



U.S. Department  
of Transportation

**Federal Aviation  
Administration**

Office of the Administrator

800 Independence Ave., S.W.  
Washington, DC 20591

February 3, 2022

The Honorable Maria Cantwell  
Chair  
Committee on Commerce, Science,  
and Transportation  
United States Senate  
Washington, DC 20510

Dear Chair Cantwell:

Enclosed is the Federal Aviation Administration's (FAA) report to Congress on the Update of the FAA Comprehensive Plan and unmanned aircraft systems (UAS) Program Alignment, as required by Section 342 of the FAA Reauthorization Act 2018 (Public Law 115-254).

This report describes the agency's strategy to support the safe integration of UAS into the National Airspace System; leverage capabilities learned across programs and avoid duplication; and systematically and timely implement the UAS Integration Pilot Program, Low Altitude Authorization and Notification Capability, UAS Traffic Management (UTM), and the UTM Pilot Program. With reference to the considerations set forth in Section 342(b), this report fulfills the mandate in Section 342(d).

A similar response has been sent to the Ranking Member of the Senate Committee on Commerce, Science, and Transportation, and the Chair and Ranking Member of the House Committee on Transportation and Infrastructure.

Sincerely,

A handwritten signature in black ink that reads "Steve Dickson". The signature is fluid and cursive, with the first name "Steve" and last name "Dickson" clearly legible.

Steve Dickson  
Administrator

Enclosure



U.S. Department  
of Transportation  
**Federal Aviation  
Administration**

Office of the Administrator

800 Independence Ave., S.W.  
Washington, DC 20591

February 3, 2022

The Honorable Roger F. Wicker  
Ranking Member  
Committee on Commerce, Science,  
and Transportation  
United States Senate  
Washington, DC 20510

Dear Ranking Member Wicker:

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This report describes the agency's strategy to support the safe integration of UAS into the National Airspace System; leverage capabilities learned across programs and avoid duplication; and systematically and timely implement the UAS Integration Pilot Program, Low Altitude Authorization and Notification Capability, UAS Traffic Management (UTM), and the UTM Pilot Program. With reference to the considerations set forth in Section 342(b), this report fulfills the mandate in Section 342(d).

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Washington, DC 20591

February 3, 2022

The Honorable Peter A. DeFazio  
Chair  
Committee on Transportation and Infrastructure  
House of Representatives  
Washington, DC 20515

Dear Chair DeFazio:

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Steve Dickson  
Administrator

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of Transportation

**Federal Aviation  
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Office of the Administrator

800 Independence Ave., S.W.  
Washington, DC 20591

February 3, 2022

The Honorable Sam Graves  
Ranking Member  
Committee on Transportation and Infrastructure  
House of Representatives  
Washington, DC 20515

Dear Ranking Member Graves:

Enclosed is the Federal Aviation Administration's (FAA) report to Congress on the Update of the FAA Comprehensive Plan and unmanned aircraft systems (UAS) Program Alignment, as required by Section 342 of the FAA Reauthorization Act 2018 (Public Law 115-254).

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Steve Dickson  
Administrator

Enclosure



**FAA**  
**Aviation Safety**

## **REPORT TO CONGRESS:**

# **Update of the FAA Comprehensive Plan and Unmanned Aircraft Systems (UAS) Program Alignment**

**FAA Reauthorization Act of 2018 (Pub. L. No. 115-254) – Section 342**

## **Executive Summary**

The Federal Aviation Administration (FAA) Administrator submits this report on the Update of the FAA Comprehensive Plan and UAS Program Alignment in accordance with Section 342 of the FAA Reauthorization Act of 2018 or “the Act.”<sup>1</sup> This report describes a strategy to support the safe integration of UAS into the National Airspace System (NAS), avoid duplication and leverage capabilities learned across programs, and systematically and timely implement commercially-operated Low Altitude Authorization and Notification Capability (LAANC); the UAS Integration Pilot Program (IPP); and the UAS Traffic Management (UTM) Pilot Program (UPP). With reference to the considerations set forth in Section 342(b), this report fulfills the mandate in Section 342(d).

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<sup>1</sup> Pub. L. 115-254 (Oct. 5, 2018).

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## Introduction

The integration and civil operation of UAS, commonly known as drones<sup>2</sup>, in the NAS has increased rapidly over the last decade. The U.S. Department of Transportation (DOT) and the Federal Aviation Administration (FAA) continue to address a number of regulatory and technical questions and challenges to ensure that the continued integration of UAS into the NAS occurs safely. As an example of these challenges, UAS tend to attract a new community of operators because of technological advances and automation. A person with no prior aviation experience can purchase a drone that ultimately could share airspace with traditional, manned aircraft.

The development of the UAS industry and the potential use of UAS for a range of operations and missions has challenged certain conceptions about aviation and the use of the NAS. Unmanned aircraft vary in size significantly (e.g., some are smaller than a cell phone while others have a wingspan as large as a Boeing 747). UAS have varying degrees of autonomous flight technologies, a capability that is evolving rapidly to enable the use of UAS in many types of operations (e.g., inspecting infrastructure, monitoring forest fires, delivering medical supplies, aiding the agricultural industry, enhancing border security and engaging in commercial uses, such as food and package delivery). The use of UAS in certain types of operational missions may create public benefits, but it also can pose safety or security concerns for other operators in the NAS, and for people and property on the ground, when UAS are unreliable, operated carelessly or recklessly, or used to support criminal activities.

The FAA forecasts that the small UAS (sUAS) recreational unmanned aircraft fleet used in limited recreational operations under Title 49 of the *United States Code* (Title 49 U.S.C.) § 44809<sup>3</sup> will reach approximately 1.39 million units by 2023.<sup>4</sup> Industry estimates predict that full integration of drones could reach a national economic benefit of \$82 billion and result in more than 100,000 jobs within the next decade.<sup>5</sup>

In the early days of UAS integration, the FAA authorized operations of UAS in the NAS on a case-by-case basis, after evaluating the scope of certain proposed operations to determine whether they could occur safely. In 2016, the FAA established the UAS Integration Office to lead the agency's integration efforts. The FAA's initial successful

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<sup>2</sup> This report uses the term “drone” and “UAS” interchangeably.

<sup>3</sup> Title 14 of the *Code of Federal Regulations* (14 CFR) § 1.1 defines small unmanned aircraft as “an unmanned aircraft weighing less than 55 pounds on takeoff, including everything that is on board or otherwise attached to the aircraft.” The term “model aircraft” in this document and in the [FAA Aerospace Forecast](#) means aircraft that operate pursuant to the exception for limited recreational operations of unmanned aircraft codified at 49 U.S.C. § 44809.

<sup>4</sup> [FAA Aerospace Forecast: Fiscal Years 2019-2039, available at https://www.faa.gov/data\\_research/aviation/aerospace\\_forecasts/media/FY2019-39\\_FAA\\_Aerospace\\_Forecast.pdf.](https://www.faa.gov/data_research/aviation/aerospace_forecasts/media/FY2019-39_FAA_Aerospace_Forecast.pdf)

<sup>5</sup> According to the Association for Unmanned Vehicle Systems International (<https://www.auvsi.org/our-impact/economic-report>), in the first three years of integration, more than 70,000 jobs will be created in the United States with an economic impact of more than \$13.6 billion. This benefit will grow through 2025 when they foresee more than 100,000 jobs created and an economic impact of \$82 billion.

integration efforts included the promulgation of the “Operation and Certification of Small UAS” final rule,<sup>6</sup> which created 14 CFR part 107, Small Unmanned Aircraft Systems; the development and implementation of an online sUAS registration system pursuant to 14 CFR part 48, “Registration and Marking Requirements for Small Unmanned Aircraft”; and the establishment of new aviation partnerships to explore operational concepts like operations over people for news-gathering purposes and beyond visual line-of-sight (BVLOS) flights for infrastructure inspection in rural parts of the United States.

The FAA published the “Remote Identification of Unmanned Aircraft” final rule on January 15, 2021 and it went into effect on April 21, 2021. The Remote ID rule will be critical in identifying UAS flying in the NAS and the location of the control stations of UAS. The ability to identify an unmanned aircraft and its control station can assist the agency and law enforcement in preventing, deterring, and detecting potential safety and security risks.

The FAA has based continued integration of UAS mainly on the regulatory framework of 14 CFR part 107. Operations that involve unmanned aircraft weighing 55 pounds or more or UAS engaged in delivery of cargo are complex operations and are subject to regulatory requirements more stringent than the requirements codified at 14 CFR part 107. Under the IPP, state, local, and tribal governments, along with industry and other organizations, conducted complex operations of UAS under the existing Part 107 regulatory framework. The IPP’s findings have served as a basis to continue with integration efforts.

The FAA’s activities in furthering UAS integration involve a variety of developments. For example, LAANC, discussed in greater detail below, is an important tool that automates UAS airspace authorizations to operate in the NAS and therefore supports the integration of a large volume of UAS operations. LAANC also serves as a building block for supporting UTM, which the FAA envisions as a suite of capabilities that enable advanced, routine low-altitude UAS operations (e.g., routine package delivery and BVLOS operations).

Executing each phase of integration requires close collaboration across all FAA lines of business (LOB), federal stakeholders, the UAS industry, academia, research organizations, and other stakeholders. The FAA’s UAS Integration Office has developed agency-wide documents detailing activities the FAA intends to carry out to continue to integrate UAS safely into the NAS. The Implementation Plan for Integration of Unmanned Aircraft Systems into the NAS (referred to as the FAA UAS Implementation Plan) is one of these documents. It outlines agency-wide integration efforts and facilitates coordination of interdependent activities across the FAA by providing a common framework for the management of UAS integration discussions.

In accordance with the Act, the FAA continues to focus on using existing regulatory frameworks to further UAS integration and to create a strategy to enable advanced operations. The goals of this strategy include supporting the safe integration of UAS

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<sup>6</sup> 81 FR 42209 (June 28, 2016).

into the NAS, implementing new technologies and programs in a systematically and timely manner, leveraging capabilities and information from various programs, and avoiding duplication.

### **Legislative Mandate**

#### **SEC. 342. UPDATE OF FAA COMPREHENSIVE PLAN.**

*(a) IN GENERAL.—Not later than 270 days after the date of enactment of this Act, the Secretary of Transportation shall update the comprehensive plan described in section 44802 of title 49, United States Code, to develop a concept of operations for the integration of unmanned aircraft into the national airspace system.*

*(b) CONSIDERATIONS.—In carrying out the update under subsection (a), the Secretary shall consider, at a minimum—*

- 1) the potential use of UTM and other technologies to ensure the safe and lawful operation of unmanned aircraft in the national airspace system;*
- 2) the appropriate roles, responsibilities, and authorities of government agencies and the private sector in identifying and reporting unlawful or harmful operations and operators of unmanned aircraft;*
- 3) the use of models, threat assessments, probabilities, and other methods to distinguish between lawful and unlawful operations of unmanned aircraft; and*
- 4) appropriate systems, training, intergovernmental processes, protocols, and procedures to mitigate risks and hazards posed by unlawful or harmful operations of unmanned aircraft systems.*

*(c) CONSULTATION.—The Secretary shall carry out the update under subsection (a) 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.*

*(d) PROGRAM ALIGNMENT REPORT.—Not later than 90 days after the date of enactment of this Act, the Secretary shall submit to the appropriate committees of Congress, a report that describes a strategy to—*

- 1) avoid duplication;*
- 2) leverage capabilities learned across programs;*
- 3) support the safe integration of UAS into the national airspace; and*
- 4) systematically and timely implement or execute—*
  - a. commercially-operated Low Altitude Authorization and Notification Capability;*
  - b. the Unmanned Aircraft System Integration Pilot Program; and*
  - c. the Unmanned Traffic Management Pilot Program.*

## **Strategy to Support the Safe Integration of UAS into the NAS**

The FAA's vision for fully integrating UAS into the NAS includes unmanned aircraft operating safely and securely in the same airspace as manned aircraft. This vision is

anchored by the FAA's mission to provide the safest, most efficient aerospace system in the world.

## **Overview of Strategy**

To successfully achieve this vision, the FAA must balance certain aspects of UAS integration (e.g., the potential of the technology, the speed of innovation, the volume of operations, and the shifting landscape of regulations and standards) with the need to ensure the safety of the NAS. Successful integration also requires close collaboration among the FAA, other Federal stakeholders, and the UAS industry to leverage capabilities learned across programs and avoid duplication of efforts. The FAA has focused on using existing regulatory frameworks (e.g., current rules, exemptions, waivers, deviations) to create initial pathways for advanced operations while simultaneously developing performance-based rules that enable routine complex operations.

The Integration of Civil Unmanned Aircraft Systems in the National Airspace System Roadmap<sup>7</sup> (Roadmap) contains an overview of the FAA's strategy to integrate UAS into the NAS safely. The UAS Implementation Plan includes the FAA's activities to execute this strategy. Both the Roadmap and Implementation Plan describe rulemaking projects: the FAA has published new rules to address the expanding operations and capabilities of UAS, balancing the mitigation of safety and security risks with support for technological and operational advancements.

Outreach and communication are important components of the FAA's strategy for UAS integration into the NAS. By educating potential UAS operators, local governments, and the public about UAS operations allowed under current regulations and waivers, the FAA facilitates safe and compliant operations. As part of its efforts to integrate UAS safely into the NAS, the FAA participates in and hosts a variety of events to promote UAS safety and to engage the UAS community and public. These events include the annual FAA UAS Symposium, conferences, and stakeholder meetings. In 2019, the FAA launched National Drone Safety Awareness Week, which the FAA also held in 2020. This event provided outreach to stakeholders, recreational drone pilots, and the public to address the safe integration of UAS into the NAS. FAA and DOT leadership facilitated the increased focus on and discussion about drone safety throughout the week.

Engagement with Federal, state, and local law enforcement agencies also is required for the safe and secure integration of UAS into the NAS. Through the Law Enforcement Assistance Program (LEAP), the FAA provides resources and facilitates investigative support to law enforcement agencies to educate members of law enforcement and assist with criminal and administrative enforcement. For example, LEAP's Law Enforcement Checklist, available online, helps law enforcement identify necessary steps in responding to situations involving the operation of unsafe or unauthorized UAS. The

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<sup>7</sup> Integration of Civil Unmanned Aircraft Systems (UAS) in the National Airspace System (NAS) Roadmap, Third Edition (2020), available at [https://www.faa.gov/uas/resources/policy\\_library/media/2019\\_UAS\\_Civil\\_Integration\\_Roadmap\\_third\\_edition.pdf](https://www.faa.gov/uas/resources/policy_library/media/2019_UAS_Civil_Integration_Roadmap_third_edition.pdf)

Office of Unmanned Aircraft Systems Integration (AUS) provides resources to LEAP Special Agents as these Special Agents provide guidance to law enforcement to support their public safety mission. AUS and LEAP worked together to provide public safety agencies with the Public Safety Small Drone Playbook that provides an investigative resource guide. AUS and LEAP continue to provide webinars, videos, and other print and electronic media to support public safety. Overall, the FAA's strategy to integrate UAS into the NAS also includes working closely with other Federal agencies to address privacy, cyber, and security risks associated with UAS.

In order for society to realize the benefits of UAS fully, UAS safety culture must become part of the fabric of our society. The FAA has and will continue to initiate dialogue and engagement throughout the country to help safely usher in this new era of aviation. The FAA is committed to spreading a message about the importance of safety and has used numerous methods to do so, including forums where traditional aviation and UAS communities can discuss safety in the NAS.

### **The Integration of Civil UAS in the NAS Roadmap**

The Roadmap outlines, within a broad timeline, the tasks and considerations needed to enable UAS integration into the NAS. The Roadmap is a public-facing, high-level document that guides stakeholders in the aviation industry in understanding operational goals as well as aviation safety and air traffic challenges. The Roadmap fulfills the congressional mandate in Section 332(a)(5) of the FAA Modernization and Reform Act of 2012 (Pub. L. 112-95).

The FAA made the first edition of the Roadmap available to the public in 2013. Along with the first edition of the Roadmap, the 2018 and 2020 versions are available on the FAA public website at [https://www.faa.gov/uas/resources/policy\\_library](https://www.faa.gov/uas/resources/policy_library).

The 2020 Roadmap describes the FAA's strategy to use an "operations first" approach to authorize UAS operations using existing regulations and to conduct UAS research in a "building block" approach for operational capabilities. It highlights the FAA's strategy to continue to engage in outreach to UAS operators and the public at large to educate current and prospective drone users about their safety responsibilities and to address security concerns by working closely with industry stakeholders.

### **The UAS Implementation Plan**

The UAS Implementation Plan is an internal agency-wide document that details how the FAA intends to accomplish the operational activities necessary to execute its strategy for safe integration of UAS in the NAS. The plan provides a description of the actions, expected outcomes, and requisite timelines to achieve integration. It provides a common framework for discussing the vast landscape of UAS-related activities across the FAA. The FAA's UAS Integration Office, under the guidance of the FAA UAS Executive Working Group and UAS Board, led the development of the UAS Implementation Plan. The UAS Integration Office worked collaboratively across all FAA LOBs to ensure the participation of agency subject matter experts. The UAS Implementation Plan informs the FAA's 1) Integration of Civil UAS in the NAS Roadmap; 2) UAS Integration Research; and 3) other UAS-related activities and content. The FAA updates the UAS Implementation Plan annually to reflect new

legislative requirements and Administration priorities. The information in the UAS Implementation Plan helps establish the FAA's annual budget priorities.

### **UAS Integration Research**

UAS Integration Research is aligned with FAA strategic priorities and initiatives, the five-year UAS Integration Approach, and the National Aviation Research Plan. While these strategic priorities and initiatives direct the FAA's UAS Integration Research, such research also is a vital component of an iterative process that serves to inform policies, procedures, and regulations.

UAS Integration Research provides a common framework for managing the variety of UAS-related research activities. This framework serves as a vehicle for understanding how to use research and development, including assessments of abilities to integrate UAS and updates on the advancement of various technologies. The FAA also is taking advantage of independent, non-sponsored UAS research efforts. For instance, the agency is leveraging an evolving array of UAS research and analyses that government agencies, industry, academia, international organizations, and standards bodies conduct to inform rulemaking and operational changes that will enable full UAS integration into the NAS. This report includes a comprehensive list of UAS Research Partners at Appendix A. More information on the FAA's UAS Research and Development is available at: [https://www.faa.gov/uas/research\\_development/](https://www.faa.gov/uas/research_development/).

The FAA has a multi-faceted strategy to integrate UAS safely into the NAS. As outlined in the Roadmap and described in the UAS Implementation Plan, the FAA strategy is to apply existing regulations through the aforementioned "operations first" approach and to enable UAS integration research to advance operational capabilities. The FAA supplements these core components of the FAA's strategy to integrate UAS safely into the NAS with its plans to continue outreach and education efforts regarding the importance of a safe and secure NAS.

## **Strategy to Leverage Capabilities Learned Across Programs and Avoid Duplication**

The FAA's strategy to ensure program alignment is based on mechanisms for internal and external coordination that allow the FAA to leverage capabilities learned across programs and avoid duplication.

### Internal Coordination

At the senior executive level, the FAA Deputy Administrator chairs the FAA-wide UAS Board, which meets monthly to determine and track cross-LOB UAS strategy. The FAA's staff-level subject matter experts working on specific UAS-related projects convene biweekly for a UAS Liaison Meeting. The UAS Executive Working Group (EWG) and the UAS/Advanced Air Mobility (AAM) Executive Steering Group (ESG) described below receive outputs from the Liaison Meeting.

A cross-section of senior leaders and working level staff also meet on a weekly basis to discuss the most pressing and time-sensitive UAS issues. This "Hot Topics" Meeting has convened consistently for several years and serves as a conduit for ensuring agency alignment on messaging, planned activities, and preventing duplication of efforts. Below is additional information about these mechanisms for leveraging capabilities learned across programs.

### **UAS Board**

Chaired by the FAA Deputy Administrator, the FAA-wide UAS Board of senior executives meets monthly to determine and track cross-LOB UAS strategy and address agency barriers.

### **UAS Executive Working Group (EWG)**

To purpose of the EWG is to review the progress of UAS integration and to provide input to members of cross-agency teams working on UAS integration. Participants in this internal meeting are executives from a range of FAA offices.

### **UAS/AAM Executive Steering Group (UAS/AAM ESG)**

The ESG is a small group of executives that routinely participate to address UAS and AAM systemic challenges and decisions that affect multiple LOBs. The ESG generally does not consider minor issues that involve only one office of primary responsibility. Individual waiver or exemption issues may come up to be adjudicated, but the group exists to resolve the policy issues that may affect other applicants. ESG membership consists of Executive Directors, Directors, or Vice Presidents in the FAA, or lower level executives with the delegated authority from appropriate Executive Directors or Vice Presidents.

### **UAS Integration Research Roundtable**

To avoid duplication in the realm of research, the FAA created the UAS Integration Research Roundtable of senior technical subject matter experts. This internal working

body focuses on identifying and coordinating research requirements to support UAS operational capabilities. Outputs from the Roundtable inform the development of the FAA's plans for UAS Integration Research.

### External Coordination

The FAA actively coordinates with other Federal agencies, industry, and international organizations to further the safe integration of UAS into the NAS and to support the FAA's global leadership role.

### **UAS Executive Committee (ExCom)**

Congress established ExCom in the Duncan Hunter National Defense Authorization Act for Fiscal Year 2009<sup>8</sup> to serve as a focal point for resolution of policies and procedures relating to UAS access to the NAS. ExCom's mission is to enable increased and ultimately routine safe and secure access to the NAS by UAS engaged in public and civil aircraft operations in support of operational, training, developmental, and research requirements of the UAS ExCom members. The UAS ExCom also supports cooperation among the participating departments and agencies and, as needed, coordination with the Executive Office of the President, to address the safety and security risks posed by errant and malicious drone operations effectively and to ensure the safety and security of UAS traffic management systems while enabling the continuing growth of UAS operations as a vital part of the nation's aviation system. The ExCom supports operational, training, developmental, and research requirements of the Department of Homeland Security (DHS), Department of Commerce, Department of Defense (DOD), Department of Energy (DOE), Department of the Interior, Department of Justice (DOJ), Department of State, FAA, and National Aeronautics and Space Administration (NASA). Top-level executives with a role in UAS integration meet on a quarterly basis at the ExCom. They provide strategic guidance on initiatives and solutions to increase access to the NAS for Federal UAS engaged in public and civil aircraft operations with the goal of routine, safe operations.

### **Science and Research Panel (SARP)**

The Science and Research Panel (SARP) supports the UAS ExCom and its two subcommittees: the UAS Integration Senior Steering Group (I-SSG) and the UAS Security Steering Group (S-SSG). The SARP is comprised of member agency research experts who collaborate on sound technical approaches and partnerships across member agencies and the broader academic and science community. The SARP identifies and validates research gaps that impact UAS integration and coordinates and leads interagency resources and expertise to develop specific solutions and recommendations that address these gaps. Through regular collaboration and information sharing venues (including advisory board meetings, workshops, and government/industry open days), the SARP provides insight as to how research initiatives may align with commercial and academic efforts to avoid duplication and reduce costs across the agencies.

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<sup>8</sup> Pub. L. 110-417 § 1036 (Oct. 14, 2008)

### **UAS Integration Senior Steering Group (I-SSG)**

The I-SSG is a group subordinate to the UAS ExCom that focuses on UAS integration issues. While it deals with the same integration issues as the ExCom, it does so at the deputy level rather than with top-level executives. Member agencies are the same as the ExCom agencies—specifically DHS, Department of Commerce, DOD, DOE, Department of the Interior, DOJ, Department of State, FAA, and NASA.

The I-SSG's role is to identify strategic goals, objectives, and priorities that clearly define a path for near-term access and long-term integration of UAS into the NAS while ensuring all agencies' priorities are integrated and aligned to achieve common objectives.

### **UAS Security Senior Steering Group (S-SSG)**

The S-SSG is a group subordinate to the UAS ExCom that focuses on UAS security issues. While it deals with the same security issues as the ExCom, it does so at the deputy level rather than with top-level executives. Member agencies are the same as the ExCom and I-SSG agencies (DHS, Department of Commerce, DOD, DOE, Department of the Interior, DOJ, Department of State, FAA, and NASA).

The S-SSG's role is to identify strategic goals, objectives, and priorities that support coordination regarding efforts to address risks posed by errant or malicious drone operations. The S-SSG focuses on security requirements created by current or ongoing integration activities. This involves the integration of security requirements, vetting of security-related standards among stakeholders, and development of UTM capabilities.

### **Drone Advisory Committee (DAC)**

The Drone Advisory Committee (DAC) was a discretionary committee chartered under the Federal Advisory Committee Act (FACA). The DAC was established on June 15, 2018, under the agency's authority and FACA. The DAC provided advice on key UAS integration issues by helping to identify challenges and prioritize improvements. The committee helped to create broad support for an overall integration strategy and vision, and provided recommendations on a variety of topics such as facility maps, part 107 waivers, and BVLOS challenges. In October 2021, the DAC transitioned to the Advanced Aviation Advisory Committee (AAAC).

### **Advanced Aviation Advisory Committee (AAAC)**

The AAAC is a broad-based federal advisory committee that provides independent advice and recommendations to the FAA on key UAS and AAM integration issues, interests and policies. The AAAC's work relates to the efficiency and safety of integrating advanced aviation technologies into the NAS.

The AAAC's charter is modified from the DAC, renaming the committee and expanding membership from 35 to 41 members. The increase expands representation in current stakeholder groups to include members with an AAM background. Additionally, there is

a new stakeholder group that includes a community advocate representative to provide insight and expertise on potential impacts of increased drone traffic on communities.<sup>9</sup>

Additional information is available at

[https://www.faa.gov/uas/programs\\_partnerships/advanced\\_aviation\\_advisory\\_committee/](https://www.faa.gov/uas/programs_partnerships/advanced_aviation_advisory_committee/).

### **Unmanned Aircraft Safety Team (UAST)**

A collaboration between industry and the FAA, the UAST seeks to make non-regulatory safety enhancements for UAS operations. Its 50 members, which include leading industry stakeholders and aviation associations such as the Aircraft Owners and Pilots Association and the Aerospace Industries Association, meet regularly to discuss safety topics. Much like the General Aviation Joint Steering Committee, which applies a data-driven, consensus-based approach to reduce the general aviation fatal accident rate, the UAST works toward developing safety enhancements by examining existing data sources on UAS operations, collecting data through surveys, developing communication strategies, and analyzing any UAS-related safety incidents.

The UAST has identified initial issues to mitigate, including loss of control, injury reduction, and improved safety culture. It has formed new groups to examine how the UAST can address these issues. Each group will create a list of potential safety enhancements and then evaluate how effective they would be at mitigating risk. With a limited number of accidents, analyzing flight data will be crucial in determining root causes of accidents. The UAST is developing a data strategy and governance and has completed a data workshop with several UAST members.

For more information, see the UAST website at [www.unmannedaircraftsafetyteam.org](http://www.unmannedaircraftsafetyteam.org).

### **Spectrum**

The FAA has continued its coordination efforts with the Federal Communication Commission (FCC) and the National Telecommunications and Information Administration (NTIA). The FAA has focused on reliable spectrum availability to support safety-critical functions such as command and control (C2) and detect and avoid (DAA). In support of efforts to address the requirements in Section 374 of the Act, the FAA also has consulted with relevant industry stakeholders, soliciting individual input and hosting a roundtable discussion to understand fully industry concerns regarding the use of spectrum for UAS operations.

### **Standards Development Organizations (SDOs)**

The FAA works with accredited SDOs such as ASTM International, Institute of Electrical and Electronics Engineers, Radio Technical Commission for Aeronautics, SAE International, European Organization for Civil Aviation Equipment, and others. SDOs have been developing UAS-specific standards in conjunction with or in reaction to FAA actions. The FAA considers the work of these SDOs when assessing certain

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<sup>9</sup> See Amended Charter (October 25, 2021), available at [https://www.faa.gov/uas/programs\\_partnerships/advanced\\_aviation\\_advisory\\_committee/media/AAAC\\_Charter\\_Amendment.pdf](https://www.faa.gov/uas/programs_partnerships/advanced_aviation_advisory_committee/media/AAAC_Charter_Amendment.pdf)

aspects of UAS integration. The FAA also collaborates with SDO committees to promote harmonization with FAA and UAS industry priorities.

In December 2018, the American National Standards Institute's (ANSI) Unmanned Aircraft Systems Standardization Collaborative (UASSC) released its UAS Standardization Roadmap. The Standardization Roadmap identifies requirements and gaps in the standards development efforts required to facilitate safe integration of UAS into the NAS. In June 2020, the ANSI's UASSC completed version 2.0 of the UAS Standardization Roadmap. Significant standards have been published for Remote ID, DAA, and C2. While the FAA and others provide input on what standards should be developed, each SDO independently determines the standards it develops.

### **International Forums**

The FAA actively engages in several international forums to leverage capabilities learned across programs. The FAA's engagement in the International Civil Aviation Organization (ICAO) includes, but is not limited to, topics including remotely piloted aircraft systems standards and recommended practices development and collaboration with the UAS Advisory Group and at Drone Enable forums.

With the Civil Air Navigation Services Organization, the FAA helps coordinate among air navigation service providers to develop a harmonized approach to the integration of UAS and RPAS into the airspace. In the Five Country Research and Development Network, the FAA coordinates across member countries to develop a global approach to UAS security-related matters.

Through the Joint Authorities for Rulemaking on Unmanned Systems (JARUS) forum, the FAA supports operations, airworthiness, safety and risk management, and future work, including UTM developments outside ICAO's remit or complementary to ICAO's work efforts. The FAA worked in tandem with JARUS to publish specific operations risk assessment (SORA) methodology to harmonize risk management for specifically defined UAS operations and led the development of a new work program and program management structure. The FAA also collaborated with Transport Canada and regional leaders from Finland and China to push for the SORA adoption at the October 2019 plenary session in China and in subsequent JARUS discussions.

With the Global UTM Association (GUTMA), the FAA works to align positions and harmonize global standards and concepts for UTM. The FAA became a full member of GUTMA in 2019 and participates in UTM harmonization discussions concerning remote identification of UAS and other key foundational elements of UTM.

As part of the agency's international outreach strategy, the FAA recently led virtual briefings on its "Remote Identification of Unmanned Aircraft" rulemaking and UTM Concept of Operations 2.0 for key partners in Africa, Asia-Pacific, Europe, the Middle East, and Western Hemisphere regions. Additionally, in February 2020, the FAA conducted a UAS Integration Workshop in Rwanda for sub-Saharan African States. Seventy-three participants from 28 regional and global organizations participated in the four-day workshop.

## **The Role of UAS Test Sites**

Since 2013, UAS Test Sites have served an important role in the FAA's efforts to leverage learned capabilities across programs. UAS Test Sites provide an avenue for the drone industry and stakeholder community to conduct advanced UAS research and operational concept validation. The research conducted at Test Sites informs the agency's decision-making process, as the information the FAA gathers from Test Sites supports critical safety decisions required to integrate UAS into the NAS. More information on the UAS Test Sites is available at:

[https://www.faa.gov/uas/programs\\_partnerships/test\\_sites/](https://www.faa.gov/uas/programs_partnerships/test_sites/).

## **The Role of the Alliance for Safety of UAS Through Research Excellence**

The Alliance for System Safety of UAS through Research Excellence (ASSURE) is comprised of 24 of the world's leading research institutions and more than 100 leading industry and government partners. The mission of ASSURE is to provide the FAA with the research it needs to integrate UAS quickly, safely, and efficiently into the NAS. ASSURE members may partner with FAA UAS test sites, lead four FAA research centers, and have seven airfields and a fleet of approximately 340 UAS. ASSURE features expertise across a broad spectrum of research areas, including: air traffic control interoperability; UAS airport ground operations; control and communications; detect and avoid capabilities; human factors; UAS noise reduction; UAS wake signatures; unmanned aircraft pilot training and certification; low altitude operations safety; spectrum management; and UAS traffic management. More information about ASSURE can be found at: <http://www.assureuas.org/>.

## **The Role of Partnership Programs**

The FAA's vision for fully integrating drones into the NAS requires drones operating harmoniously alongside manned aircraft in the same airspace. This vision goes beyond the accommodation practices in use today, which largely rely on operational segregation to maintain systemic safety. The FAA recognizes that this vision requires collaboration across industry, government, and academia and is leveraging the capabilities learned across partnership programs in order to further integrate UAS into the NAS. Below is a description of each of our major partnership initiatives. More information on the FAA's UAS partnerships is available at: [https://www.faa.gov/uas/programs\\_partnerships/](https://www.faa.gov/uas/programs_partnerships/).

### **Partnerships for Safety (PSP)**

The PSP program launched on December 15, 2016 to address and advance complex UAS operational capabilities. PSPs establish a working relationship between the FAA and industry, by which the FAA gathers information in furtherance of facilitating full integration of UAS into the NAS. PSP partners are not only leaders in their industry, but their proposed UAS operations involve national policy decisions that ultimately benefit the public. The PSP program facilitates the progression of complex UAS integration operations by establishing a single FAA point of entry for an applicant and ensuring that the industry partner has relationships with the appropriate contacts at the relevant FAA policy divisions. This is necessary in order to prioritize complex operations, coordinate the safety case needed for operational approvals, and, where appropriate, support rulemaking and standards development.

## **UAS BVLOS Aviation Rulemaking Committee (ARC)**

On June 8, 2021, the FAA chartered the Unmanned Aircraft Systems Beyond Visual Line-of-Sight (UAS BVLOS) Aviation Rulemaking Committee (ARC). The UAS BVLOS ARC will provide recommendations to the FAA for performance-based regulatory requirements to normalize safe, scalable, economically viable, and environmentally advantageous UAS BVLOS operations that are not under positive air traffic control. The UAS BVLOS ARC will consider the various lessons and insights gained from the FAA's partnership programs and other activities to inform them in this effort.

The ARC membership includes 87 organizations. Many of the members have previously collaborated with the FAA in the aforementioned efforts and will be able to bring their experience and lessons learned to inform the recommendations to the FAA. The ARC includes workgroups that will leverage information from those organizations to provide recommendations that will address the various safety concerns associated with BVLOS operations.

The FAA's strategy to avoid duplication and leverage capabilities learned across programs is based on coordination and alignment of programs as well as coordination of efforts, internal and external to the FAA, to integrate UAS safely into the NAS.

## **Strategy to Systematically and Timely Implement LAANC, the IPP, and the UTM Pilot Program**

The FAA strategy to implement key initiatives for integrating UAS into the NAS often involves partnerships or close collaboration with industry stakeholders or other governmental entities. This strategy has proven to be successful in the IPP and the FAA expects the results of these initiatives to benefit FAA strategy moving forward and will continue our efforts with programs like BEYOND.

### **UAS Integration Pilot Program (IPP)**

In October 2017, the United States Executive Office of the President issued a Presidential Memorandum for the Secretary of Transportation to establish the IPP and required the FAA to prioritize support for the effort through fiscal year 2020.<sup>10</sup> The IPP was a partnership with state, tribal, and local governments to test and mature jointly the concepts, processes, and data required to continue integrating UAS into the NAS, as well as to build public acceptance that will contribute to expansion of UAS operations nationwide. Applications came from state, local, and tribal governments, with the DOT choosing ten Lead Participants from a competitive group of 149 applicants. One applicant, the Lee County Mosquito Control District in Florida, chose to withdraw from the program in February 2019 due to leadership changes, shifting priorities, and budget constraints. Nine lead participants representing 36 different operating environments with economic, geographic, and climatic diversity moved forward with the program. The FAA and operators benefited from cooperation between the UAS industry, the Federal government, and participating state, local, and tribal governments.

The IPP Lead Participants began operations, as well as community outreach initiatives, in 2018 and concluded in October 2020. The IPP tested the further integration of UAS into the NAS in a select number of state, local, and tribal jurisdictions. The IPP's objectives were to test and evaluate various models of state, local, and tribal government involvement in the development and enforcement of Federal regulations for UAS operations; encourage UAS owners and operators to develop and safely test new and innovative UAS concepts of operation; and inform the development of future Federal guidelines and regulatory decisions on UAS operations nationwide.

The data the FAA collected during the IPP focused on three key areas: safely integrating UAS into the NAS; informing policy and decision-making; and engaging in societal and community collaboration. The FAA is leveraging data it collected and capabilities learned through the IPP to inform new rules, policies, and guidance that support complex low-altitude operations. The FAA expects to use new rules, policies, and guidance for decision-making across all UAS programs.

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<sup>10</sup> The FAA and DOT announced the IPP in a Federal Register notice. *See* Unmanned Aircraft Systems Integration Pilot Program-Announcement of Establishment of Program and Request for Applications, 82 FR 91503 (Nov. 8, 2017), available at <https://www.federalregister.gov/documents/2017/11/08/2017-24126/unmanned-aircraft-systems-integration-pilot-program-announcement-of-establishment-of-program-and#footnote-1-p51903>.

## **The BEYOND Program**

Now that IPP has concluded, the future is BEYOND. The BEYOND program started on October 26, 2020, to continue partnerships with eight of the nine IPP participants over the next three to four years. The FAA is working with these Lead Participants to build on the IPP's successful accomplishments with new focused efforts to tackle remaining UAS challenges. The program will focus on operating under established rules rather than waivers, collecting data to develop performance-based standards, streamlining the approval processes for UAS integration, collecting and addressing community feedback and understanding the societal and community benefits associated with small UAS operations. By the end of this effort, the FAA aims to achieve repeatable, scalable and economically viable BVLOS operations with the realization that additional efforts — for example, national infrastructure, airspace shaping, and performance standards — will be required for continual UAS operations. These additional elements will need to be discussed and trialed to realize full integration of UAS into the NAS.

## **Low Altitude Authorization and Notification Capability (LAANC)**

The FAA's LAANC system is a step forward in automating the operation authorization process to manage the increasing volume of authorization requests to conduct UAS operations. LAANC has enabled near-real time issuance of airspace authorizations under part 107 using FAA-approved UAS Service Suppliers. LAANC facilitates the sharing of airspace data between the government and private industry, and enables part 107 operators to obtain airspace authorizations immediately before flying in certain airspace described in UAS Facility Maps (UASFMs). The use of UASFM and LAANC expedited the airspace authorization process because it shifted a significant amount of airspace authorization requests from a labor-intensive process involving manual review to a more streamlined, automated, and near real-time authorization process.<sup>11</sup> In July 2019, LAANC capability was expanded to include airspace authorizations for recreational UAS flyers as required by Section 349 of the Act. More information on LAANC is available at:

[https://www.faa.gov/uas/programs\\_partnerships/data\\_exchange/](https://www.faa.gov/uas/programs_partnerships/data_exchange/).

## **Unmanned Aircraft System Traffic Management (UTM)**

The FAA envisions UTM as the manner in which the FAA will support operations for UAS operating in low altitude airspace (below 400 ft. AGL). The FAA envisions the concept as a set of services and an all-encompassing framework for managing multiple UAS operations in the NAS. It would be a community-based traffic management system in which the operators would be responsible for the coordination, execution, and management of operations with common expectations the FAA establishes. UTM would rely on layers of information-sharing— from operator to operator, vehicle to vehicle, and operator to the FAA — to achieve safe operations. Operators would share their flight intentions with one another and coordinate to de-conflict and separate trajectories safely. The FAA envisions it would have on-demand access to UTM operational information when needed. UTM would be designed to support the demand

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<sup>11</sup> See UAS Facility Maps, available at [https://www.faa.gov/uas/request\\_waiver/uas\\_facility\\_maps/](https://www.faa.gov/uas/request_waiver/uas_facility_maps/).

and expectations for a broad range of operations with ever-increasing complexity and risk. More information about UTM is available at:

[https://www.faa.gov/uas/research\\_development/traffic\\_management/](https://www.faa.gov/uas/research_development/traffic_management/).

### **UAS Traffic Management Pilot Program (UPP)**

In 2015, NASA and the FAA formed a research transition team to jointly develop and enable a traffic management ecosystem to provide management services to sUAS operations. Established in April 2017, the UAS UTM Pilot Program's (UPP) primary goal is to develop, demonstrate, and provide an enterprise service to support initial UTM operations. In addition, the FAA Extension, Safety, and Security Act of 2016 required coordination, development, and publication of a UTM Research Plan and establishment of a UTM Pilot Program (UPP).<sup>12</sup> Pursuant to the Research Plan, in January 2019, DOT announced that the FAA selected the Nevada, North Dakota, and Virginia FAA UAS Test Sites to partner with the agency in the UPP's "Phase One". Phase One of the UPP demonstrated UTM services such as the exchange of flight intent among operators; the generation of notifications to UAS operators regarding air and ground activities relevant to their safe operation, known as UAS Volume Reservations (UVRs); the ability to share UVRs with stakeholders, including other UAS Service Suppliers; and the Flight Information Management System.

In August 2019, Phase One ended with an UPP Demonstration Report and lessons learned. Section 376(b) of the Act requires the UPP to meet additional objectives, include testing of Remote ID technologies and operations with increasing volumes and density, before completion. The FAA will conduct this testing in cooperation with NASA and industry stakeholders, including those stakeholders selected under the IPP and FAA UAS Test Sites. The FAA will award the second phase of work and will determine the appropriate next steps as it progresses toward the deployment of Remote ID technologies in complex environments to enable BVLOS operations.

More information about the UPP is available at:

[https://www.faa.gov/uas/research\\_development/traffic\\_management/utm\\_pilot\\_program/](https://www.faa.gov/uas/research_development/traffic_management/utm_pilot_program/).

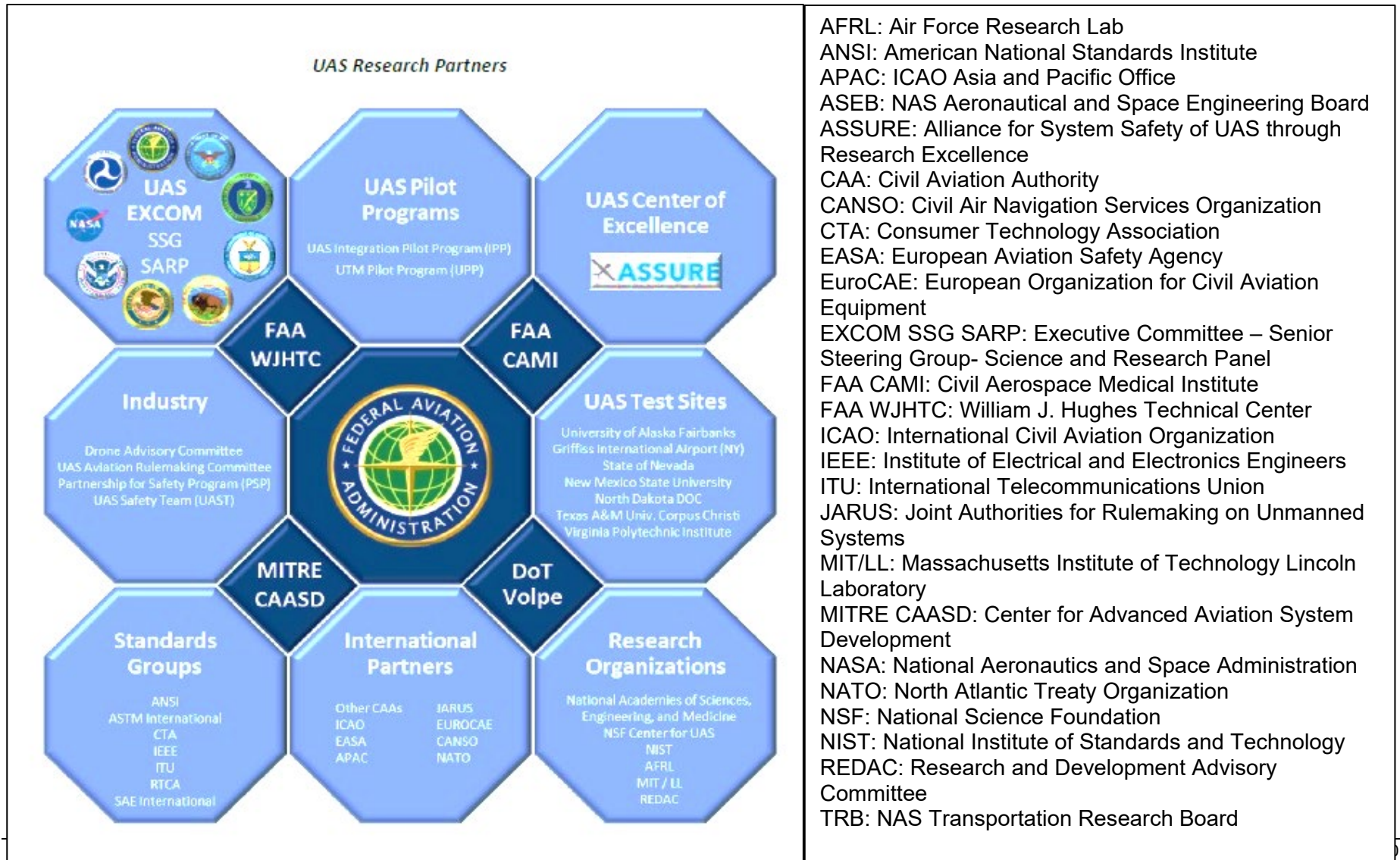
### **Conclusion**

The FAA continues to improve its UAS program alignment efforts by avoiding duplication, leveraging strategies learned across programs, supporting the safe integration of UAS into the NAS, and implementing LAANC, the IPP, and the UTM Pilot Program in a systematic and timely manner. The agency's program alignment efforts already have proven to be effective with the successful completion of the IPP in October 2020.

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<sup>12</sup> Pub. L. 114-190 § 2208 (July 15, 2016).

## Appendix A: UAS Research Partners



AFRL: Air Force Research Lab  
 ANSI: American National Standards Institute  
 APAC: ICAO Asia and Pacific Office  
 ASEB: NAS Aeronautical and Space Engineering Board  
 ASSURE: Alliance for System Safety of UAS through Research Excellence  
 CAA: Civil Aviation Authority  
 CANSO: Civil Air Navigation Services Organization  
 CTA: Consumer Technology Association  
 EASA: European Aviation Safety Agency  
 EuroCAE: European Organization for Civil Aviation Equipment  
 EXCOM SSG SARP: Executive Committee – Senior Steering Group- Science and Research Panel  
 FAA CAMI: Civil Aerospace Medical Institute  
 FAA WJHTC: William J. Hughes Technical Center  
 ICAO: International Civil Aviation Organization  
 IEEE: Institute of Electrical and Electronics Engineers  
 ITU: International Telecommunications Union  
 JARUS: Joint Authorities for Rulemaking on Unmanned Systems  
 MIT/LL: Massachusetts Institute of Technology Lincoln Laboratory  
 MITRE CAASD: Center for Advanced Aviation System Development  
 NASA: National Aeronautics and Space Administration  
 NATO: North Atlantic Treaty Organization  
 NSF: National Science Foundation  
 NIST: National Institute of Standards and Technology  
 REDAC: Research and Development Advisory Committee  
 TRB: NAS Transportation Research Board