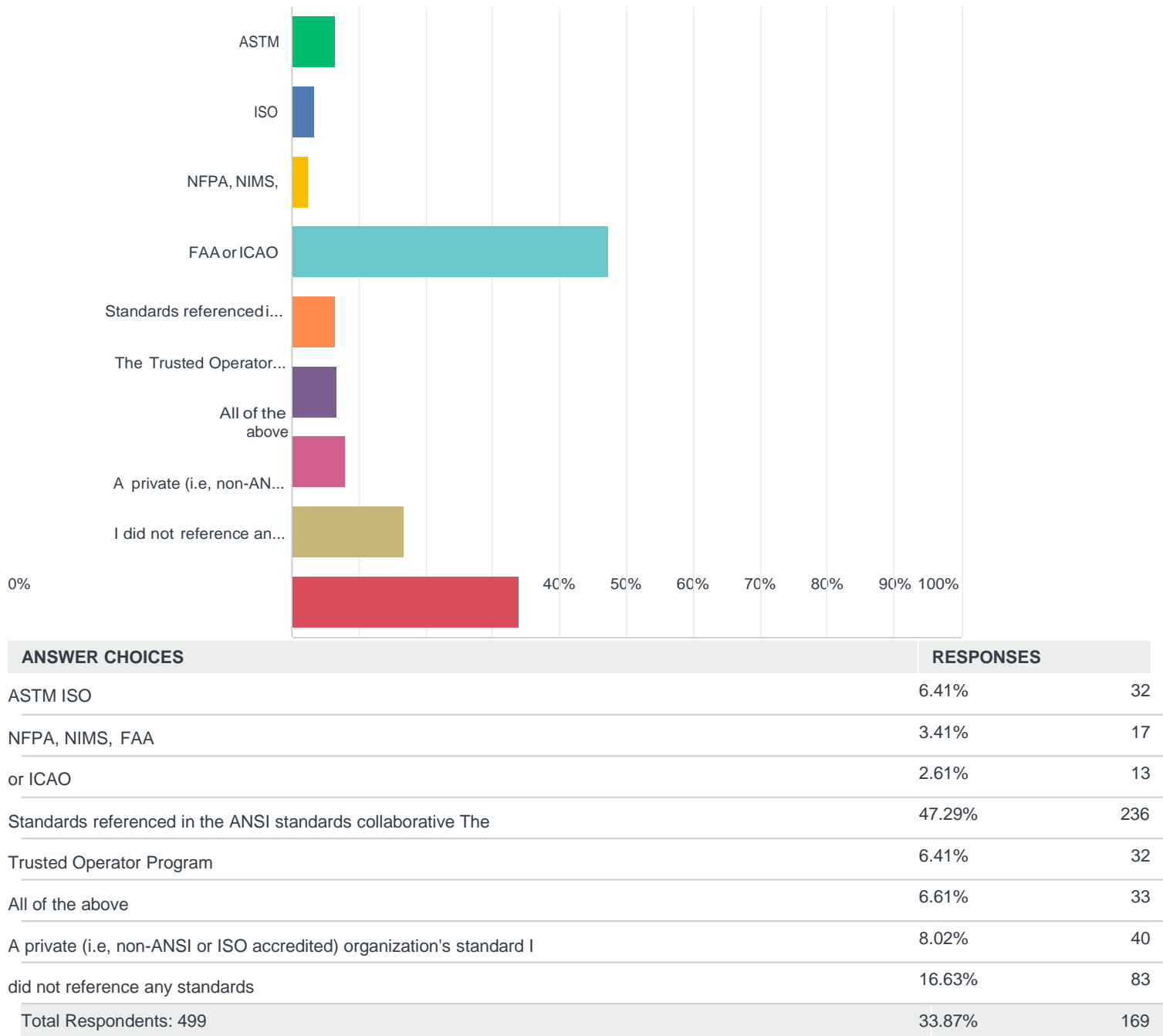
Q19 Are you satisfied with the application process based on your experience?

Answered: 415   Skipped: 217
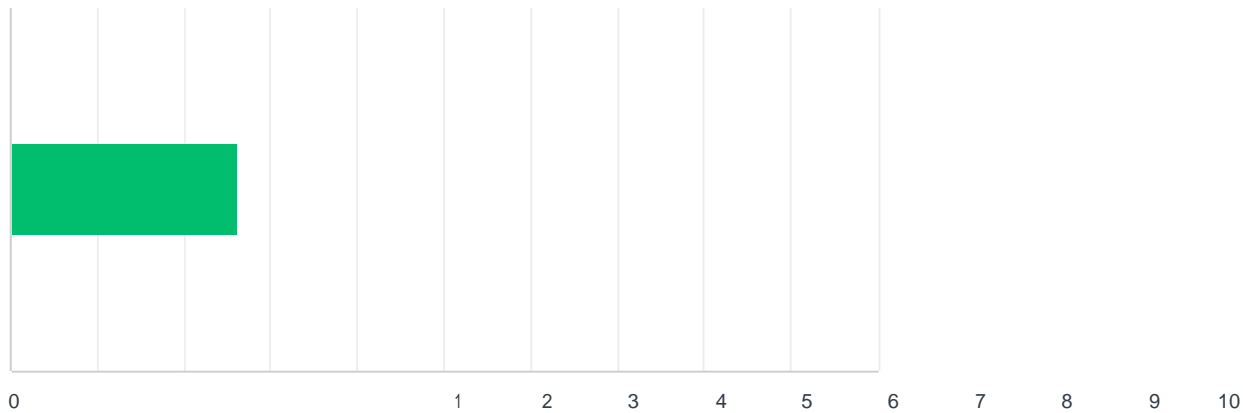
ANSWER CHOICES	AVERAGE NUMBER	TOTAL NUMBER	RESPONSES
3		1,088	415
Total Respondents: 415			

Q20 How long has your company been in business?

Answered: 546   Skipped: 86
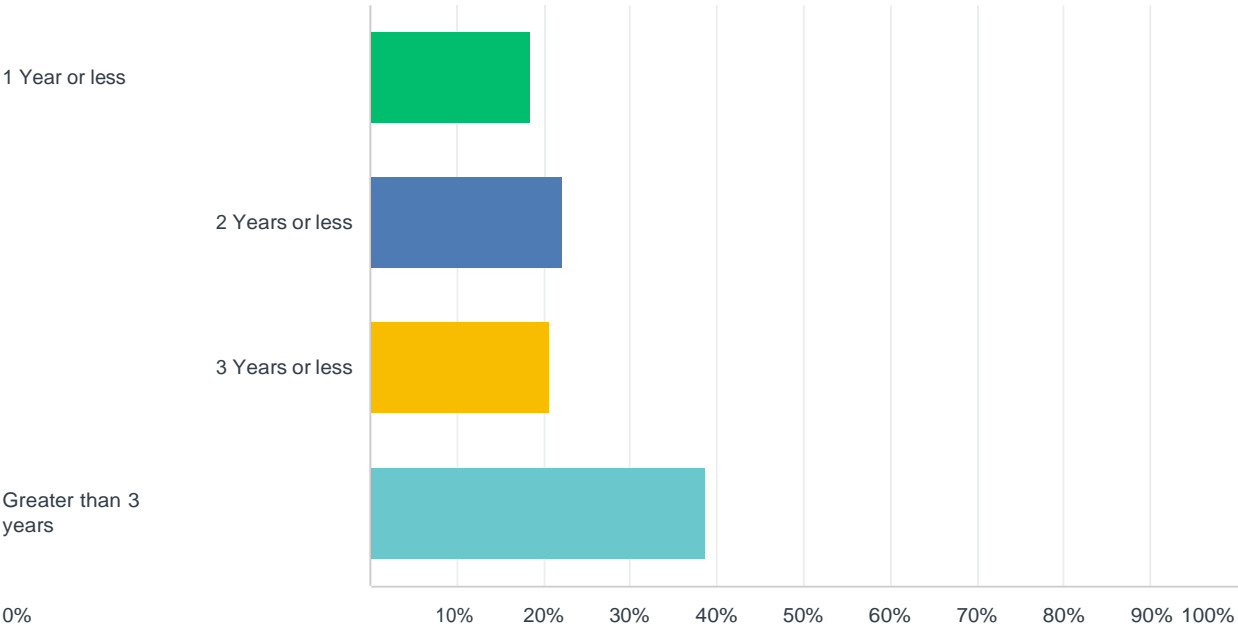
ANSWER CHOICES	RESPONSES	
1 Year or less 2	18.50%	101
Years or less 3	22.16%	121
Years or less	20.70%	113
Greater than 3 years	38.64%	211
TOTAL		546

Q21 How many Remote Pilots are directly employed by your organization?

Answered: 615   Skipped: 17
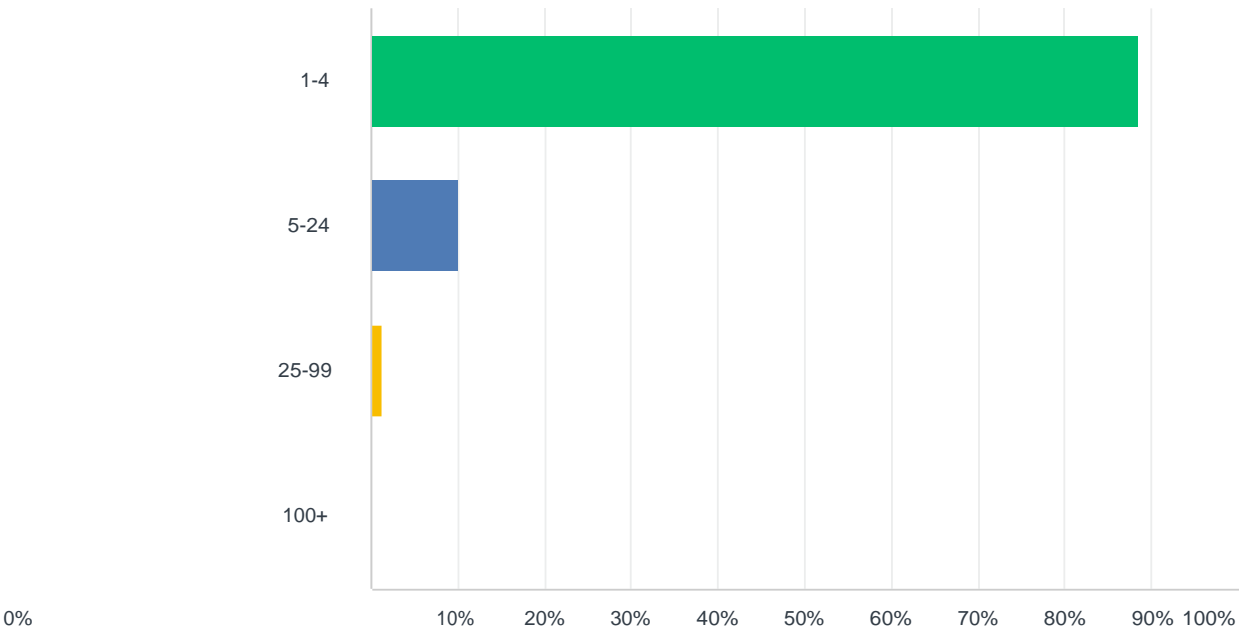
ANSWER CHOICES	RESPONSES	
1-4	88.46%	544
5-24	10.08%	62
25-99	1.30%	8
100+	0.16%	1
TOTAL		615

Q22 Which industries does your business address?

Answered: 623   Skipped: 9
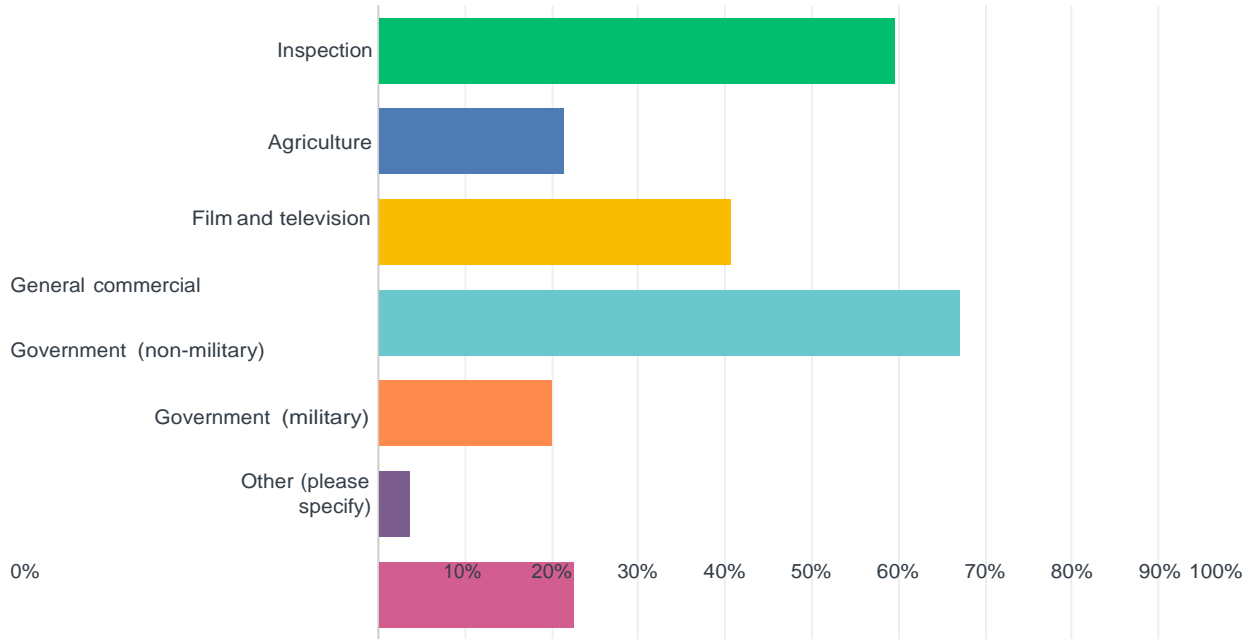
ANSWER CHOICES	RESPONSES	
Inspection	59.55%	371
Agriculture	21.51%	134
Film and television General	40.77%	254
commercial Government	67.09%	418
(non-military) Government	20.06%	125
(military) Other (please	3.69%	23
specify)	22.63%	141
Total Respondents: 623		

FAA DRONE ADVISORY COMMITTEE

Official Statement of the DFO

PUBLIC MEETING ANNOUNCEMENT
Read by: Designated Federal Officer Dan Elwell
Drone Advisory Committee
October 17, 2019

In accordance with the Federal Advisory Committee Act, this Advisory Committee meeting is OPEN TO THE PUBLIC.
Notice of the meeting was published in the Federal Register on:

September 30, 2019

Members of the public may address the committee with PRIOR APPROVAL of the Chairman. This should be arranged in advance.

Only appointed members of the Advisory Committee may vote on any matter brought to a vote by the Chairman.

The public may present written material to the Advisory Committee at any time.

REVIEW OF AGENDA AND APPROVAL OF PREVIOUS MEETING MINUTES

Dan Elwell

Designated Federal Officer, FAA Drone Advisory Committee

Deputy Administrator, FAA

Agenda

9:00 a.m.	9:01 a.m.	Greeting from FAA
9:01 a.m.	9:05 a.m.	Official Statement of the Designated Federal Officer
9:05 a.m.	9:15 a.m.	Review of Agenda and Approval of Previous Meeting Minutes
9:15 a.m.	9:30 a.m.	Opening Remarks from DAC Chairman
9:30 a.m.	10:15 a.m.	DAC Recommendation and Discussion: Tasking #1 – Remote Identification
10:15 a.m.	10:25 a.m.	Break
10:25 a.m.	11:10 a.m.	DAC Recommendation and Discussion: Tasking #2 – UAS Security Issues
11:10 a.m.	11:55 a.m.	DAC Recommendation and Discussion: Tasking #3 – 107 Waivers
11:55 a.m.	1:10 p.m.	Lunch and Networking
1:10 p.m.	1:25 p.m.	FAA Update: National Drone Safety Awareness Week Update
1:25 p.m.	1:35 p.m.	FAA Update: Remote Identification
1:35 p.m.	1:50 p.m.	FAA Update: Exception for Limited Recreational Operations of Unmanned Aircraft
1:50 p.m.	2:05 p.m.	FAA Update: UAS Security
2:05 p.m.	2:20 p.m.	Break
2:20 p.m.	2:50 p.m.	Industry-Led Technical Topics
2:50 p.m.	3:50 p.m.	New Business/Agenda Topics/Review Taskings
3:50 p.m.	4:00 p.m.	Closing Remarks
4:00 p.m.	4:00 p.m.	Adjourn

Action Item Update

- **DAC Tasking #4: FAA UAS Comprehensive Plan (60 Days after receipt of Draft Plan)**
  - The FAA Reauthorization Act of 2018, Section 342, requires the FAA to update the comprehensive plan in consultation with representatives of the aviation industry, Federal agencies that employ unmanned aircraft systems technology in the national airspace system, and the unmanned aircraft systems industry.
  - The FAA will sent the draft UAS Comprehensive Plan to the DAC members and tasked the DAC to provide feedback.
    - The plan was sent on October 11, 2019.

OPENING REMARKS FROM DAC CHAIRMAN

Michael Chasen

Chair, FAA Drone Advisory Committee

Chief Executive Officer, PrecisionHawk USA Inc.

DAC 2.0 – Where We Started

- In June, we held our first meeting of the DAC 2.0
- To recap, we established 5 Key Priorities for the DAC:
    1. Remote ID
    2. BVLOS
    3. Counter UAS
    4. Waiver Process
    5. Public-Private Partnerships

DAC 2.0 – Our Progress

- We formed 3 initial Task Groups:
    1. Remote ID
    2. UAS Security
    3. Part 107 Waiver Process Improvements
- We set aggressive 90 day timelines for all groups to deliver Final Reports
- Today, the Task Group leaders will present their findings and recommendations for the DAC to discuss and recommend formally to the FAA

DAC 2.0 – Keeping up Our Momentum

- We are going to continue to take advantage of the talent we have in the DAC and keep up our momentum
- We have made great progress already, and we have much more to achieve together
- The issues we are tackling define the market opportunity for drones, the business models and time to market, the safe adoption of drones, and public perceptions and acceptance

DAC 2.0 – Keeping up Our Momentum

- We are going to continue the pace we set, by establishing 3 new Task Groups later today
- The new Taskings are focused on issues that we need to solve to fully benefit from drones, and to fully deploy and integrate drones safely alongside manned aircraft
- As before, Taskings will be due in 90 days!

DAC RECOMMENDATIONS FROM JUNE 2019 TASKINGS

Michael Chasen

Chair, FAA Drone Advisory Committee

Chief Executive Officer, PrecisionHawk USA Inc.

RECOMMENDATION & DISCUSSION DAC TASKING #1: REMOTE ID

Steve Ucci

Lead, DAC Task Group #1

Senior Deputy Majority Leader, Rhode Island State Assembly

Tasking on Remote ID

- **DAC Tasking #1: Remote ID**
- The Final Rule for remote identification of UAS is likely up to 24 months away. In the absence of remote identification of UAS and in consideration of security partners' concerns regarding operations over people and other waivered operations under part 107 in the intervening period, the FAA tasks the DAC to develop recommendations on:
    1. What voluntary equipage of remote identification technologies by UAS manufacturers or operators could occur in the short-term prior to a Final Rule for remote identification 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 identification prior to the enactment of a Final Rule for remote identification and finalization of remote identification requirements?

Tasking on Remote ID

- **DAC Tasking #1: Remote ID (continued)**
- 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

TG-1 Recommendations - Equippage

- **Remote ID (RID) standard**
  - Regulator would add a regulatory "overlay" and
  - Minimal Operational Performance Standard (MOPS)
    - Using one or more of the following:
      - Bluetooth: 4 or 5
      - Broadcast: Wi-Fi
      - Network: connected UAS or,
      - Non-Equipped Network Participant
  - Note: The method used must function in the area of operation.
  - Participants must support all required fields in the ASTM standard.

TG-1 Recommendations - Incentives

FAA Incentives
- Contract Preference - Federal Contracts
- Part 107 Waiver Application Prioritization
- Satisfy a Component of Part 107 Waiver, Exemption, or Application Requirement
  - mitigate anonymous flying for operations over people, beyond visual line of sight waivers or night operations
- FAA online database of manufacturers who have self-declared Remote ID equipped UAS and self-certified network Remote ID service providers
- Airspace Access to otherwise restricted areas
- Financial rebate in collaboration with Remote ID drone manufacturers or software suppliers to offset the cost for compliance, similar to the FAA ADS-B rebate
- Monetary Incentive rebate or exempt registration / permit fees.
- Promotion on FAA website/Apps

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.

TG-1 Recommendations - Incentives

- **Non FAA Incentives**
  - Insurance Incentive – reduced cost to operators
  - State and Local Government – additional takeoff and landing locations, and relief from other restrictions
  - Other Federal Agencies – designate regular or ad-hoc locations, dates, and times to allow drone takeoff and landing using Remote ID, in locations currently restricted (ex. Dept. of Interior National Parks restrictions)
  - Industry Recognition – common logo or slogan

RECOMMENDATION & DISCUSSION DAC TASKING #2: UAS SECURITY ISSUES

Dan Dalton (on behalf Jaz Banga)
DAC Task Group #2
Airspace Systems, Inc.

Tasking on UAS Security Issues

- **DAC Tasking #2: UAS Security Issues**
- 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 do them, would substantially reduce the likelihood of unintentional threatening behavior.

Tasking

- **Purpose of the Task Group (TG) was twofold:**
  1) Identify <u>technical solutions</u> at the <u>aircraft or operational limitation/capability</u> level that could make it less likely that <u>"careless" and "clueless"</u> operators could operate UAS in ways that could be perceived as posing a safety or security threat;
  2) <u>Identify the universe of actions</u> that would <u>substantially reduce</u> the likelihood of <u>unintentional threatening behavior</u>.

Key Assumptions

- Comprehensive UAS ecosystem security necessitates <u>layered security-by-design</u>.
- National Airspace System (NAS) security is comprised of three core pillars:
  - airframe security,
  - airspace/operational security,
  - airmen/operator security*
- Unmanned Traffic Management systems will be another important method to address airspace and operational security in the future.
- Increased safety is an overarching goal for all stakeholders and efforts to increase <u>security</u> in the NAS <u>must also enhance safety</u>.

Scenarios

- 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.

Recommendations

1. OEMs should equip their UAS with geofencing capabilities
2. Federal government should make available a consolidated, standardized, and up-to-date database for critical infrastructure and TFRs issued, that are machine processable
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 II above.
   a. A follow-on to this would be voluntary equipage of an airborne conflict resolution/collision avoidance capability for the UAS operator.

Recommendations (cont.)

4. 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.
5. 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.

Discussion / Next Steps

- Implementation
    - What does this look like?
    - Over what time frame?
    - Who does it apply to?
    - Are these recommendations constrained to certain locales?
- Incentivization
    - What incentives exist for OEMs?
    - What incentives exist for operators?
    - What incentives exist for UAS service providers?
    - How do we contend with those not participating?

Thank You!

Aerospace Industries Association
Major League Baseball
Air Line Pilots Association
McLuskey, McDonald & Hughes, P.A.
Aircraft Owners and Pilots Association
The Moak Group
American Airlines
National League of Cities
The Boeing Company

New York Fire Department
Dallas Police Department
New York Police Department
DJI
PrecisionHawk
City of Fort Collins, Colorado
Slipstream Strategies
Lockheed Martin Corporation
Wing

Airspace Systems, Inc.

**RECOMMENDATION & DISCUSSION
DAC TASKING #3: 107 WAIVERS**

Brian Wynne
Lead, DAC Task Group #3
President and Chief Executive Officer
Association for Unmanned Vehicle Systems International

Tasking on 107 Waivers

- **DAC Tasking #3: 107 Waivers**
- 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.

Tasking Summary

- Task Group 3 to provide recommendations on improvements to the processing of Part 107 applications
- The Part 107 waiver process is known to be cumbersome, inconsistent, and lengthy

Process

Two prong approach, Survey of the FAA & Survey on the industry
- Received Briefing from FAA on Part 107 application processing
- **Developed question set for FAA on processing of applications**
- **Task Group developed a survey that was distributed to industry**
- Developed final recommendations

Task Group Survey of FAA Waiver Team Process

- Seven questions in total
- Question Topics:
  - To clarify FAA Analyst training
  - To clarify existing Guide materials
  - To clarify current denial and appeals criteria and process
  - To clarify assessment and criteria of operator competency determination
- The provided answers were not illuminating
- It appeared that the FAA analysts saw no cause for concern

Industry Distributed Survey

- 24 questions in total;
  - Focusing on the operator's understanding of the process and criteria for the application
  - Determining the operator's experience with technical feedback and advice from the FAA regarding their application result
  - Overall time and efficiency experience of the application
- 632 total responses
- Mix of multiple choice and written response questions.
- Responses unanimously support need for Part 107 reforms.

Recommendations

1. Expiring waivers should auto-renew unless there is a compliance issue or change in regulations to reduce administrative burden and limit re-submissions
2. Modify Drone Zone to allow the operator to update nonconsequential information without having to file an application for an amendment to their waiver [e.g.; nonoperational information]
3. FAA should create a checklist inventorying 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.

   Rationale: These recommendations will clarify the processes, criteria and promote transparency and increase efficiency

Recommendations

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 in UAST, TOP and industry standards etc., and give operators credit for undergoing audits, certification and other training beyond part 107compliance.
   Rationale: This will foster collaboration and safety practices within industry groups.

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.
   Rationale: This will foster collaboration and safety practices within industry groups.

Recommendations

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.

    Rationale: This recommendation will provide a 'learning' and supporting mechanism for both operator and FAA.

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.

    Rationale: This will clarify the processes and criteria and promote transparency and fairness.

FAA UPDATE: NATIONAL DRONE SAFETY AWARENESS WEEK

Bobby Fraser
Acting Assistant Administrator
FAA Office of Communications

Goals

- Maintain focus on drone safety and education.
- Welcome all users into our community and our ongoing safety conversation.
- Keep the public informed of latest safety requirements and best practices.

Stakeholder Playbook

The **Stakeholder Playbook** contains ideas, tips, messages and inspiration for anyone who would like to participate in Drone Safety Awareness Week.

- URL: https://www.faa.gov/uas/resources/events_calendar/drone_safety_awareness/
- Will be updated consistently

2019 Focus Areas & Safety Themes

- Focus areas have been provided as inspiration for interested parties that may want to participate.
- The FAA will promote a specific focus area on each day and share your stories and digital content.
- Participants will engage by hosting events and sharing their drone safety story.

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

FAA UPDATE: REMOTE IDENTIFICATION

Jay Merkle
Executive Director
FAA UAS Integration Office

Remote ID Status

- **Remote Identification (ID) will…**
  - Enable more complex operations
  - Address safety and security concerns
  - Be the foundation for UTM
- **Current Status**
  - The Remote ID notice of proposed rulemaking (NPRM) is currently at OIRA for review
  - FAA has begun working on a Remote ID implementation plan

Remote ID Status

- **ASTM F38 – Committee on UAS**
  - RID Standard
    - Includes broadcast and network components
    - Large segment of industry involved in drafting beginning Nov '18
    - Out for ballot on 9/16 for 30 days, need 60% of members to vote
    - Negative comments need to be adjudicated or found non-persuasive
    - Expected to be published in next ASTM publishing cycle (11/15)

Remote ID Status

ASTM Remote ID Conceptual Overview
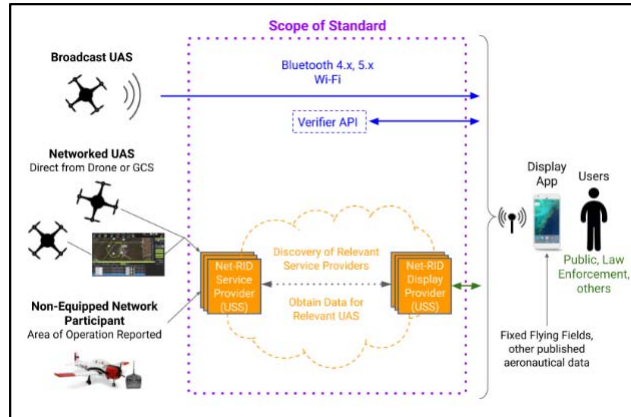
Remote ID Status

- **What's next?**
  – 12/20/2019: FAA anticipates publishing the Remote ID notice of proposed rulemaking
  – Public comment period

FAA UPDATE:
RECREATIONAL FLYERS (SECTION 349)

Jay Merkle
Executive Director
FAA UAS Integration Office

Where we are and where we're headed
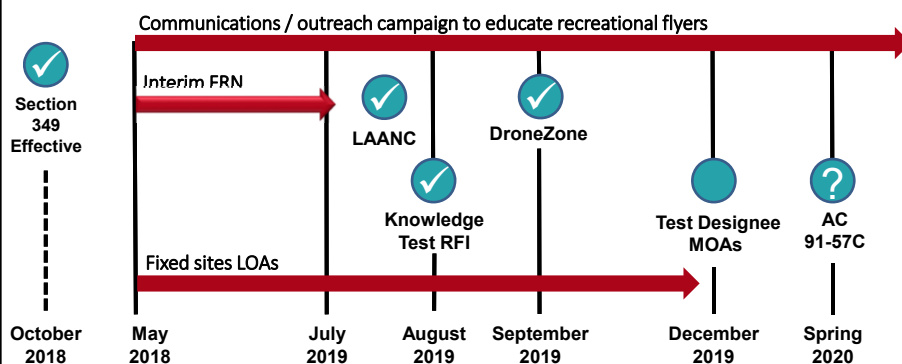
Communications / outreach campaign to educate recreational flyers

Interim FRN

Section 349 Effective

LAANC

DroneZone

Knowledge Test RFI

Test Designee MOAs

AC 91-57C

Fixed sites LOAs

| October 2018 | May 2018 | July 2019 | August 2019 | September 2019 | December 2019 | Spring 2020 |

Implementation Details

- **LAANC is issuing airspace authorizations to recreational flyers**
  - 300+ approvals were granted on the first day (July 23rd)
  - Nearly 8,000 approvals granted in August alone
- **DroneZone launched for recreational flyers on September 1st (for at airports not serviced by LAANC)**
- **RFI for knowledge test administration closed on September 19th**
  - Nearly 40 submissions were received
- **Examination Board drafting knowledge test content and questions**
  - Work is 95% complete
  - Board includes reps from AMA and Small UAV Coalition
- **New Advisory Circular 91-57C is in coordination**
- **LOAs are being signed for fixed sites and CBO events in controlled airspace**
  - This work is ongoing

FAA UPDATE: UAS SECURITY

Angela Stubblefield
Deputy Associate Administrator
FAA Office of Security and Hazardous Materials Safety

FAA Reauthorization Act of 2018 - Section 372

- **Directs the FAA to establish a pilot program to use available remote detection and identification technologies for safety and enforcement actions to pursue non-compliant UAS operators**
- **Albuquerque International Balloon Fiesta (AIBF)**
  - October 5-13, 2019
  - First of three planned pilot program venues
- **Working two additional venues before end of year**
  - Will incorporate lessons learned and enforcement actions from AIBF

FAA Reauthorization Act of 2018 - Section 383

- **Formed cross-agency team to work this mandate**
- **Program timeline and milestones being established**
  - Determining selection process for airports & vendors
- **Informed by other interagency activities**
  - DHS Northern Border Detection Study
    - Air Domain Awareness and Protection in the NAS / 2019-2020 Equipment Demonstration and Evaluation
  - TSA UAS/Counter-UAS Technology Integrated Project Team (IPT)
  - Deployment activities of four partner agencies (DOD, DOE, DHS, and DOJ)
- **Working with airports deploying detection systems**

Core 30 CONOPs

- **National Security Council (NSC) tasked Unified National-Level Response to Persistent UAS Disruption of Operations at Core 30 Airports Concept of Operations (CONOPs)**
  - Awaiting Deputies' Committee approval
  - Already moving toward implementation
  - Tabletop exercises & discussions occurring locally
  - TSA engaging airport sponsors to develop standard operating procedures
  - FAA working with TSA, airport sponsors, and DOD

INDUSTRY-LED TECHNICAL TOPICS

Michael Chasen

Chair, FAA Drone Advisory Committee

Chief Executive Officer, PrecisionHawk USA Inc.

FAA Facility Maps

- The Facility Maps show the maximum altitude around airports where FAA may authorize Part 107 operations without additional safety analysis
- Drone operators rely on Facility Maps to understand whether they are likely to get approval to fly drones near airports

FAA Facility Maps

- Drone operators have noticed pain points with Facility Maps, i.e. airspace that indicates a zero altitude restriction that doesn't reflect actual risk
- At the same time, increased airspace access for drones must be pursued carefully to ensure risks are addressed
- So, our goal will be to identify how industry and FAA can collaborate to improve Facility Maps and safe airspace access

Beyond Visual Line of Sight

- The FAA initiated research focused on solving BVLOS challenges more than a year before Part 107 was in place
- Under the Pathfinder Program, BNSF and PrecisionHawk conducted research for 3 years and received the first BVLOS waivers in 2016
- Today, BVLOS research efforts continue under the UAS Integration Pilot Program

Beyond Visual Line of Sight

- Today, we have seen over 50 BVLOS waivers approved
- However, we are still a few years out from a BVLOS rule
- Today, we need to focus our efforts to position FAA to create policy and regulations for BVLOS
- To do that, we must identify what challenges remain, and how best to address them to move forward

Unmanned Traffic Management

- NASA pioneered UTM research years ago and many industry stakeholders participated in NASA's efforts, including PrecisionHawk
- Today, we know that UTM will be required for widespread BVLOS operations in complex airspace
- Many industry players have developed and tested components of UTM, including Remote ID, an early building block

Unmanned Traffic Management

- The FAA released a UTM Concept of Operations in 2018, which laid out a framework and vision for UTM deployment
- We must now work together to identify priorities for UTM development and deployment, and to make a plan for safely rolling out UTM

**NEW BUSINESS
AGENDA TOPICS / REVIEW TASKINGS**

Dan Elwell
Designated Federal Officer, FAA Drone Advisory Committee
Deputy Administrator, Federal Aviation Administration
Michael Chasen
Chair, FAA Drone Advisory Committee
Chief Executive Officer, PrecisionHawk USA Inc.

Tasking Discussion

- **Proposed DAC Tasking #1: Facility Maps**
  - What are options for better FAA/industry collaboration to update and improve UAS facility map and airspace access for all operators?

Tasking Discussion

- **Proposed DAC Tasking #2: BVLOS Challenges**
  - What are the remaining BVLOS challenges that the DAC sees?

Tasking Discussion

- **Proposed DAC Tasking #3: UTM**
  - Provide industry comment on the UAS Traffic Management (UTM) Concept of Operations v2.0.
  - Provide industry prioritization of UTM capabilities.

CLOSING REMARKS

Dan Elwell
Designated Federal Officer, FAA Drone Advisory Committee
Deputy Administrator, Federal Aviation Administration
Michael Chasen
Chair, FAA Drone Advisory Committee
Chief Executive Officer, PrecisionHawk USA Inc.

Drone Advisory Committee
October 17, 2019 Meeting • Washington, DC

**Federal Aviation
Administration**
www.faa.gov/uas

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U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

**ORDER
1110.157**

Effective Date:
06/15/18

SUBJ: Charter of the Drone Advisory Committee

1. Enter overview of the Order here. This will help provide a uniform look for all FAA directives. **Committee's Official Designation.** The Committee's official designation is the Drone Advisory Committee (DAC).

2. Authority. The Committee is established under the authority of the U.S. Department of Transportation (DOT), in accordance with the provisions of the Federal Advisory Committee Act (FACA), as amended, Pub. L. 92-463, 5 U.S.C. App. The Secretary of Transportation has determined that the establishment of the Committee is in the public interest.

3. Objectives and Scope of Activities. The objective of the DAC is to provide independent advice and recommendations to the Federal Aviation Administration (FAA) and to respond to specific taskings received directly from the FAA. The advice, recommendations, and taskings relate to improving the efficiency and safety of integrating Unmanned Aircraft Systems (UAS) into the National Airspace System. In response to FAA requests, the DAC may provide the FAA with information that may be used for tactical and strategic planning purposes.

4. Description of Duties. The DAC will act solely in an advisory capacity and will not exercise program management responsibilities. Decisions directly affecting implementation of transportation policy will remain with the FAA Administrator and the Secretary of Transportation. The DAC will:

  a. Undertake only tasks assigned by the FAA.

  b. Deliberate on and approve recommendations for assigned tasks in meetings that are open to the public.

  c. Respond to ad-hoc informational requests from the FAA and or provide input to the FAA on the overall DAC structure (including the structure of subcommittees and or task groups).

5. Agency or Official to Whom the Committee Reports. The DAC reports to the Secretary of the Department of Transportation (DOT) through the FAA Administrator.

6. Support. The FAA will provide support as consistent with the act, including funding for the Committee. For the period of this charter, the FAA plans to utilize contractual support to provide for logistics and administrative support.

7. Estimated Annual Operating Costs and Staff Years. The FAA's annual operating costs to support the DAC for the period and scope specified by the charter is approximately $704,000, which includes 1.0 full-time equivalent salary and benefits at $204,000, plus $500,000 in contractor costs.

8. Designated Federal Officer. The FAA Administrator, on behalf of the Secretary of Transportation will appoint a full-time Federal employee to serve as the DAC Designated Federal Officer (DFO). The DAC DFO will ensure that administrative support is provided for all activities. The Designated Federal Officer will:

   a. Ensure compliance with FACA and any other applicable laws and regulations.

   b. Call and attend all the committee and subcommittee meetings.

   c. Formulate and approve, in consultation with the Chair, all committee and subcommittee agendas.

   d. Notify all Committee members of the time, place, and agenda for any meeting.

   e. Maintain membership records.

   f. Ensure efficient operations, including maintaining itemized contractor invoices.

   g. Maintain all DAC records and files.

   h. Adjourn any meeting when doing so would be in the public interest.

   i. Chair meetings when directed to do so by the FAA Administrator.

9. Estimated Number and Frequency of Meetings. Committees will meet as follows:

   a. It is estimated that the DAC will meet three times a year to carry out its responsibilities.

   b. Meetings of the DAC will be announced in the *Federal Register* at least 15 days before each meeting, unless exceptional circumstances require shorter notice. Such circumstances will be explained in the notice. DAC meetings will be open to the public, except as provided by section 10(d) of the FACA and applicable regulations. The DAC will publish an annual report summarizing activities held in closed or partially closed meetings, consistent with the policies of the Freedom of Information Act.

   c. Anyone interested may attend committee meetings and appear before the DAC within reasonable limits of space and time. Additionally, anyone interested may file written statements with the committee.

10. Duration. Subject to renewal every 2 years.

11. Termination. The charter will terminate 2 years after its effective date, unless renewed in accordance with FACA and other applicable regulations. If the DAC is terminated, the FAA will give as much advance notice as possible of such action to all participants.

12. Membership and Designation. The FAA will submit recommendations for membership to the Secretary of Transportation, who will appoint members to the DAC. All DAC members serve at the pleasure of the Secretary of Transportation.

    a. The DAC will have no more than 35 members.

    b. Members will serve without charge, and without government compensation. The employing organization bears all costs related to its participation. Members must represent a particular interest of employment, education, experience, or affiliation with a specific aviation-related organization.

13. Subcommittees. The DAC DFO has the authority to create and dissolve subcommittees as needed. Subcommittees must not work independently of the DAC. They must provide recommendations and advice to the DAC, not the FAA, for deliberation, discussion, and approval.

14. Recordkeeping.

    a. The records of the committee and subcommittee will be handled in accordance with the General Records Schedule 6.2, or other approved agency records disposition schedules.

    b. Meeting minutes must be kept in accordance with GSA standards as published in 41 CFR Part 102-3 Subpart D - § 102–3.165.

    c. These records will be available for public inspection and copying, subject to the Freedom of Information Act, 5 U.S.C. 552. The records, reports, transcripts, minutes, and other documents that are made available to or provided for or by the DAC are available for public inspection at www.faa.gov/regulations_policies.

15. Filing Date. This charter is effective June 15, 2018, the date on which it was filed with Congress. This Committee will remain in existence for 2 years after this date unless sooner terminated or renewed.

OK Elwell

Daniel K. Elwell
Acting Administrator

Advisory Committee Member Roles and Responsibilities

Advisory committees have played an important role in shaping programs and policies of the federal government from the earliest days of the United States of America. Since President George Washington sought the advice of such a committee during the Whiskey Rebellion of 1794, the contributions made by these groups have been impressive and diverse.

Through enactment of the Federal Advisory Committee Act (FACA) of 1972 (Public Law 92-463), the U.S. Congress formally recognized the merits of seeking the advice and assistance of our nation's citizens to the executive branch of government. At the same time, the Congress also sought to assure that advisory committees:

- Provide advice that is relevant, objective, and open to the public;
- Act promptly to complete their work;
- Comply with reasonable cost controls and recordkeeping requirements; and
- Had government oversight through creation of the Committee Management Secretariat.

Participation in a FACA such as the Drone Advisory Committee (DAC) provides the Federal Government with essential advice from subject matter experts and a variety of stakeholders. The FACA requires that committee memberships be "fairly balanced in terms of the points of view represented and the functions to be performed." Selection of committee members is made based on the particular committee's requirements and the potential member's background and qualifications. DAC members assume the following responsibilities:

- Attend ¾ of all DAC public meetings during membership term.
- Provide oversight, deliberation, comments and approval of the DAC activities.
- Contribute respective knowledge and expertise.
- Participate as a member on a working group, if desired.
- Coordinate with the constituents in his or her Unmanned Aircraft System and aviation sector.
- Review work plans, if requested.
- Review the DAC and any subcommittee or working group recommendation reports.
- Inform the DAC Chair and the DFO when he or she can no longer represent his or her organization/association on the DAC.
   o Members may continue to serve until a replacement has been appointed or removed.

Daniel K. Elwell
Deputy Administrator

Daniel K. Elwell is the Deputy Administrator of the Federal Aviation Administration (FAA). Mr. Elwell was sworn in to office on June 26, 2017 following his appointment by President Trump. He also served as Acting FAA Administrator from January 2018 until August 2019.

Elwell previously served at the FAA as the Assistant Administrator for Policy, Planning, and Environment from 2006–2008. Most recently, he was Senior Advisor on Aviation to U.S. Secretary of Transportation Elaine L. Chao. Earlier in his career, he served as a legislative fellow for the late Senator Ted Stevens (R-Alaska).

From 2013–2015, as Senior Vice President for Safety, Security, and Operations at Airlines for America (A4A), Elwell was responsible for leading the advancement of commercial aviation safety and security excellence for major U.S. air carriers.

Prior to A4A, Elwell was Vice President of the Aerospace Industries Association (AIA) from 2008–2013. In this role, Elwell represented civil aerospace manufacturers and led policy development and advocacy for the civil aerospace manufacturing interests of more than 300 AIA member companies.

Elwell was a commercial pilot for 16 years with American Airlines, flying DC-10, MD-80, and B-757/767 aircraft. While maintaining his proficiency as an MD-80 Captain, he served as Managing Director for International and Government Affairs at American Airlines.

Dan earned his pilot wings at Williams Air Force Base in Arizona after graduating from the U.S. Air Force Academy with a Bachelor of Science degree in International Affairs. Lieutenant Colonel Elwell retired from military service as a Command Pilot with more than 6,000 hours combined civilian and military flight time in the U.S. Air Force and U.S. Air Force Reserve, including combat service during Operation Desert Storm.

Federal Aviation Administration

Jay Merkle
Executive Director, Unmanned Aircraft Systems Integration Office

Prior to being named the new Executive Director of the Unmanned Aircraft Systems Integration Office, Peter "Jay" Merkle was the Deputy Vice President (DVP) of the Program Management Organization (PMO) within the Air Traffic Organization (ATO). The PMO is responsible for all NextGen program activity; all National Airspace System (NAS) communications; navigation, weather, surveillance and automation modernization programs; and all service life extensions to legacy NAS sensors, communications and navigation aids. Given the tight coupling between successful automation program delivery and current system operation, the PMO also leads and manages all second-level automation engineering efforts. Lastly, the PMO works with FAA operations and aviation users to ensure globally interoperable solutions for NextGen.

Prior to that position, Merkle was the Director of Program Control and Integration, AJM-1, in the PMO for the ATO. In that capacity, he led the PMO in developing effective, timely, and innovative solutions to evolving business needs. The focus areas were program control, cross-cutting analysis and integration, and special initiatives.

Since joining the FAA, Merkle has served as the Manager of Systems Integration for Portfolio Management and Technology Development within the NextGen organization. He also has held positions as the Lead Engineer for tower, terminal, and en route automation systems, as the Chief System Engineer for En Route and Terminal Domains, and as the Chief Architect for NextGen at the Joint Planning and Development Office.

Merkle has over 30 years of extensive experience in engineering and program management. He started his career as an engineer working in cockpit and crew station design on several aircraft, including the C-17 large transport aircraft. Merkle holds a Bachelor's degree in Psychology from the University of Central Florida and a Master's degree in Industrial Engineering and Operations Research from the Virginia Polytechnic Institute and State University.

Michael Chasen
Chief Executive Officer, PrecisionHawk

Michael Chasen is the CEO of PrecisionHawk – a leading software and service provider in the commercial drone space. PrecisionHawk uses advanced drone technology combined with A.I. and Machine Learning to provide actionable business intelligence and works across the Energy, Agriculture, Telecom, Construction, and Infrastructure space. PrecisionHawk is also one of the thought leaders in flying Beyond Visual Line of Sight (BVLOS).

In his tenure as CEO, PrecisionHawk has grown to over 250 employees. In 2017, Chasen oversaw a series D funding round that culminated in $75 million, bringing PrecisionHawk's total funding to over $100 million to date and establishing the company as the world's most well-capitalized commercial drone company.

In 2018, Chasen also lead PrecisionHawk to acquire five companies including Droners.io, AirVid, HAZON Solutions, InspectTools, and Uplift Data Partners. These acquisitions helped solidify PrecisionHawk as the market leader for commercial drone services with a database of over 15,000 commercially-licensed drone pilots.

Prior to PrecisionHawk, Chasen was the co-founder and CEO of Blackboard (NASDAQ: BBBB), a leader in the global eLearning space. He grew Blackboard to serve over 30,000 institutions worldwide, had 3,000 employees and 20 offices around the world. Michael took Blackboard public in 2004 and ran it as a public company for 7 years before selling to Providence Equity Partners for $1.7B. Michael then started SocialRadar, a company specializing in improving location accuracy on SmartPhones, which he sold to Verizon in 2016.

Michael has an undergraduate degree in Computer Science and an MBA from Georgetown.

Meeting Minutes

Time: 9:00 a.m. to 4:00 p.m. Eastern Time
Location: Hyatt Regency Crystal City (Regency E, Ballroom Level), 2799 Jefferson Davis Highway, Arlington, Virginia 22202

For additional information, please view the Meeting eBook.

Meeting Summary

Acting Drone Advisory Committee (DAC) Designated Federal Officer (DFO) Carl Burleson opened the meeting at 9 a.m. on June 6. In his opening remarks, Burleson, also the Acting Federal Aviation Administration (FAA) Deputy Administrator, discussed the status of the drone industry, then went on to introduce the new members of the DAC and the newly appointed DAC Chairman, Michael Chasen.

Newly appointed DAC Chairman, Michael Chasen, PrecisionHawk USA, Inc. Chief Executive Officer, was by introduced by Carl Burleson. Chasen stated that he is honored to serve as the DAC Chairman as the industry is fundamentally changing and stressed the ability of industry to support what the FAA is doing before rulemaking is complete. Chasen went on to discuss the status of the drone industry and shared his five priorities for the DAC.

The FAA's Jay Merkle, the Executive Director of the UAS Integration Office, presented a summary to DAC members on the FAA's planned activities to support the implementation of the FAA Reauthorization Act of 2018. Merkle went on to explain that the FAA's Reauthorization of 2018 prioritizes UAS, gives the FAA full authority over UAS operating in the National Airspace System (NAS), reaffirmed the UAS Integration Pilot Program (IPP), provides mention of counter-UAS (C-UAS), and directs the FAA to develop risk-based consensus standards. Merkle moved on to give an update on the FAA's current rulemaking activities.

Mr. Merkle then reviewed how the FAA plans to address key provisions in the FAA Reauthorization Act of 2018, and provided an update outlining the outlook on remote identification (ID). Merkle highlighted the importance of remote ID as the identification and discrimination of any threats caused by UAS, also stating that this technology is fundamental for complex operations and is central to safe and secure integration of UAS into the NAS. Merkle stated that this is an opportunity for the DAC to help with the voluntary adoption of remote ID standards and described the FAA's related tasking for the DAC on this subject.

Mr. Merkle then provided the DAC with an overview of National Drone Safety Awareness Week. Merkle explained the purpose and main idea of the weeklong event. This event would provide an opportunity to highlight the societal benefits of UAS, while also giving participants a platform to host or conduct drone safety-related events and engage in drone safety related discussions in their communities.

7/23/2019

The FAA's Angela Stubblefield updated DAC members on C-UAS technology and trends. Stubblefield discussed UAS security initiatives, current capabilities to counter UAS safety and security risks, and the need for industry development of technologies and capabilities that counter these risks without compromising the safety of the NAS. Stubblefield mentioned that the malicious use of UAS is increasing and that concern is growing within the manned and unmanned aviation environments.

Jay Merkle then discussed the FAA's plan to implement the knowledge test for recreational flyers as required in the FAA Reauthorization Act of 2018. Merkle explained that through the DAC meeting, members would have an opportunity to provide input on key aspects of the test. Merkle stated that the test should be practical and easy, and material should be provided in a user-friendly rather than prescriptive format.

DAC Chairman Michael Chasen then discussed industry led topics and future outlook. Chasen covered Part 107 waiver requirements, stating that the challenge of the waiver process is the uncertainty of how to obtain a waiver. Chasen went on to explain that the DAC may be used to increase the efficiency of the process. Secondly, Chasen covered the topic of beyond visual line-of-sight (BVLOS) and how the DAC can examine safety information companies are using to obtain this type of waiver.

The meeting concluded with Burleson reviewing the four new DAC taskings from the meeting and agenda topics for the next meeting.

The meeting resulted in the following new DAC taskings:

Tasking #1: Remote Identification (90 Days, beginning on June 6, 2019)
- The Final Rule for remote identification of UAS is likely up to 24 months away. In the absence of remote identification of UAS and in consideration of security partners' concerns regarding operations over people and other waivered operations under Part 107 in the intervening period, the FAA tasks the DAC to develop recommendations on:
    1) What voluntary equipage of remote identification technologies by UAS manufacturers or operators could occur in the short-term prior to a final rule for remote identification 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 identification prior to the enactment of a Final Rule for remote identification and finalization of remote identification requirements?

7/23/2019

- 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

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.

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

Tasking #4: FAA UAS Comprehensive Plan (60 Days after receipt of Draft Plan)
- The FAA Reauthorization Act of 2018, Section 342, requires the FAA to update the comprehensive plan in consultation with representatives of the aviation industry, Federal agencies that employ unmanned aircraft systems technology in the national airspace system, and the unmanned aircraft systems industry.

7/23/2019

- The FAA will send the draft UAS Comprehensive Plan to the DAC members and task the DAC to provide feedback.
- The FAA anticipates initiating this tasking within the next two months.

- TASK GROUP LEAD: None, full DAC membership participation will be requested

Detailed Minutes

Official Statement of the Designated Federal Officer

Burleson 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 July 17, 2018.

DFO Opening Remarks

Acting Drone Advisory Committee (DAC) Designated Federal officer (DFO) and Acting Deputy Administrator Carl Burleson discussed the status of the drone industry. Burleson mentioned that Acting Federal Aviation Administrator, Dan Elwell apologized that he could not attend the meeting. A number of growing UAS metrics were provided to members as well as a recap of the FAA 2019 UAS Symposium. Burleson went on to mention that the FAA will seek advice from the DAC in a number of areas and that the he is looking forward to the discussions.

DAC Chair Opening Remarks

Newly appointed DAC Chairman, Michael Chasen, PrecisionHawk USA Inc. Chief Executive Officer, was introduced by Burleson. Chasen stated that he is honored to serve as the DAC Chairman as the industry is fundamentally changing and stressed the ability of industry to support what the FAA is doing before rulemaking is complete. Within his opening remarks, Chasen listed his top five priorities of the DAC which are remote identification, beyond visual line of sight (BVLOS), counter-UAS (C-UAS), the waiver process, and public-private partnerships. Members were urged to act as one single organization in an effort to move the UAS industry forward as he discussed the status of the drone industry.

Chasen stressed that we are no longer talking about drones in the future, we are talking about drones now. Covered in the discussion was the importance of the DAC and future rulemaking in order to prevent the industry from failing to keep up with the predicted growth of the emerging technology. Chasen provided a recap of UAS regulations and an operator timeline asserting that now is the time to discuss policy that promotes innovation and maintains safety.

The FAA's Plan to Address the FAA Reauthorization Act of 2018
Jay Merkle, Executive Director, FAA's UAS Integration Office

Mr. Merkle discussed FAA's plans and roadmap for implementing the FAA Reauthorization Act of 2018. Merkle did not touch on every provision in the Act, but did provide an overview of a number of provisions and stated that the key takeaway from the large number of provisions included in the Act is that Congress supports the safe integration of UAS into the National Airspace System (NAS). Also discussed was the prioritization of UAS provided by the Act as the FAA was given full authority of all UAS operating in the NAS through Sec. 349 which rescinded Sec. 336 of the FAA Modernization and Reform Act of 2012 (FMRA). Merkle continued to mention that the reauthorization reaffirmed the FAA's UAS Integration Pilot Program and mentioned that Congress has the ability to extend the program if needed. He also mentioned that in the 2018 Reauthorization included C-UAS provisions and directed the FAA to develop risk based standards to allow a wide range of UAS operations.

Furthering the discussion, Merkle provided an update to members of the DAC on the current rulemaking activities of the FAA. Merkle spoke about the advanced noticed of proposed rulemaking (ANPRM) for Safe and Secure Operations of small UAS (sUAS). It was described that the vision of the FAA is to use information from this ANPRM to inform the decision regarding the need to enhance or advise other rules. The second proposed rule discussed was the notice of proposed rulemaking (NPRM) for Operations of sUAS Over People. Merkle stated that many comments regarding the proposed rule have been received by the FAA and are being reviewed. Clarity was provided that the proposed rule will not be effective until remote identification is available. Lastly, the interim final rule for external markings was discussed and how operators will now need to mark the external surface of the UAS rather than within the battery compartment due to security concerns.

A review of the remote identification timeline was presented to the DAC. Merkle stated that the schedule for the rule has been moved to September 2019 and that the FAA is currently developing the draft NPRM. Closing the discussion for the Reauthorization Act of 2018, Merkle provided updates on the FAA UAS Integration Pilot Program (IPP), including the first part 135 type certification with Wing, as well as updates on the Unmanned Traffic Management (UTM) Pilot Program (UPP) and the FAA cross-agency team formed to track and coordinate multiple 2018 Reauthorization Act provisions.

Discussion on Mr. Merkle's Presentation

No discussion occurred.

FAA Update: Remote ID Outlook
Jay Merkle, Executive Director, FAA's UAS Integration Office
Michael Chasen, DAC Chair

Mr. Merkle provided an FAA update outlining the outlook on remote identification (remote ID). Merkle highlighted the importance of remote ID as the identification and discrimination of any threats caused by UAS, also stating that this technology is fundamental for complex operations and central to safe and secure integration of UAS into the National Airspace System (NAS). As remote ID is central to safe and secure integration, it is also the next major step towards a UTM system.

Merkle stated that the remote ID rule is very complex and has taken a lot of work and a lot of time. It will be the first rule that will define the public-private partnership required to make this work. Merkle also addressed the many changes presented by the 2018 Reauthorization Act and elaborated on how these changes have necessitated the FAA to go back and address changes needed for other rules that were already in progress when the legislation was enacted.

Merkle identified that this is an opportunity for the DAC to help with the voluntary adoption of remote ID. DAC Tasking number one involving voluntary early equipage of remote ID technology was then presented to the members. It was proposed to Chasen that a remote ID task group be established for the purpose of having industry drive early voluntary equipage of the technology. Merkle cited early adoption as a key element to enabling and unlocking expanded operations and business cases. He requested that the DAC form a task group and provide recommendations within 90 days.

Discussion on Mr. Merkle's Presentation

- Houston Mills (UPS): Can you please elaborate on the standards to be used by the DAC from ASTM International, SAE international, ANSI and Consumer Technology Association?
    - Following the summary of the standards, discussion then shifted to how the recommendations provided by the remote ID task group will be used by the FAA.
    - Merkle: The FAA envisions these recommendations from the DAC will be used to encourage voluntary early equipage of remote identification technology. If early equipage were to begin now, the FAA would be able to authorize operations using the technology when the infrastructure became available. Remote ID equipage may be required when applying for certain waivers, exemptions, or part 135 type certification.

- Lirio Liu (FAA): The importance of the DAC's role is providing recommendations to the FAA, specifically to assist the FAA with implementation of the remote identification rule.
    - Members of the DAC expressed concern regarding the input from the Department of Defense (DoD) and Department of Homeland Security (DHS) on the remote ID requirements needed to satisfy security concerns.

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- o Merkle: The discussions regarding remote ID including interagency coordination has taken place with federal security partners through the FAA UAS Executive Committee (ExCom) and the ExCom's Senior Steering Group (SSG). Through these meetings, Federal security partners have been continuously briefed on the status of the remote ID rulemaking effort. Once the draft rule is complete, the security partners will have the opportunity to provide comments. The FAA will share DAC recommendations with the security partners to validate the ability to use the DAC's recommendations.
  - o Stubblefield: The FAA reinforced this by stating that building a rule that meets the requirements of security partners is key.

- Mills: How does the FAA envision including subject matter experts in the task group?
  - o Merkle: The chair of the task group will provide guidance to its members on how to begin the tasking and what mechanisms will be used. Ensuring that the tasking and scope of recommendations is clearly understood by the group will allow industry to organize and provide recommendations to the FAA within 90 days that will meet the needs of security partners.

- James Burgess (Project Wing): Can the FAA provide a clear understanding of what is expected?
  - o Merkle: The ability to understand gaps in the technology is crucial as there is doubt that everything will be done right the first time. It is important for the FAA to understand how the technology will work as there are many components in play.

- Discussion continued regarding the relationship between remote identification and UTM, reflecting on the Low Altitude Authorization Notification Capability (LAANC) process, its success and the importance of public-private partnerships. Additional discussion surrounding remote identification included questions on if manned aircraft will need to equip with remote ID technology, if remote identification will enable flight in areas where UAS operations are prohibited or limited (i.e. national parks) and how the FAA plans to implement a remote identification rule. Liu expressed the importance of standards and early compliance in support of the rule.

- After a break, DAC members returned and Merkle continued the discussion on remote ID. Liu and leadership from the FAA's Chief Counsel's Office provided clarification to the regulatory aspect of the tasking for remote identification.
  - o Liu: Early equipage is beneficial and the intent of the task group is to work with industry to develop guidance on the technology in addition to supporting regulatory evaluation and analysis.

DAC Tasking #1: Remote ID
- Proposed DAC Tasking #1: Remote ID
- The Final Rule for remote identification of UAS is likely up to 24 months away. In the absence of remote identification of UAS and in consideration of security partners' concerns regarding operations over people and other waivered operations under Part 107 in the intervening period, the FAA tasks the DAC to develop recommendations on:
  1. what voluntary equipage of remote identification technologies by UAS manufacturers or operators could occur in the short-term prior to a Final Rule for remote identification 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; and
  3. are there other drivers that could lead to widespread use of remote identification prior to the enactment of a Final Rule for remote identification and finalization of remote identification 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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Drone Safety Week
Jay Merkle, Executive Director, FAA's UAS Integration Office

Mr. Merkle began with an overview of National Drone Safety Awareness Week stating that the drone community is really starting to focus on safety. It's important that drone flyers are part of the National Airspace System (NAS) and as a result understand safety responsibilities and their tremendous societal benefits. Drone Safety Week (DSW) highlights the importance of public-private partnerships and will draw upon the collective resources of the drone community. The FAA envisions working with communities and stakeholders throughout the country for a week-long series of activities in November. Key partners to assist the FAA in executing the event would include the UAS Safety Team (UAST), the Know Before You Fly (KBYF) campaign partners - the Academy of Model Aeronautics (AMA) and the Association of Unmanned Vehicles International (AUVSI).

Merkle continued to explain the goal of DSW. The focus of the event and its activities is drone safety and education. Through this initiative, the FAA wants to begin the safety dialogue across the country. Consistent messaging will be key to reinforcing drone safety and education. We also want to welcome new members into the aviation community while starting and sustaining the safety conversation. Lastly, the FAA will engage the public to make sure that they are always informed of the latest safety requirements and best practices.

Discussion on Mr. Merkle's Presentation

- Chris Anderson (3DR): One problem faced when educating the public is people usually view drones as toys and may feel that regulations don't apply to them. Has the FAA thought of redefining drones to make it clear that they are not toys for children?
    - Merkle: A task such as this would have to be clarified through Congress in order to make it clear that drones are not toys. For example, Congress could say drones 50 grams and below are toys and not aircraft (for now they are considered aircraft).

- Mills: Please expand on the roll out process of National Drone Safety Week and if there are any tangible benefits to participants besides messaging.
    - Merkle: The FAA and DOT are developing a whitepaper describing the roll out. The plan is to put together a playbook for the weeklong event that participants can use. Post event, the FAA intends to capture data from activities that have taken place and repackage this information for future use. The FAA wants to build on material from year to year.

- Anderson: Why isn't the FAA emphasizing privacy messaging, a secondary message may cover the issue of privacy.
    - Bob Brock (KDOT): Privacy and security are related, and it is important that an ecosystem protecting all is created.

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- o Merkle: The FAA's mandate is safety. Privacy is mainly a state and local issue and FAA welcomes them addressing that. However, the FAA will not set privacy policies.
  - o Burleson: The priority of FAA is safety. Local authorities can provide better messaging regarding state privacy issues. The drone industry will have as much of a safety focus as manned aviation does and this focus is of personal interest to me when UAS are used as a tool for law enforcement officers as my son is a law enforcement officer. There are two messages that may be spread, the first being that there is no competition on safety and the second that this is an opportunity to make society safer.

- Brendan Schulman (DJI): I agree, DJI thinks safety is of utmost importance. With the pattern of airport happenings we are reaching a point where safety issues need to be solved. DJI has implemented safety technologies to alleviate these concerns and will continue to do so in the future.

- Discussion continued between the DAC members regarding automatic dependence surveillance broadcast (ADS-B) out, specifically if ADS-B out will saturate the network and, if so, if it will affect air traffic control (ATC).
  - o Merkle: The problem is multipath, many drones operating in populated areas would be received by FAA Surveillance Broadcast System. The FAA would have to filter out and identify against manned aircraft. This is a complex process.
  - o Discussion surrounded the meaning of wide area network and considering internet based transmission.

- This agenda item closed with many of the DAC expressing support for National Drone Safety Awareness Week, the need to include lead participants from other FAA programs (IPP, UPP), and how this event will highlight the importance of aviation safety.

Update on Counter-UAS Technology Trends
Technology & Tools for Countering UAS Security Risks
Angela Stubblefield, Deputy Associate Administrator, FAA's Office of Security & HAZMAT Safety

Ms. Stubblefield spoke about UAS security issues, mentioning that more security issues exist beyond the counter-UAS space. The malicious use of UAS are increasing and raising concerns in the manned and unmanned aviation environment. Comparing the security risk of manned aviation to that of unmanned, it was stressed that it takes regulators and industry to identify layers to a multifaceted strategy. It is important we address the careless, clueless, and criminal as appropriate and it is the responsibility of all to deal with malicious UAS. We need to work together to make it harder to use UAS for malicious purposes.

Stubblefield continued her presentation by describing the space where UAS operate, stating that currently there are many undocumented UAS operating in the NAS. These undocumented UAS operate in the same space as all other UAS. As UAS are able to be identified we can move them into a category of compliant UAS. Clearly compliant UAS are not of any worry, however it is the UAS that are not compliant or that we cannot identify that we must be concerned with. Through this point, the importance of remote identification was reinforced. Also highlighted was the need for recreational operators to comply with remote identification requirements, when available, in order to move them into an identified compliant category. Stubblefield did mention that in the end the clueless and careless (drone operators) will still need to be addressed.

The next part of the presentation focused on the limited C-UAS authority granted to other federal agencies through the 2018 Reauthorization Act. Stubblefield stated that the FAA is not the agency that will take an aircraft out of the sky and stressed that C-UAS technologies may have a negative unintended consequence associated with their use. It is clear that we do not want to create a safety hazard for other aircraft while addressing security risks that UAS may pose.

Next, Stubblefield provided "Proposed DAC Tasking #2: UAS Security Issues" to members. The FAA tasked the DAC to develop a recommendation on standards or protocols that will address the current and possible future UAS security concerns and allow for expanded UAS operations and help the industry grow. Discussion centered on the focus of the tasking while members asked for Stubblefield to clearly define what types of recommendations were needed from the task group.

Stubblefield then went on to discuss detection and C-UAS considerations, stating that coordination with users of C-UAS technology is important to the FAA and again restating that the Agency does not want to create any safety hazards while addressing UAS issues. The second DAC tasking was discussed while Stubblefield added that there is a focus on domestic support for using C-UAS. The DAC was asked what other technologies are available that can be used and how the future of the technology affects the C-UAS toolkit. Dan Dalton (Airspace Systems,

Inc.) was asked to provide an industry perspective on behalf of DAC Member Jaz Banga, CEO of Airspace Systems, who could not attend the meeting.

Dalton focused on expanding the discussion regarding UAS security issues, stating that we should start addressing the issue of drone security and not C-UAS. Dalton asked DAC members to start thinking of how security can be built into the drone, starting from when it is developed. Dalton highlighted that there is an abundance of data currently out now that can be used to identify what we can do to safely advance the industry. Needs such as automating existing security rules and leveraging new technology must be industry-led. The future of technology and policy of C-UAS is something we need to accelerate to accommodate the development of new types of drones although it may open up a new class of nefarious actors. Moving along the conversation, the DAC was asked to consider what metrics are important to send to the FAA for security purposes.

Discussion on Ms. Stubblefield's Presentation (continued after members returned from break)

- Houston Mills (UPS): The idea of security by design is fascinating and there is need to ensure that C-UAS technology is limited to its specific purpose.
  - Stubblefield: The FAA tries to use the terms errant or malicious while focusing on how to separate these types of actors from compliant operators. Remote identification is needed to remove compliant operators from the threat category and right now everyone looks like a threat.

- Mark Colborn (Dallas Police Department): If bad actors were located would operator information be handed over to the FAA? Having state or local laws that mimic those of the FAA is crucial in order to investigate these types of operations and operators. An example of the similarities of state and federal laser laws is that states have the ability to convict offenders using lasers to interfere with manned aircraft operations. If examples are made out of bad actors, results will follow.
  - Stubblefield: DHS used C-UAS technology to cover the Super Bowl, where three dozen violations of the temporary flight restriction (TFR) occurred alone. In these scenarios, operators cannot be located. Regarding the need for field education and how to provide assistance to law enforcement officers, the FAA's Law Enforcement Assistance Program may be able to be leveraged for this purpose.

- Greg Agvent (CNN): Please expand on the systems used to cover the Super Bowl, as these were detection efforts taking place and the next step is interdiction. How will we move forward?
  - Stubblefield: Detection and interdiction were available during the event, as well as mitigation. Mitigation does not have to be technology, it may also be an approach to a response. If violations were detected, the mitigation approach would be to identify and locate the operator, land the drone and then figure out the intentions of that

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operation. There was mention of the technical elements of C-UAS but also the importance of using the technology as sparingly as possible.

- Joe DePete (ALPA): Was there an emphasis placed on detection rather than mitigation, with the understanding that mitigation may be more complex? Is there an interest in focusing on detection?
  - Stubblefield: The focus is drone security, we should address what would make the aircraft secure so that it cannot be used in a nefarious manner or taken control of remotely. At what level can this be done from an industry standpoint and what makes sense in protecting the integrity of an operation from a security perspective? What can be done to an aircraft to address security concerns?

- Marily Mora (Reno-Tahoe Airport Authority): In the last six months nefarious UAS operators have become a top concern. Part of the DAC tasking should focus on the protection of airports.
  Comment from Deborah Flint, DAC Member (Los Angeles World Airports) who was unable to attend the meeting, was read aloud for the record by Mora:
  I am very sorry that I am unable to attend today's meeting personally, but I have sent key leadership from my team and look forward to engaging with all of you – our new Chair Michael Chasen and both new and continuing members – on the critically important work of this committee.

  The world today looks very different from when the DAC last met 11 months ago. We have seen majorly disruptive drone incidents at and around manor global airports – most notably and Gatwick, but also at Newark and other U.S. airports.

  We know that a Gatwick-type incident at LAX would be devastating for the local, regional and national economy. It also could grind the public appetite for integration of drones into the National Airspace System to a halt. Yet, even after Gatwick and other incidents, the fundamentals for preventing and responding to such incidents are not yet in place.

  This committee has the right people and mandate to tackle these issues and develop specific timeframes, outcomes and clearly defined roles and responsibilities to guarantee the safety and security of our airports.

  Thank you for treating this issue with the urgency it demands.

- Stubblefield then presented the DAC members with an updated tasking on UAS security issues and included "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?"

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- o Burgess: This is a complicated problem as the ease of building drones with operational limitations may present complications in the future. It is important to understand what other technologies are being developed for non-cooperative aircraft and to ensure that the industry doesn't develop overly broad constraints for drones.
  - o Stubblefield: Bad actors will always be present and in the case when we do not know anything about an operator the hope is that secondary tools are in place such as low altitude authorization notification capability (LAANC) to derive operator information from. Detection and mitigation becomes hard as we are trying to identify the entire spectrum of UAS. UAS security will provide multiple layers of security.
  - o Burgess: Is it possible that the DAC has more insight as to what is needed for non-cooperative detection? Currently tools are being developed for good actor identification, however these same tools may be used to help identify bad actors. There may be an interest in understanding the gaps or limits of non-cooperative detection technologies.
  - o Robie Samanta Roy (Lockheed): This may be a classical architecture approach. Is this what is being sought through the DAC tasking? There are other analogies. This effort may be about risk management.
  - o Burleson: The tasking is intended to provide knowledge to the FAA that we may not have. The request is that the DAC work through limitations and infrastructure.

- Mariah Scott (Skyward): What is the expected output of the DAC as the request of the reformatted tasking may be too broad?
  - o Stubblefield: The goal of the tasking is to identify where UAS technology is going and being sure that what has been identified has applicability.
  - o Brock: Will it be helpful for DAC members to provide feedback on what is an acceptable level of risk?
  - o Discussion continued around the details and clarification of the tasking.
  - o Burleson: The FAA is looking to industry to match what the Agency does for aviation safety.

- Brendan Schulman: We may be talking about security rather than safety. The UAS Safety Team (UAST) is already working on safety enhancements, including geofencing, security is about criminal actors and counter-UAS. DJI produced a paper with one principle being the need for local officials to be able to respond and identify drones that are not compliant. Part of the tasking for the DAC may be what we recommend in response to criminal actors and how to empower local responses.
  - o Lorne Cass (American Airlines): Members of the DAC need better defined roles and responsibilities for this tasking.
  - o Stubblefield: We may need to identify if this is the right venue to discuss detection and mitigation systems.
  - o Burleson: The intent of the tasking is to evaluate the data in these areas to better inform where we are trying to go.

o   Scott: If the tasking focused on capabilities and limitations to inform what may be considered it may require a more defined and actionable approach.

- Stubblefield: Jay Merkle has described this tasking as "How can we make drones less scary?" The FAA is trying to express that there are a lot of security concerns surrounding nefarious actors. With this, what can the FAA do to address bad actors with what is already in place, and from an industry realm, what can be done within manufacturing or software to make drones less scary?
  - o   Schulman: If the approach is to see what can be done on board the drones voluntarily, bad actors may just be moved to purchase other products that do not have those features.
  - o   Chasen: This conversation will need to be continued within the DAC task group for 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 do them, would substantially reduce the likelihood of unintentional threatening behavior.

- TASK GROUP LEAD: Jaz Banga, Co-Founder and Chief Executive Officer, Airspace Systems, Inc.

The FAA Knowledge Test for Recreational Flyers
Jay Merkle, Executive Director, FAA's UAS Integration Office

Mr. Merkle discussed the Knowledge Test for Recreational Flyers opening with the most frequent question of when people can provide feedback. Today's public meeting is the first of a likely four opportunities in which input can be provided on the test. Within the next month the FAA is going to be publishing a Request for Information (RFI) about creating public-private partnerships to provide the test. Per the legislation, besides FAA, there are two other types of entities that are able to provide the knowledge test for recreational flyers, Community Based Organizations (CBO) or other (FAA) designees. The FAA also intends to establish the definition of a CBO in the future, (for now all test providers besides the FAA will be considered designees).

Merkle continued the discussion with an outline of the RFI. We are proposing a narrative-style training and testing module. It is going to be for the community. We want it to be in a fun,

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enjoyable format instead of a restrictive, dull format. Merkle stated that the real goal of this test is to have the knowledge to operate safely. We want this test to be as approachable as possible. We want to take the test to gain the knowledge and build a safety culture.

Merkle proceeded to discuss the areas of input sought through stakeholders to include an effective model of the knowledge test, testing fees, testing age and data collection and availability. The last area discussed surrounded the new advisory circular (AC) that would provide guidance on the full implementation of the statute, to include the CBO recognition process and standards and limitations for UAS over 55 pounds. The draft AC will be posted for public comment.

Discussion on Mr. Merkle's Presentation

- Burgess: Technology in this industry is rapidly evolving. Can we build the test in a modular way so that it can be easily updated as needed? Is there any room to provide comments on the architecture of the test?
  - Merkle: We are having these discussion internally.

- Steve Ucci: Many states have safety courses and they are not limited about age because it's part of safety.
  - Merkle: The provision requires that these recreational flyers be personally identifiable. We are seeking public input regarding these issues. The RFI will be on the FAA's Contracting Opportunities (FACCO) site. We want to get this test up and running so we are enhancing safety.

- Agvent: What is the thought process on touch points?
  - Merkle: The thought process is that designees will open up availability of touch points to include others.

- Burleson: Can you please clarify what questions we are asking when seeking input from stakeholders as mentioned in the slide?
  - Merkle: The importance in seeking input from stakeholders is receiving public input as internal discussions are already taking place.

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Industry-Led Technical Topics
Michael Chasen, DAC Chair

Mr. Chasen initiated the next section of the meeting with a discussion surrounding Part 107 waiver improvements. The challenge is uncertainty on how to obtain waivers and the DAC is able to provide more certainty to the process. It is important to use the DAC to obtain tangible results. Chasen continued to describe the waiver process and purpose, and discussed the demand for clarity in the wavier process providing that it will also influence more investments and increase effectiveness of the FAA.

Chasen then moved on to propose that a DAC task group be formed focusing on recommended improvements for the Part 107 waiver process. Mills brought mention of the accelerated waiver activity found in IPP operations. It was asked if the DAC envisions leveraging this and using this knowledge in the task group.

Chasen proceeded to mention key components of the tasking, including mapping the current FAA waiver process and identifying potential improvements to the waiver process. Schulman provided feedback to the described process stating that the DAC continues to go without small business owner or service provider representation. Schulman continued that he would like to see how the DAC can engage with this large part of the drone community as larger companies already have waivers while small businesses do not. Schulman concluded by proposing the ability of small business owners to provide comments to the DAC. Chasen agreed that the DAC should take into consideration the needs of smaller companies in order to ensure that they are not left out of the conversation. Thomas Karol (National Association of Mutual Insurance Companies) also expressed support, offering the idea of using information on granted waivers to create a standard template that others may use.

Chasen began to brief the members on BVLOS. Describing the previous involvement of his company, PrecisionHawk Inc., he expressed that he would like to continue examining how companies can operate BVLOS and addressing the needs for future rulemaking that are not being addressed today. Merkle responded with the mention of safety cases for BVLOS operations. Chasen asked the DAC to address one challenge of providing sub-definitions of levels of BVLOS as safety cases may need to be identified according to different levels of operation. It was suggested that a future task on BVLOS would be proposed at the next DAC meeting. Rich Hanson (AMA) supported the challenge by suggesting that a list be compiled of UAS safety cases for BVLOS operations.

Chasen gave a recap of items discussed throughout the DAC meeting and highlighted the importance of public-private partnerships. Chasen then began to address the need to form the task group that would address the Part 107 waiver process. Burleson provided comment and stated that DAC tasking is provided by the FAA. Burleson acknowledges that the waiver process has been discussed and the FAA is always looking to improve the process. The points of the

DAC members have been understood in full and the FAA agrees and will form a task group consisting of members of the DAC. Burleson and Merkle were to discuss the task group moving forward and then provide instruction on how to address the waiver process.

Discussion on Mr. Chasen's Presentation

Burleson: Taskings must be provided from the FAA to the DAC. Part 107 waiver discussions have taken place within the agency and the FAA is always looking to improve the process. The points of the DAC members have been understood in full and the FAA agrees and will form a task group consisting of members of the DAC. Jay and I will discuss the task group's approach to BVLOS waivers moving forward, then provide instruction on how to address the waiver process.

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

New Business/Agenda Topics/Review Taskings
Jay Merkle, Executive Director, FAA's UAS Integration Office
Michael Chasen, DAC Chair

Acting DAC DFO Burleson opened the last agenda item by summarizing the DAC taskings discussed throughout the meeting. After the discussion regarding remote ID, Chasen appointed Steve Ucci as the task group chair. Stubblefield provide a summary of DAC Tasking #2 to the group. Following this, Chasen appointed Jaz Banga as the chair for the C-UAS task group. Chasen then selected Brian Wynne as the chair for the waiver task group. The final tasking is for the DAC to Review and Comment of the FAA's UAS Comprehensive Plan. This tasking will conclude 60 days after the draft plan is received by the DAC from the FAA. There is no task group chair for this final tasking, and all DAC members are asked to provide feedback.

Discussion

- Hanson: How will the task groups be populated?
  - Burleson: The chair of the task group will select members. It is important to note that task groups are not limited to DAC members.

- o Wynne: If possible we would like to survey smaller groups. AUVSI can provide this.

- Zuccaro: The focus of the DAC is to prioritize the safe integration of UAS into the NAS. Recent tasks were more business related. All of this has to be subservient to safety.
  - o Burleson: Thank you for your remarks. The purpose of the FAA is to integrate safely and we look to this committee because they do feed into the safety of the NAS. Remote ID provides safety in the NAS. Priorities of the DAC must have the same commitment to safety.
  - o Zuccaro: What is the problem with listing "safety" as a priority?
  - o Brock: Safety is an implied task and baseline recommendation when committees put forward recommendations. Stakeholders should not recommend anything that does not have a safe baseline.
  - o Zuccaro: Then what is the problem with listing safety as a priority in the document?
  - o Burleson: Record of this discussion will be captured in the minutes and safety is agreed upon within the group.
- Chasen: Thank you everyone for your participation. I think this is the right group of people to handle critical issues for the industry. These improvements will open up the industry across the board while promoting safety.

Tasking #4: FAA UAS Comprehensive Plan (60 Days after receipt of Draft Plan)
- The FAA Reauthorization Act of 2018, Section 342, requires the FAA to update the comprehensive plan in consultation with representatives of the aviation industry, Federal agencies that employ unmanned aircraft systems technology in the national airspace system, and the unmanned aircraft systems industry.
- The FAA will send the draft UAS Comprehensive Plan to the DAC members and task the DAC to provide feedback.
- The FAA anticipates initiating this tasking within the next two months.

- TASK GROUP LEAD: None, full DAC membership participation will be requested

Closing Remarks

Burleson: Safety is the priority when integrating this new user into the system.

Mills: I am very impressed by the focus to safety and security of everyone involved.

Burleson: Mark your calendars for our next DAC meeting. We are considering October 22, 23, & 24 as possible dates.

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Adjourn

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

Appendix A: Meeting Attendees

First Name	Last Name	Organization	Attendee Type
Michael	Chasen	Chief Executive Officer, PrecisionHawk USA, Inc.	DAC Chair
Greg	Agvent	Senior Director of National News Technology, CNN	DAC Member
Chris	Anderson	Chief Executive Officer, 3DR	DAC Member
Bob	Brock	Director of Aviation and UAS, Kansas Department of Transportation	DAC Member
James	Burgess	Chief Executive Officer, Wing (an Alphabet company)	DAC Member
Lorne	Cass	Vice President, Operations / Industry Affairs, American Airlines (AA)	DAC Member
Peter	Cleveland	Vice President of Law and Policy Group, Intel Corporation	DAC Member
Mark	Colborn	Senior Corporal, Dallas Police Department	DAC Member
Joe	DePete	President, Air Line Pilots Association	DAC Member
Trish	Gilbert	Executive VP, 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
George	Kirov	VP and General Manager, Commercial UAS Solutions, Harris Corporation	DAC Member
Michael	Leo	Captain, New York City Fire Department	DAC Member
Houston	Mills	Vice President, Flight Operations and Safety, United Parcel Service (UPS)	DAC Member
Marily	Mora	President and CEO, Reno-Tahoe Airport Authority	DAC Member
Robie	Samanta Roy	VP of Technology Strategy and Innovation, 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	Sinnett	Vice President Product Development and Strategy, Boeing Commercial Airplanes	DAC Member
Steve	Ucci	Senior Deputy Majority Leader, Rhode Island State Assembly	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
Carl	Burleson	FAA and Acting DAC Designated Federal Officer	Government
Bonnie	Ahumada	FAA	Government
Rahat	Ali	FAA	Government
Erik	Amend	FAA	Government
David	Astorga	FAA	Government
Danny	Blum	FAA	Government
Teri	Bristol	FAA	Government
Bill	Crozier	FAA	Government
Teresa	Denchfield	FAA	Government
John	Dermody	FAA	Government
Bailey	Edwards	FAA	Government
Arjun	Garg	FAA	Government
Chris	Hillers	DOT	Government
Kate	Howard	FAA	Government
Peter	Irvine	DOT	Government
Tammy	Jones	FAA	Government
Maureen	Keegan	FAA	Government
Lirio	Liu	FAA	Government
Claudio	Manno	FAA	Government
Ashleigh	Martin	FAA	Government
Jay	Merkle	FAA	Government
Joe	Morra	FAA	Government
Phil	Newman	FAA	Government
Mike	O'Shea	FAA	Government
Jessica	Orquina	FAA	Government

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Lorelei	Peter	FAA	Government
Lauren	Remo	DOT	Government
Genevieve	Sapir	DOT	Government
Kirk	Shaffer	FAA	Government
Angela	Stubblefield	FAA	Government
Guy	Turner	DOT	Government
Damon	Walker	DOT	Government
Randy	Willis	FAA	Government
Karen	Chartrand	Transport Canada	Government Observer
Bill	English	National Transportation Safety Board	Government Observer
Alexandra	Jeszeck	Government Accountability Office	Government Observer
Daniel	Kozub	Embassy of Canada	Government Observer
Felix	Meunier	Transport Canada	Government Observer
Vladimir	Murashov	Center for Disease Control and Prevention	Government Observer
John	Sasse	USN NAVSEA	Government Observer
Basil	Yap	NC Department of Transportation	State, Local, and Tribal Government Observer
Mark	Aitken	DJI Technology Inc.	Observer
Jack	Allen	Airlines for America	Observer
Brandon	Allen	IAFC	Observer
Ben	Ambrose	Horizon Hobby	Observer
Vishal	Amin	Aertron, Inc.	Observer
Kenneth	Baker	Air Carrier and Ab Initio Training (Americas)	Observer
Michael	Baum	Aviators Code Initiative	Observer
Sara	Baxenberg	Wiley Rein LLP	Observer
Stacey	Bechdolt	The Moak Group	Observer
Darby	Becker	GE Aviation	Observer
Grant	Bishop		Observer
David	Bowen	Measure	Observer
Charles	Boyd	Akin Gump	Observer

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Missye	Brickell	Intel	Observer
Chris	Brown	Consultant	Observer
Mike	Burnside	American Fuel & Petrochemical Manufacturers	Observer
Bill	Carey	Avionics and Air Traffic Management	Press
Sean	Cassidy	Amazon Prime Air	Observer
Andy	Cebula	Airlines for America	Observer
Drew	Colliate	AUVSI	Observer
Diana	Cooper	Precision Hawk	Observer
Daniel	Dalton	Airspace Systems	Observer
Jim	Davis	uAvionix Corporation	Observer
Mel	Davis	Cavan Solutions	Observer
John	Davisson	Electronic Privacy Information Center	Observer
Jeff	Dygert	AT&T	Observer
Robert J.	Ehrich	Slipstream Strategies	Observer
Josh	Elder	Bell Flight	Observer
Lisa	Ellman		Observer
Max	Fenkell	AIA	Observer
Richard	Fox	Ohio UAS Center	Observer
Jeff	Frank	FLIR Systems, Inc.	Observer
Brianne	Garciallo	Politico	Observer
Ben	Gielow	Amazon	Observer
Anna	Gomez	Wiley Rein LLP	Observer
Zachary	Gossett	National League of Cities	Observer
Tom	Gramaglia	Battle Road Advisors	Observer
Dean E.	Griffith	JONES DAY® - One Firm Worldwide℠	Observer
Jessica	Hale	The City of Los Angeles: Federal Affairs Office	Observer
Alexander	Harmsen	Iris Automation, Unlocking Your Drones	Observer
Cat	Hofacker	American Institute of Aeronautics and Astronautics	Press
Andrew	Howell	Monument Advocacy	Observer
Catherine	Jackson		Press
Doug	Johnson	Consumer Technology Association (CTA)	Observer
Chris	Julius	AA	Observer
Wilson	Kagabo	Locus Dynamics	Observer
Charles	Keegan	Aviation Management Associates, Inc.	Observer
Randy	Kenagy	ALPA	Observer
Philip	Kenul	ASTM F39	Observer
Rob	Knochenhauer	GreenSight	Observer

7/23/2019

Brittany	Kohler	National League of Cities	Observer
Tracy	Lamb	AUVSI	Observer
Adam	Lisberg	DJI Technology Inc.	Observer
David	Logsdon	CompTIA	Observer
Lisa	Malloy	Intel Corporation	Observer
Nicolas	Marcou	dGAC	Observer
Chris	Martino	Helicopter Association International	Observer
Terry	McVenes	RTCA	Observer
David	Messina	FPVFC	Observer
Samuel	Minifie	American Petroleum Institute	Observer
Chris	Mitton	Fortem Technologies	Observer
Kerry	Moker	DroneCourse.com	Observer
Jeff	Mort	Los Angeles World Airports	Observer
Vic	Moss	Moss Photography/Drone U	Observer
Margart	Nagle	Wing	Observer
Matthew	Navarrete	Union Pacific Corporation	Observer
Eric	Nottorf	Bell Flight	Observer
Alexis	Oberg		Observer
Chris	Oswald	ACKUNA	Observer
Christian	Ramsey	uAvionix	Observer
Mark	Reed	ALPA	Observer
Jeff	Richards	Narional Air Traffic Controllers Association, National UAS Representative	Observer
Michael	Robbins	The Moak Group	Observer
Melissa	Rudige	AOPA	Observer
Amanda	Rutherford	MTSNAC	Observer
Matthew	Satterly	AirMap	Observer
Michelle	Schwartz	Los Angeles World Airports	Observer
Al	Secen	RTCA, Inc.	Observer
Charles	Small	Washington Office of Los Angeles Mayor Eric Garc	Observer
Libby	Snyder	Uniform Law Commission	Observer
Annette	Taber	CompTIA	Observer
James	Taylor		Observer
Ryan	Terry	LMCO	Observer
Joshua	Turner	Wiley Rein LLP	Observer
George	Valcarcel	Ascension Global	Observer
Sally	Veith	Air Medical Operators Association	Observer
Stella	Weidner	The Boeing Company	Observer

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Steve	Weidner	Narional Air Traffic Controllers Association	Observer
Heidi	William	NBAA	Observer
Raymond	Young	NY UAS Test Site	Observer
Mark	Zimmerman	Simplex Manufacturing Company	Observer

Written Public Comments Submitted Since Last DAC Meeting

SMALL UAV
COALITION
A Partnership for
Safety & Innovation

August 26, 2019

Honorable Daniel K. Elwell
Deputy Administrator
Federal Aviation Administration
Designated Federal Official
Drone Advisory Committee

Michael Chasen
Industry Co-Chair
Drone Advisory Committee

Dear Deputy Administrator and Mr. Chasen,

The Small UAV Coalition[1] responds to the invitation the Drone Advisory Committee (DAC) extended at its June 6, 2019 meeting to submit suggestions as to (1) how manufacturers and operators could voluntarily equip unmanned aircraft systems (UAS) with remote identification technology ahead of a remote identification (ID) final rule, (2) what types of incentives the Federal Aviation Administration (FAA) could provide to encourage industry to voluntarily equip UAS with remote ID; and (3) whether there are any other drivers to promote widespread equipage (Tasking #1).

As the FAA has recognized, the need to address remote ID requirements is foundational to further advancement of opportunities for UAS operations at scale. The Coalition has long advocated for a requirement that drones be equipped with remote ID technology. Several Coalition members participated in the FAA's Remote Identification and Tracking Aviation Rulemaking Committee ("ARC"), which issued its report in October 2017, and in ASTM Group F-38 Committee's development of remote ID standards. Earlier this year, the Coalition submitted a set of specific recommendations for inclusion in the FAA's proposed rule, one of which is to adopt the ASTM remote ID standards.

The sooner remote ID is implemented, the sooner safety, security, and privacy benefits can be realized. The Coalition is also keenly aware that the rulemaking process typically takes up to a year or more to get to final rule. For these reasons, the Coalition strongly supports actions to promote remote ID implementation in advance of the initiation of the rulemaking process, which

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[1] Members of the Small UAV Coalition are listed at www.smalluavcoalition.org.

we remain hopeful will begin in September. To promote implementation of remote ID equipage in advance of the FAA's adoption of a final rule, the Coalition offers the proposals outlined herein.

Voluntary Equipage

Remote ID technology is available now and in use by many UAS operators. The UAS industry is ready to demonstrate the effectiveness of the technology and its potential to deliver immediate safety, security, and privacy benefits at a reasonable cost.

The Coalition urges that any pre-rule implementation promoted by the DAC be consistent with the ASTM standards as it represents a well-considered approach to deployment of remote ID.[2] The Coalition suggests that in conjunction with such promotion, the DAC also implore the UAS industry publicly to commit to remote ID equipage in advance of the completion of the rulemaking process. The Coalition's member companies stand ready to make such a public commitment once the DAC makes its determination.

To demonstrate the potential of remote ID in addressing a number of concerns with UAS operations, the Coalition also recommends the DAC urge the FAA to sponsor live remote ID demonstrations to key interest groups, such as Congress, Federal law enforcement and homeland security agencies, State and local law enforcement officials, and the general public. In addition, the FAA should support and acknowledge live demonstrations conducted by the UAS industry. Live remote ID demonstrations are critical to public acceptance of commercial drone operations in a range of use cases, including over people and beyond visual line of sight in both remote or urban environments. The FAA should work with industry and State, and local agency participants in the Integrated Pilot Program to facilitate these demonstrations. The Coalition members are prepared to explore such presentations with the FAA to help ensure they are conducted safely. Such opportunities would benefit from the DAC's endorsement.

The Coalition members are prepared to explore such presentations with the FAA in partnership with Federal, State, and local agencies to facilitate these demonstrations and help ensure they are conducted safely. Such opportunities would benefit from the DAC's endorsement.

Incentives

In order to incentivize companies to implement remote ID in compliance with the ASTM standards, the Coalition believes the FAA should provide priority consideration to Part 107 waiver and section 44807 exemption petitions filed by UAS operators that have implemented the ASTM remote ID standards. In addition to expedited processing, the Coalition believes that remote ID equipage should be considered favorably in evaluating the merits of a waiver or exemption request because it increases the margin of safety of the drone operations.
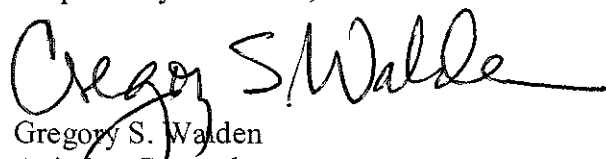
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[2] While Tasking #1 refers to remote identification standards projects by SAE International and ANSI/Consumer Technology Association (CTA), only the ASTM standards project is complete and suitable for the FAA's adoption.

Other drivers

Tasking #1 also asked whether there are any other drivers that could lead to widespread remote ID equipage before the FAA publishes a final rule. The Coalition believes that a statement from the FAA that its rule will be based on and consistent with the ASTM standards would encourage the UAS industry to begin equipage in compliance with these standards.

In summary, FAA adoption of the ATSM standards in advance of the FAA's final remote ID rule, industry equipage commitments and public demonstrations, and FAA's commitment to expedite and favorably consider waiver and exemption applications, will spur broad industry implementation of remote ID equipage before the rulemaking process is complete. As an incentive to equip UAS with remote ID, the Coalition recommends that the FAA offer expedited and favorable treatment of waiver and exemption applications. The Coalition looks forward to moving forward with this opportunity and is available to meet with the Lead and members of Task Group 1 at a mutually convenient time.

Respectfully submitted,

Gregory S. Walden
Aviation Counsel
Small UAV Coalition

Copy to:

Steve Ucci, Task Group Lead
Jessica Orquina, FAA

SECURITY – THREAT ANALYSIS AND INTERDICTION – OCTOBER 2019

John H. Hilditch, MSTM

ABSTRACT

Flight duration for sUAS vehicles is determined by battery capability vs current draw [formula & citation]. Current generation (2018) vehicles [define] typically stay airborne for thirty (230) minutes or less. The short flight envelope simultaneously provides initial interdiction constraints. Interdiction requires the successful execution of several elements within that short time frame.

1. Weaponized sUAS antagonists must be discovered from within swarms where they seek anonymity. They must be positively identified as a threat, dynamically tracked, and analyzed in flight to determine threat type(s) [explanatory footnote- A, B, C, SigInt or Explosive] being transported.

2. The device must dynamically and simultaneously have its flight path backtracked from discovery point to flight origin so flight duration can be estimated while rapid response intercept teams [do these exist?] are dispatched [using what mechanism] to apprehend and identify the launch team(s).

3. Meanwhile, the forest UTM system [domain master] charged with security [several UTMs could be operating in a theatre] must determine the predicted flight paths, parse a target database [needs to be created and constantly updated for identification, attack probability and value weight] any potential targets within flight range.

4. Potential grounding locations must be identified, taking several prerequisite elements into consideration: They are
    a. Threat payload
    b. Threat target probabilities
    c. Pedestrian densities along the predicted flight path(s) [pedestrian considerations explained and referenced],
    d. Appropriate response team proximity,
    e. Surface traffic densities,
    f. C2 mesh blind spots and dead zones
    g. Interdiction solution selection (type and location)
    h. Interdiction authority decision (does interdiction authority cross political boundaries?)
    i. Dispatch interception team interface functionality [does an interface with 911 exist? Is it universally deployed?]

WHAT IS MISSING?

- A definitive airspace segmentation scheme
- Positive ID system (for cooperative and non-cooperative UAS traffic)
- An effective legitimate vs illegitimate sUAS usage filtration system

- Threat detection systems with effective IFF components
- Non-compliant detection effectiveness under high density sUAS traffic conditions
- Non-compliant false negative and false positive detection acceptance levels
- Secure and redundant C2 system with D2D ad-hoc sub-networking capability
- Spectrum allocation rules and management structure
- Harmonized nationwide 5G infrastructure build-out authorization and rule structure
- 5G C2 test and validation
- Safe interdiction and emergency services coordination plans
- UTM to Surface traffic and emergency services response coordination system
- Threat and Airspace reservation matrices
- A harmonized national regulatory structure
- The ability to guarantee timely and appropriate ground-based emergency services on-site presence to secure the landing zone (LZ) before an intercepted sUAS touches down.

WHAT ARE THE CHALLENGES?

- Complete the development of UTM/ATM system coordination protocols to ensure seamless integration and operation.
- Develop a robust counter-UAS system that:
  - Isolates non-compliant sUAS traffic from within a swarm
  - Quickly and effectively identifies which sUAS devices are threats
  - Determines the threat level for each
  - Decides on appropriate interdiction plans for each
  - Co-ordinates safe interdiction scenarios with minimized latency and
  - Ensures timely and appropriate ground forces response to secure a landing zone (LZ) in preparation for receiving a downed sUAS.
- Upgraded 911 systems to address sUAS interdictions and coordinate surface emergency services response in whatever urban area sUAS flights are approved.
- Develop a software link that automatically patches into the 911 system and delivers appropriate landing zone (LZ) and HazMat information to emergency responders when a sUAS interdicting agency attempts an intercept.
- Develop a harmonized national regulatory structure and provide training to all enforcement agencies throughout the country as a prerequisite to allowing sUAS flights in urban areas. There are sure to be adversarial incidents where public safety officials are involved. This is a new technology to most of them so the laws regulating use of these devices must be made crystal clear to those charged with enforcement or litigation will become very costly to municipal governments rather rapidly.

Onboard communications are separated into two main groups, Command and Control (C2) and Ad Hoc networking which is used to communicate with swarm cohorts (V2V or D2D) for sense and avoid maneuvers and/or tactical purposes. Ad-hoc communications tend to be limited yet more immediate as they utilize direct vehicle to vehicle (V2V) communications to address tactical issues. C2 communications, however, are subject to latency challenges resulting from 'hub-and-spoke' delays imparted by the upload, collation, analyses and download sequences of a top-down command model. Ad-hoc networking may experience role expansion as swarm intelligence

2

capabilities improve. Until decision responsibility becomes a swarm intelligence role however, particularly with aerial interdiction episodes, the top-down C2 rather than ad-hoc model will remain dominant (Lamont, Li, & Zhou, 2013). The requirements for both should expand and possibly merge, to some degree, as the field matures and their roles continue to complement each other.

FLIGHT INTERDICTION (BASIC QUESTIONS)

Identifying and interdicting airborne sUAS threats is not a homogenous endeavor. Every incident is different and, according to reports from the US military's Black Dart exercises over the past ten years (Whittle, 2015), there is no 'magic bullet' solution. When a threat is initially suspected and possibly confirmed, authorities may decide that interdiction is the only sure way to eliminate the threat, whatever its nature may be. In an urban context, making the decision to forcibly ground a sUAS flight carries numerous ramifications, physical, legal and safety related. The following are elements in such a decision tree. Each one comes with challenges.

The following are a few (yet incomplete) items to be addressed when considering what would be required to develop an In-flight Interdiction plan. Urban sUAS interdiction will, unfortunately, be a fact of life going forward. Terrorism, banditry, anti-social behavior, the allure carried with '15 minutes of fame' or dreams of easy money will always draw some people to become societal outliers. sUAS vehicles will be a new criminal tool that travels at significant speeds through crowded airspace over even more crowded streetscapes. In order to interdict such a flying threat, authorities will have very limited time to identify the threat, determine what kind of threat it is, discover (or deduce) where it is going and when it will arrive at its intended target. They will then have to determine where would be a safe location to bring the sUAS down, clear that area, coordinate with ground-based emergency services to be on site before the sUAS is knocked from the sky so they can secure the site and sUAS (in the event it is carrying a hazardous or explosive payload). Each step in such a decision process adds time to a rapidly closing opportunity window so all this has to happen at a very fast pace. I've constructed this list of elements and questions to ask in constructing a response plan to demonstrate how complex and difficult a challenge faces planners. This is simply one of many scenarios that require significant planning and management to make urban sUAS low altitude integration happen.

- What is the discovery methodology
  - How would specific vehicles be perceived to present a threat while in-flight?
  - What would happen if the sUAS belonged to another government agency and was non-communicative or operating in a 'dark' mode for security purposes?
- **Positive identification**
  - If a vehicle is non-responsive, how will positive identification be made?
  - If a vehicle is non-responsive, how will a determination be made that the sUAS is non-compliant or simply has suffered a communications device failure?
  - What criteria will determine threat status absent communications capability?
- **Flight status validation**
  - Absent communications capability, yet flying on a LAANC validated flight plan be positively identified as the sUAS assigned to that flight plan?

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- o Absent communications capability, how will authorization for a sUAS to be in a specific flight area be determined to an intercept agent or device?
  - o What amount of latency could be expected during a challenge and response sequence while the unresponsive sUAS is moving at speed?
- **Geolocation and vector analysis** (where in 3D space is the outlier UAS? What vector & velocity?)
  - o What methods would be employed to locate and track a non-responsive sUAS in flight?
  - o At some point a decision would be made to interdict the flight and ground the device. What protocol would be employed for identifying safe landing zones and directing surface security personnel to secure the grounded device?
  - o How would air to ground interdiction predict safe landing zones from blocks away when pedestrian and/or surface traffic cannot be determined from the interceptor's location?
- **Proximal airspace analysis** (are any restricted areas in the outlier's path or proximity?)
  - o Given the speed and agility of sUAS flight, what criteria would be used to predict flight into a geo-fenced area thereby triggering a threat alert?
- **Interdiction Decision criteria**
  - o Given the wide variety of potential flight options and airspace, what criteria would be used to determine whether a particular device is a threat beyond the obvious flight into or toward a TFR?
  - o Would threat levels be determined by proximity to a geo-fenced or TFR protected area?
  - o Would a challenge and response protocol interrogate the sUAS for automated TFR receipt for the intercept jurisdiction?
  - o Would automated TFR and geo-fenced area issuance be part of the LAANC flight plan approval process?
- **Decision matrices**
  - o Given the short decision time frame, what would an interdiction threat analysis entail?
  - o What would an interdiction decision matrix require?
  - o What would an interdiction decision matrix contain?
  - o What organization would have the development responsibility for such a matrix?
  - o Has any development work been started to provide security authorities with a matrix?
- **Interdiction Decision Authority**
  - o Given the airspeed and short duration of urban sUAS flights, would interdiction decisions be made by local or national authorities?
  - o What would the interdiction decision process entail?
  - o What elements would an urban sUAS threat analysis include?
- **Intercept Elements**
  - o Target analysis
  - o Intercept analysis
    - C2 spectrum analysis
    - flight path analysis

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- Projected LZ analysis
- Safety analysis
- Intercept success probability analysis
- Intercept type determination
- Intercept timing decision
- Surface analysis below intercept flight path
- Safe LZ determination
- Intercept authorization
- Surface unit arrival coordination
- Intercept action
- Intercept follow-up analysis

As I mentioned at the beginning of this section, each challenge I've identified will bring with it a series of challenges. Some may prove more complex and troublesome than others but none will arrive unencumbered.

SECURITY

- Industrial espionage (Gortney, 2016)
- Private intelligence gathering threats
- Political campaign intelligence gathering
- Terrorism (e.g. off-the-shelf drones fitted with explosives in the middle east) (Gortney, 2016)
- Subminiaturized sUAS privacy invasion (passive monitoring by tiny, stationary, sUAS devices) (ibid.)
- Interdiction and its challenges (Whittle, 2015)
  - How to identify and intercept non-compliant operators and sUAS vehicles
  - Safe interdiction
  - Legal consequences of interdiction (Rupprecht, n.d.)
  - Non-regulatory interdiction (hijacks, thefts, private groundings)
- Foreign manufacturers creating a ubiquitous, yet unnoticed, domestic intelligence apparatus capable of being dynamically re-tasked for intelligence gathering purposes via unremarked, autonomous, 'phone home' software update processes. (Patterson, 2017), (Gortney, 2016)

LEGAL AND LIABILITY

- Interdiction challenges (Jonathan Rupprecht, JD, Esq., CFI, CFI-I , "Federal Drone Law")
- Torts flowing from accidents involving UAS activities
- Privacy invasion
- Airspace ownership (including primacy doctrine litigation)
- Local patchwork laws vs harmonized national code
- UAS registration conflict (Taylor v FAA lawsuit)

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SOCIETAL

- Airspace ownership and privacy invasion (Foina, Krainer & Sengupta, 2015)
- Noise abatement issues
- Technology overload
- Intrusive surveillance activities
- Luddite (techno-skeptical) resistance

REFLECTIONS

The pace of change in this field is so rapid that it was difficult to contain the scope of this project or stop the research process to complete the paper. There were so many interconnected areas to include when telling the story that it became a bit unwieldy during the assembly process. At the heart of any research paper is the ability to discover facts and tell a story about them. I touched on many of the subjects in this paper and tried to show the links that require their presence when painting a picture of sUAS integration into urban low altitude airspace. A number of them would rate a paper of their own. I found several areas, rather late in the process, that really caught my attention and are worthy of additional study. Two have my attention and will be topics for their own individual studies. Both are security related which is not really my focus but their sheer complexity and importance have a firm grip on me. They are interdiction and autonomous 'phone-home' re-tasking.

AERIAL INTERDICTION SAFETY CONSIDERATIONS (with respect to Part 107.39)

Given the current administrations legislative efforts (S.2943 - National Defense Authorization Act for Fiscal Year 2017) and others, interdiction and drones being 'shot down' in one form or another seems almost inevitable. Companies are beginning to ramp up advertising for UAS interception solutions. While such interceptions may play out fairly innocuously in a rural context, the potential for catastrophe in urban airspace seems pretty evident to me. I realize part 107 prohibits flight over human beings and the current FAA position is fairly hardened in that respect. However, with companies (Uber, etc.) beginning to make noise about personal UAS transport for urban airspace, current sUAS initiatives could be viewed as precursor or pathfinder enabling technologies. I have lots of questions about this area but I'll start with a short list.

1. How will interdiction over populated airspace (urban or otherwise) be conducted safely?
2. How will outlier or other non-cooperating sUAS objects be safely grounded?
3. How will potential aerial interdiction efforts play out against Part 107.39?
4. Will the inability of various security organizations to remove intrusive sUAS objects from low altitude airspace without endangering pedestrians below be the deal breaker that finally prohibits urban integration?
5. Is the FAA planning for low altitude aerial interdiction?
6. What are the potential ramifications for such interdiction on part 107.39 rulemaking?

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7. What planning has been made for automated 911 alerting prior to interdiction action being taken?
8. What steps will be in place to endure appropriate emergency responders (HazMat, EOD, etc.) will be on site at an interdiction landing zone (LZ) prior to grounding?

New change to law on or around June 5, 2018 about reasonable rights and expectations of privacy. [**citation needed here**]

INITIAL NARRATIVE

Identifying threats within a benign urban airspace sUAS vehicle swarm will be a daunting task for a variety of reasons. The following are systemic and temporal constraints:

- Average sUAS flight time based on battery life when laden.
- Identifying non-responsive sUAS vehicles from within a compliant, communicating swarm.
- Determining whether a non-compliant target is a 'dark' operations sUAS under control of a security organization or a threat.
- Is the non-compliant sUAS operating alone or as part of a sub-swarm?
- Determining flight path(s) and potential target(s).
- Determining flight origin and controller(s) (reverse SigInt?)
  - How would this be accomplished?
  - What organization would be in control?
  - How could it be done sufficiently rapidly to interrupt the flight and round up the perps?
- Identifying controlled landing zones (nearest) along flight path
- Identifying potential payload (A-B-C or SigInt)
- Identifying appropriate responding organization (HazMat, EOD, etc.)

FLIGHT NARRATIVE

A non-cooperative sUAS is identified [how? By what means?] within a swarm (or larger murmuration). What direction is it going and at what speed? Where is it coming from? Is it alone or part of a group? Is it a rogue non-compliant sUAS or being operated by a security agency or military organization in 'dark' mode? Is there a clearing house for these types of operations? Who runs it and how effective is its track record on timely alerting of all UTM stakeholders?

HYPOTHETICAL SCENARIO

At some point in the near future, weaponized off the shelf sUAS devices (drones) seen in war zones like Syria, will appear in US urban airspace as asymmetric conflict weapons. Countering this new

© John H. Hilditch, MSTM (October 10, 2019)

threat will require significant US first response infrastructure modernization. This will occur across several domains. I will explain what is involved in a small narrative.

Unmanned Traffic Management (UTM) systems, currently under various stages of development by several entities, are intended to identify, track, and otherwise manage urban air mobility. This means such systems will manage any devices operating in the urban airspace, in much the same way police and traffic control manage street level traffic. With potentially thousands of such devices delivering goods, moving people, inspecting structures, monitoring installations and providing surveillance, this third dimension of traffic management will also need to provide security for those at street level. To do so, positive identification, robust communications, and real-time tracking of each airborne device are absolute mandatory components. None of those are at an operational state of development currently.

In a potential threat scenario, a non-communicative drone, or one that is flying without a mandatory flight plan [citation] is somehow discovered among all other airborne traffic. Assume, for the sake of argument, that this drone is a typical retail device using current battery technology. Battery life therefor limits it to approximately 30 minutes of flight time. Several issues must be resolved within that thirty-minute flight time frame.

- It (they) must be positively identified,
- Traced back to its (their) point(s) of flight origin,
- Response teams dispatched to flight origin location(s)
- have its potential range and flight paths determined (based on time spent already in flight),
- Determine that the drone is a threat and designate as such (criteria?)
- Identify any potential targets in its predicted flight range
- Analyze and determine its weaponized payload (how?)
- Analyze and designate drone as either a 'lone wolf' or swam operator
- Analyze and designate for interdiction
- Have potential grounding locations along predicted flight paths designated
- Have properly equipped and trained first response teams (FRT) staged within the city
- Dispatch appropriately equipped and trained FRT(s) along predicted (potential) flight paths to designated grounding locations(s)
- UTM controllers (?) determine pedestrian and surface traffic at designated grounding location(s)
- FRTs secure designated grounding location(s) by clearing pedestrian and surface traffic
- Interdiction ordered
- Drone grounded
- Payload contained

Summary Questions

1. In the quest to deliver urban air mobility to US NAS, are these and other security issues involving first response being adequately addressed?
2. What structure exists, or is in planning, that can provide timely and complete management across all domains involved?
3. What adjudication structure will handle cross domain conflicts with minimal inter-domain communication interference?

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