STATEMENT OF SHELLEY J. YAK, DIRECTOR OF THE WILLIAM J. HUGHES TECHNICAL CENTER, BEFORE THE U.S. HOUSE OF REPRESENTATIVES COMMITTEE ON TRANSPORTATION AND INFRASTRUCTURE, SUBCOMMITTEE ON AVIATION, "AIRSPACE INTEGRATION OF NEW AIRCRAFT," SEPTEMBER 6, 2018

Chairman LoBiondo, Ranking Member Larsen, Members of the Subcommittee:

Thank you for the opportunity to speak with you today about the role of the Federal Aviation Administration's (FAA) William J. Hughes Technical Center in facilitating new entrants, new users, and new technologies into the National Airspace System (NAS). Accompanying me today is Peter "Jay" Merkle, the Deputy Vice President of the Program Management Organization (PMO) within the Air Traffic Organization (ATO). The PMO is responsible for implementation of all Next Generation Air Transportation System (NextGen) program activity; all NAS communications; navigation, weather, surveillance and automation modernization programs; and all service life extensions to legacy NAS sensors, communications and navigation aids.

William J. Hughes Technical Center

The Technical Center has served as one of the core facilities for sustaining and modernizing the air traffic management system, and for advancing programs to enhance aviation safety, efficiency, and capacity since 1958. It is the Nation's premier air transportation system federal laboratory. The Technical Center's highly technical and diverse workforce carries out activities to support the full system/service development lifecycle—from conducting research and development, testing and evaluation, verification and validation, to operational sustainment and decommissioning.

The Technical Center's staff develops scientific solutions to current and future air transportation safety, efficiency, and capacity challenges. Our engineers, scientists, mathematicians, and technical experts utilize a robust, one-of-a-kind, world-class laboratory

environment to identify integrated system solutions for the modernization and sustainment of the NAS. Automatic Dependent Surveillance Broadcast (ADS-B), En Route Automation Modernization (ERAM) and Data Communications (Data Comm) were all developed, tested and began their nationwide deployment at the Technical Center through its engineering, testing, evaluation, and deployment platforms.

The Technical Center replicates the entire NAS, with the capability to support not only NextGen, but all aviation systems. The Technical Center's areas of focus include air traffic management, communications, navigation, surveillance, aeronautical information, weather, human factors, airports, and aircraft safety. More recently, the Technical Center has been instrumental in the FAA's efforts to facilitate new entrants and users to the NAS; particularly, unmanned aircraft systems (UAS or drones).

FAA's Vision for UAS Integration

Future aviation operations must accommodate the increasing demand for airspace access by traditional civil aviation users as well as new entrants. UAS are at the forefront of change in the aviation industry. They are being used today to inspect infrastructure, provide emergency response support, survey agriculture, and to go places that are otherwise dangerous for people or other vehicles. Entrepreneurs around the world are exploring innovative ways to use drones in their commercial activities. To date, we have processed over 1.1 million UAS registrations, over 230,000 of which are for unmanned aircraft that can be flown commercially. For perspective, as of July 2018, there are just under 300,000 manned aircraft listed on the U.S. registry. The need for us to fully integrate this technology into the NAS continues to be a national priority.

The Department of Transportation and FAA's vision for integration is ambitious. We intend to fully integrate UAS into the most complex airspace system in the world, enabling UAS

to operate harmoniously with manned aircraft, occupying the same airspace and using many of the same standards and procedures. Two years ago, we established the regulatory framework—and set the global standard—for small UAS integration. Our roadmap for full UAS integration is intended to enable increasingly more complex UAS operations over time: (1) operations over people; (2) operations beyond the visual-line-of-sight of the operator; (3) small UAS package delivery operations; (4) routine/scheduled operations; (5) large carrier cargo operations; and, finally, (6) passenger transport operations.

Research and Development

As the FAA's Director of Research, I oversee the FAA's aviation research and development (R&D) activities. Effective research enables the FAA's mission to provide the safest, most efficient aerospace system in the world. As new technologies change the aviation industry, our approach to research must evolve as well. Emerging innovations, such as UAS, require an agile research and development strategy focused on change driven by technology and collaborative, data-driven partnerships across government and with industry and academia. Through this collaboration, we will continue building on our unparalleled safety record, while increasing the efficiency of our system and more fully integrating new users.

With the exponential growth of UAS technologies and market applications we have witnessed in just a few years, we know that research must keep pace to support full integration. We are aligning our UAS research activities with our integration roadmap. Safety is and will always be the FAA's first priority, and continued support for UAS research initiatives will ensure that UAS are integrated into the NAS in a safe, secure, and efficient manner.

UAS research activities are coordinated across many different types of entities, including internal FAA organizations, different U.S. Government agencies, and nongovernmental entities

that perform collaborative research to support the FAA's overall integration objectives. Coordination with each type of entity includes the identification of research needs and current research, governance for continuous cooperation, and mechanisms for managing progress and results. Issues and considerations being addressed include detect and avoid standards and technologies, collision avoidance standards, command and control standards and technologies, human factors, severity thresholds (for example, impact effects), automation/autonomy, and wake turbulence effects. One example of this coordination is the UAS Standardization Collaborative (UASSC), co-chaired by the FAA and the Association for Unmanned Vehicle Systems International (AUVSI) and managed by the American National Standards Institute (ANSI). UASSC brings together over 230 members from the user applications, manufacturer, safety and emergency response, academic and government communities to accelerate development of standards and conformity assessment programs to facilitate the safe integration of UAS into the NAS.[1]

The FAA's NextGen organization also has appointed a UAS portfolio manager to unify and manage all UAS R&D execution. The UAS R&D portfolio includes UAS research conducted at the Technical Center, the Center of Excellence for UAS, interagency UAS partnerships, UAS flight demonstrations and test sites, and all aviation safety research defined by the Office of Aviation Safety through the FAA's UAS Integration Office. Additionally, the FAA's ATO is developing concepts and requirements to address FAA challenges associated with the provision of air traffic services to UAS airspace users.

The FAA is also gathering operational data and experience that will inform future rulemaking to enable UAS operations over people and beyond line-of-sight. While the small

[1] https://www.ansi.org/standards_activities/standards_boards_panels/uassc/overview#UASSC%20Overview

UAS rule—14 C.F.R. part 107—has been largely successful by enabling operations such as crop monitoring/inspection; research and development; educational/academic uses; power-line/pipeline inspection; antenna inspections; emergency response; bridge inspections; aerial photography; and wildlife nesting area evaluations, it does not permit several potential uses for UAS that are highly valued by industry, such as operating beyond line-of-sight or at night. To accommodate these operations, the rule allows operators to apply for waivers from its provisions. As of August 2018, the FAA has reviewed almost 12,000 operational waiver applications and has issued approvals for over 1,800 waivers, significantly reducing the processing time from almost 90 days to approximately 20 days.

While most of these approved waivers (more than 90 percent) have been for night flying, others have been granted for more complex activities, such as for flying over people or beyond line-of-sight. The commercial activities that typically receive waivers for UAS operations are for filmmaking, photography, and infrastructure inspections.

The newly launched UAS Integration Pilot Program (IPP) sets the stage to move even closer to expanded operations through enhanced partnerships among industry and state, local and tribal authorities. On May 9, 2018, the Secretary of Transportation announced that 10 state, local, and tribal governments were selected to participate in the IPP. Each of the participants is partnering with private sector entities to evaluate operational concepts and provide DOT and FAA with actionable information that will accelerate safe and secure UAS integration. The goals of the program are to: identify ways to balance local and national interests; improve communications with local, state, and tribal jurisdictions; address security and privacy risks; accelerate the approval of operations that currently require special authorizations; and collect data to support the development of regulatory actions necessary to allow more complex, routine

low-altitude operations. A list of the participants and each of their proposed operational concepts may be found at: https://www.faa.gov/uas/programs_partnerships/uas_integration_pilot_program/awardees/.

Airspace Management

The FAA's primary mission is to provide the safest, most efficient airspace system in the world. We are responsible for providing air traffic control and other air navigation services 24 hours a day, 365 days a year, for 29.4 million square miles of airspace. In addition to this critical operational role, the FAA uses its statutory authority to carry out this mission by issuing and enforcing regulations and standards for the safe operation of aircraft—manned and unmanned—and by developing procedures to ensure the safe movement of aircraft through the nation's skies.

Automated Airspace Authorization

The basic rules for small UAS operations—14 C.F.R. part 107—set the global standard for integration and provided small drone operators with unprecedented access to the NAS. Part 107 creates airspace rules specific to small UAS operations. It allows line-of-sight, daytime operations in uncontrolled Class G airspace without the need for approval from the FAA. Operations in controlled airspace—Class B, C, D, and surface area E—require prior approval from air traffic control.

Compliance with basic airspace requirements—the "rules of the road"—is essential to maintaining safety and efficiency in the NAS and ultimately will make it easier for our national security and law enforcement partners to identify a drone that is being operated in an unsafe or suspicious manner. To facilitate airspace approvals for small UAS operators, last November, we deployed the prototype Low Altitude Authorization and Notification Capability (LAANC) at several air traffic facilities to evaluate the feasibility of a fully automated solution enabled by

public/private data sharing. Based on the prototype's success, we began the first phase of a nationwide beta test of LAANC on April 30, 2018, enabling LAANC services at about 80 airports. This rollout will continue incrementally to nearly 300 air traffic facilities covering approximately 500 airports. We recently completed the fifth wave of this nationwide rollout, which now covers 82 percent of air traffic facilities, and we are on track to complete nationwide deployment in September 2018.

LAANC uses airspace data based on the FAA's UAS facility maps, which show the maximum altitudes in one square mile parcels around airports where UAS may operate safely under part 107. It gives drone operators the ability to request and receive real-time authorization from the FAA, allowing them to quickly plan and execute their flights. LAANC also makes air traffic controllers aware of the locations where planned drone operations will take place, and it can provide information on aircraft that have requested access to a defined airspace.

UAS Traffic Management

LAANC is an important foundational step toward implementing UAS Traffic Management (UTM). UTM is a "traffic management" ecosystem for UAS operations not under FAA air traffic control (ATC), and is separate but complementary to the FAA's air traffic management system. UTM development will ultimately identify services, roles/responsibilities, information architecture, data exchange protocols, software functions, infrastructure, and performance requirements for enabling the management of low-altitude UAS operations where ATC does not typically provide services.

We view UTM as a suite of capabilities that will incorporate components from the FAA, industry, and our government partners to create a comprehensive system of low-altitude airspace management for UAS. Our plan for future UTM capabilities includes a number of

components—LAANC, remote identification, and dynamic airspace management—that will support the needs of industry, FAA, and our security partners. The eventual full deployment of UTM services will create an environment in which the entire spectrum of unmanned aircraft can be safely realized, including the transportation of people and property.

UAS in Controlled Airspace

We are also making headway with an Aviation Rulemaking Committee (ARC) to address UAS in controlled airspace, which will provide recommendations on UAS integration in, and transit to, high altitude airspace. The ARC will develop scenarios that will encompass the most desired operations, identify gaps in research and development needed to successfully integrate larger UAS into controlled airspace, and recommend up to five prioritized changes to policies and procedures that will spur integration and economic growth. The ARC held its fifth meeting in May 2018 and will continue to meet through the expiration of the ARC's charter in June 2019.

Impediments to Full UAS Integration

The FAA has made significant progress in integrating UAS into the NAS and, through our ongoing research activities, we are well-positioned to continue to build on our accomplishments. We know, however, that there is much more work to do. The FAA's commitment to the safe, secure, and efficient integration of UAS and the expansion of routine UAS operations also requires resolving specific challenges to enable this emerging technology to achieve its full potential.

Statutory Exemption for Model Aircraft

The most significant challenge the FAA continues to encounter is the perception by many recreational UAS operators that they are not required to follow the basic rules of UAS operation because they erroneously believe they fit under the statutory exemption for model aircraft

operated under the programming of a community-based organization. These unknowing operators present risks to both manned and unmanned compliant operators. The current exemption for model aircraft—Section 336 of the FAA Modernization and Reform Act of 2012—makes it difficult for the FAA to develop new regulatory approaches that will help expand and facilitate more advanced uses of UAS in the NAS. A set of basic requirements for all UAS operators are essential to allow both the FAA and our security and law enforcement partners to discern between the clueless, the careless, and the criminal—including serious threats to national security—and to ensure all operators conduct compliant operations or face the consequences of introducing a safety or security risk into the NAS.

Remote Identification

As Congress has recognized, remote identification of UAS is another critical step on the path to full integration of UAS technology. In order to support beyond visual line-of-sight operations, UAS operators need to know where their aircraft is and where other aircraft are along their flight path. Remote identification is also essential to enable our law enforcement and national security partners to identify and respond to security risks. Effective integration and threat discrimination will continue to be a challenge until all aircraft in the NAS—manned and unmanned—can be identified. Anonymous operations are inconsistent with safe and secure integration.

Last December, we published the report and recommendations prepared by the summer 2017 UAS Identification and Tracking ARC[2]. The ARC's 74 members represented a diverse array of stakeholders, including the aviation community and industry member organizations, law enforcement agencies and public safety organizations, manufacturers, researchers, and standards

[2] *See* https://www.faa.gov/news/updates/?newsId=89404&omniRss=news_updatesAoc&cid=101_N_U

developing organizations involved with UAS. The ARC's recommendations cover issues related to existing and emerging technologies, law enforcement and national security requirements, and how to implement remote identification. Although some recommendations were not unanimous, the group reached general agreement on most issues. The FAA is reviewing the technical data and recommendations in the ARC report to support the development of the FAA's remote identification requirements. We are currently working on a proposed rule to implement these requirements as quickly as possible.

Conclusion

Throughout our history, the FAA has adapted to changes in technology and has successfully integrated new operators and equipment into the NAS. Our progress in accommodating new technologies and operations demonstrates that the agency is well positioned to maintain its status as the global leader in UAS integration. We are committed to working with Congress and all of our stakeholders to find solutions to our common challenges. Working together, we are confident we can balance safety and security with innovation. With the support of this Committee and the robust engagement of our stakeholders, we will continue to safely, securely, and efficiently integrate UAS into the NAS and solidify America's role as the global leader in aviation.

Finally, before I conclude I would like to take a moment to acknowledge the support of Chairman Shuster and Subcommittee Chairman LoBiondo. You have been instrumental in providing the FAA with the direction and necessary resources to maintain our position as a global leader in aviation. I thank you both for your leadership and wish you well as you retire from Congress.

This concludes my statement. I will be happy to answer your questions at this time.