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Committee on Science, Space and Technology
"Unmanned Aircraft Systems (UAS) Research and Development"
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Chairman Smith, Ranking Member Johnson, and members of the committee, thank you very much for the opportunity to address the importance of UAS research and development (R&D). I am speaking on behalf of the Association for Unmanned Vehicle Systems International (AUVSI), the world's largest non-profit organization devoted exclusively to advancing the unmanned systems and robotics community. AUVSI has been the voice of unmanned systems for more than 40 years, and currently we have more than 7,500 members, including over 600 corporate members.

As you know, UAS increase human potential, allowing us to execute dangerous or difficult tasks safely and efficiently. Whether it is assisting first responders with search and rescue missions, advancing scientific research or helping farmers more efficiently spray their crops, UAS are capable of saving time, saving money, and, most importantly, saving lives. However, the benefits of this technology do not stop there; this technology has incredible potential to create jobs and stimulate the U.S. economy as well.

In 2013, AUVSI released an economic impact study[1] which found that, within the first 10 years following UAS integration, the UAS industry will create more than 100,000 new jobs and more than $82 billion in economic impact. I would encourage everyone to take a look at it if you haven't already, as we even break out our figures state-by-state.

The benefits I just outlined can be recognized immediately, once we put the necessary rules in place to enable commercial operations. We understand that a notice of proposed rulemaking (NPRM) for small UAS from the Federal Aviation Administration (FAA) is now expected any day,

[1] www.auvsi.org/econreport

and it cannot come soon enough. Industries from agriculture and real estate to filmmaking and oil and gas are clamoring to use this technology. But until rules are created, these industries and many others will remain largely grounded. And for every day that UAS integration is delayed, the U.S. stands to lose $27.6 million in potential economic impact, according to AUVSI's economic impact study.

Establishing rules will also eliminate the current precedent of "regulating by exemption," whereby the FAA issues exemptions on a case-by-case basis for some commercial UAS operations under Section 333 of P.L. 112-95, the "FAA Modernization and Reform Act of 2012."

While we're here today to discuss the critical role of UAS research and development, the fact is, we don't need a lot of additional research to permit low-altitude, line of sight operations, which is generally what we expect the first phase of the integration will allow. These are low-risk flights in airspace where manned aircraft generally do not fly. A variety of commercial applications can be safely authorized right away, and we look forward to working with the FAA to get this done as expeditiously as possible.

As we look beyond the initial phase of the UAS integration, we will need robust research to further expand access to the airspace and address some of the challenges that exist to fly beyond-line-of-sight, for example. Current research needs include:

- Sense and avoid – How will unmanned aircraft that fly beyond line-of-sight sense and avoid other aircraft, both manned and unmanned?

- Command and control – What is the appropriate command and control – also known as "C2" – link between an unmanned aircraft and its control station? This includes determining the proper radio spectrum for UAS applications and the level of security needed to protect against jamming, spoofing and other attempts to interfere with UAS.

- Autonomous operations – How can UAS one day operate autonomously within the NAS and how will autonomous UAS interface with the air traffic control system?

The advancement of UAS technology, as with other technologies, will need to be a collaborative effort between industry and government. The industry is already leading the way, investing millions into R&D. All of us can become smarter faster if the industry and government work closely together – and the collaboration will also save the government from having to expend significant resources to conduct the necessary research itself.

As just a few examples of current industry research, companies like Airware are developing software that will interface with NASA's UAS traffic management (UTM) system and introduce new levels of safety and reliability in commercial operations. Lockheed Martin is working to make long-range UAS operations cleaner, greener and quieter. The company has developed a 20-pound propane fuel-cell powered aircraft that decreases carbon and lead emissions while virtually eliminating engine noise.

I would also like to credit our government partners for their role in advancing UAS research and development. While the small UAS rule has been delayed, the FAA has made some notable progress with regard to UAS research. In November 2013, the agency released its roadmap for UAS integration, which identified areas warranting further research, including sense and avoid, command and control and human factors. A month later, in December of 2013, the agency designated six UAS test sites to help to collect the data needed to safely and responsibly integrate UAS into the NAS. As of last fall, all of the test sites are operational, and the FAA continues to approve certificates of authorization for companies to use these sites.

While the industry is investing millions in research, and the federal government has various research projects underway, we can all do this better, and in a more coordinated fashion. The challenges we jointly face call for a national leadership initiative that places UAS integration into the NAS – and all relevant R&D – at the top of our country's priority list.

A deeper, national commitment to UAS R&D has three main components – a comprehensive industry-government UAS research plan, more resources for the federal government to coordinate UAS research and intellectual property protections for the companies that participate in UAS R&D.

1. First, the industry and its government partners need a holistic research plan that coordinates all UAS research. While the test sites are operational and each has been given specific areas to research, too many questions remain unanswered:
    - What type of data will the test sites collect, and in what manner?
    - Where will the data go, how will the data be used?
    - How will the soon-to-be-designated UAS Center of Excellence fit into the picture?
    - How will all of this be incorporated with NextGen?
    - How does NASA's UTM system – which could potentially manage flight approvals and aircraft deconfliction – fit into all of this?

Our industry wants to work with federal partners to help provide the answers and create a holistic research plan. In concert with better planning, it should be clarified who coordinates the various efforts, and at what level.

2. Second, the federal government needs more resources to coordinate UAS research. To be clear, the industry expects to shoulder the lion's share of the cost for UAS R&D, and the industry is already spending millions. But the FAA needs more resources to coordinate all of the various research efforts. The FAA was given $14.9 million (courtesy of a $6 million congressional increase) to support its UAS research this next year, which is up from previous years. However, when compared to other federal research efforts, this figure is insufficient. For example, the FAA's funding pales in comparison to the more than $50 million NASA received in Fiscal Year 2015 for UAS R&D in the Integrated Aviation Systems Program and UTM program under the Airspace Operations and Safety Program. UAS integration into the NAS should be a top national priority, and the relevant federal agencies and departments should have the financial resources commensurate with the task at hand.

3. Third, the government must have transparent intellectual property (IP) protections. Companies on the cutting edge of UAS innovations won't participate in FAA or other governmental research activities if we cannot guarantee that their intellectual property will be protected. Everyone stands to benefit from robust IP protections. Companies that are investing millions into new technologies would be encouraged to continue innovating. The FAA and other stakeholders would gain valuable data to guide the integration. There should be clarity about the government's responsibilities and obligations to protect proprietary data and processes. There also need to be clear IP policies from the entities designated to perform R&D functions on behalf of the government, such as the six federally designated test sites. These policies and protections would ease the concerns of manufacturers, software developers and other companies on the cutting-edge of UAS technology, and encourage them participate in UAS R&D.

The FAA has taken significant steps to advance the UAS integration, but much work remains to be done. If we are to fully realize the tremendous benefits of UAS technology, we need a national commitment supporting its advancement, including a comprehensive public-private research plan, more resources for the government to coordinate research, and intellectual property protections for the industry to participate.

AUVSI members stand ready to collaborate with the appropriate government agencies to accelerate the needed R&D efforts that will allow for safe integration of UAS into the NAS.

Thank you again for the opportunity to speak today. I look forward to answering any questions the committee might have.