

STATEMENT OF DR. KARLIN TONER, DIRECTOR, JOINT PLANNING AND DEVELOPMENT OFFICE, FEDERAL AVIATION ADMINISTRATION, ON OPERATING UNMANNED AIRCRAFT IN THE NATIONAL AIRSPACE SYSTEM: ADDRESSING R&D EFFORTS TO ENSURE SAFETY, BEFORE THE HOUSE COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY, SUBCOMMITTEE ON INVESTIGATIONS AND OVERSIGHT, FEBRUARY 15, 2013.

Chairman Broun, Congressman Maffei, Members of the Subcommittee:

Thank you for inviting me today to discuss the Federal Aviation Administration's (FAA) ongoing research and development efforts to ensure the safe integration of unmanned aircraft systems (UAS) into the national airspace system (NAS). As Director of the Joint Planning and Development Office (JPDO), I will discuss both the role of the JPDO in the coordination and collaboration of research efforts, as well as FAA's overall research efforts to achieve UAS integration.

The current NAS was developed to accommodate the capabilities of manned aircraft. While many procedures and principles used for manned aircraft apply to UAS, there are significant differences between the two types of operations in technological maturity, perception and acceptance, and operational experience. Joint efforts, including the development of NextGen, must deal with these differences because the demand for UAS operations has increased dramatically over the past few years, and is expected to continue to increase, due to the unique capabilities, and lower operating costs of UAS.

The FAA's mission is to ensure the safety and efficiency of the NAS. This means FAA will not integrate UAS unless and until we can be assured the safety of the NAS will not be degraded. JPDO is tasked with coordinating with public agencies, including the Department of Homeland Security, the Department of Defense, the Department of Commerce, the National Aeronautics

and Space Administration (NASA), and the FAA to understand the complexity of the airspace and to safely integrate the wide variety of UAS technology, sizes, and speeds into the NAS.

The JPDO has developed a number of UAS national goals and related objectives in coordination with executive and working level representatives from NextGen partner agencies to provide a framework for interagency coordination and planning. The FAA is specifically focusing its current research efforts on four areas: sense and avoid technology; control and communication (including possible security risks associated with communication); aircraft certification, maintenance, and repair standards; and human factors associated with UAS integration. FAA research activities focus on new technology assessments, methodology development, data collection and generation, laboratory testing and field validation. The role of the JPDO is extremely important to enable leveraging the research being done by different agencies to ensure that no two agencies are conducting the same research, and that all agencies are aware of and can benefit from the work being done by other agencies. This interaction helps advance the goals and objectives agreed to within the Administration.

The FAA also recognizes the importance of non-safety related issues, such as privacy and national security which need to be taken into consideration as UAS are integrated into the NAS. The FAA plans to use the UAS test sites mandated by the FAA Modernization and Reform Act of 2012 to gather information on operational and technical issues, as well as privacy issues and potential of UAS to promote economic growth. Further, the FAA will continue to work with relevant U.S. government agencies to develop appropriate frameworks to address the privacy and national security questions brought about by the integration of UAS into the NAS.

UAS information systems security is needed to protect against the potential impact that a loss of confidentiality, integrity or availability would have on individuals and organizational operations and assets. We need to identify potential security features or mechanisms to protect UAS operations against threats, such as IT system threats, radio link threats, and human or physical threats. For example, FAA is currently collaborating with NASA on a UAS prototype architecture that will be used to develop a high-level security risk assessment. Our joint work will define a network architecture and potential security mechanisms for protecting air-ground communications for control and communication that are consistent with developed standards.

I want to assure you that UAS integration has the attention of individuals at the highest levels within the Administration. The President's budget request for FY 2013 reflects the FAA's commitment to UAS-related research. The request proposed a significant increase in FAA funding for this research. In addition, the interagency structure, such as the NextGen Senior Policy Committee, provides for Cabinet level input and review as required. All of the agencies involved in UAS integration have mission-related incentives for succeeding, which translate into the interest and support of key policy makers throughout the Administration.

The NextGen UAS Research and Development (R&D) Roadmap was published last year and is the first report that identifies relevant ongoing and planned NextGen UAS R&D activities. It is the joint product of more than 60 experts from the JPDO and our NextGen partners. The work was organized within four broad challenges which encompass research by the FAA and partner agencies and are common ways to think about identified barriers to UAS NAS integration. It is a blueprint for identifying and addressing technical challenges and establishes a set of research areas that must be addressed to permit routine UAS operations in a NextGen environment. The work brought together researchers, regulators and operators and led to an approach to link the

R&D activities of our partner agencies with the research needs of FAA. As a result of the Roadmap, we now have achieved an ongoing coordinated, multi-agency effort.

The challenges of integrating UAS into the NAS are extremely complex. It is on those challenges that FAA's research is focused. For example, in the area of command and control, we are conducting human factors research to determine the evaluation of criteria and guidelines related to UAS pilot and crew training and certification requirements. We also have eight ongoing Sense and Avoid activities in this area with the long term goal of replacing a pilot's see and avoid functions with technology or procedures that will meet the safety standards in our regulations.

In the area of Control and Communication, we are working with NASA on prototype architecture that is described above. The long term goal in this area is to develop baseline security standards that the prototype can be designed to meet.

Maintenance and Repair focuses on the differences between manned and unmanned aircraft. The FAA has implemented detailed safety standards for maintaining an aircraft in compliance with our regulations. Unmanned aircraft are a new and emerging technology. The FAA is working to identify whether unmanned aircraft require new and innovative safety approaches to address the differences in the operation and maintenance of these vehicles. Should different maintenance and repair requirements be identified, standards and requirements would be developed to ensure the same level of operational safety as manned aircraft.

Finally, there is the area of human factors. FAA has just initiated a study in this area that is intended to evaluate criteria for UAS control stations, pilot and crew training and certification requirements. In manned aircraft, a pilot can see, feel and even smell if something is not

functioning properly. An aircraft being flown by a pilot not collocated with the aircraft does not provide the same sensory access that a pilot in the aircraft has. We hope to use the information provided by the study to determine how best to mitigate this inequity.

Each of these safety research initiatives cannot be looked at in a vacuum, but rather as part of our overall strategy of transitioning to the NextGen capabilities necessary to meet the airspace demands of the future. It is abundantly clear that there are untold uses for the myriad of UAS and that their eventual integration into the NAS is both necessary and complicated. The FAA and its partners throughout the Administration will continue to work to make this happen seamlessly and, most importantly, safely. There is commitment to achieving the identified goals and objectives for integration at the highest levels of the Administration. The United States is the world leader for safety and technological innovation in aviation. The integration of UAS into the NAS is the latest of many challenges the FAA has faced, and like those we have seen in the past, we are confident we will successfully and safely meet it.

The FAA looks forward to continuing working with Congress on this and other important aviation issues, and we thank you for the support Congress has provided thus far in assisting our work.

This concludes my prepared statement. I will be happy to answer any questions you have at this time.