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Chairman Latta, Ranking Member Schakowski, and members of the subcommittee, thank you very much for the opportunity to participate in today's hearing on unmanned aircraft systems. I'm speaking on behalf of the Association for Unmanned Vehicle Systems International, 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 many small businesses that support and supply this innovative industry.

Many of our members are exploring ways unmanned systems – whether in the water, on the ground or in the skies – can transport goods such as household items, medical supplies, and food, to even transporting people in the not too distant future. My comments today will focus on unmanned aircraft systems, or UAS, which are increasingly being used by a range of American businesses.

From inspecting pipelines to newsgathering to mapping flood zones, UAS help save time, save money and, most importantly, save lives. It is no wonder why thousands of businesses – small and large – have already embraced this technology, and many more are considering integrating it into their future operations.

When it comes to transporting goods, many companies have been testing the capabilities of UAS both domestically and abroad. Amazon, Google and UPS are among the major players who hope to eventually launch UAS delivery services. Industry and government have already taken several steps in the right direction to open the airspace to commercial UAS. Let me explain.

We now have initial regulations governing civil and commercial UAS operations. On August 29, 2016, the FAA implemented the small UAS rule, also known as Part 107. The rule was the result of years of collaboration between government and industry that established a flexible, risk-based approach to regulating UAS. This new regulatory framework helped reduce many barriers to low-risk civil and commercial UAS operations, allowing businesses and innovators to harness the tremendous potential of UAS and unlock the many economic and societal benefits the technology offers.

The demand for commercial UAS has since exploded. As of this month, there are more than 820,000 UAS registrations with the FAA, the vast majority of which are hobbyists. Of those, about 62,000 platforms have been registered for commercial use. The FAA expects more than 400,000 UAS could be flying for commercial purposes over the next five years—a more than six-fold increase from today.

Part 107 allows anyone who follows the rules to fly for commercial purposes. Generally speaking, operators need to fly under 400 feet, within visual line of sight and only during daylight hours. However, recognizing the need for the rule to be flexible in order to foster innovation, the FAA created a waiver process under Part 107 that allows for expanded types of operations with the approval of the agency.

To date, the FAA has granted more than 800 waivers to Part 107. An AUVSI analysis of the first 300 found that companies in 44 states were already taking advantage of the process. Most of these companies are small businesses with fewer than 10 employees. Many companies are requesting waivers to operate at night, beyond light of sight and over people. High profile use of these waivers includes the most recent Super Bowl halftime show, which featured an aerial light show made possible by Intel's waivers to operate multiple UAS at night. BNSF Railway received a waiver to conduct inspections of its sprawling rail network beyond line of sight.

Part 107 and its waiver process were just the first steps in creating a regulatory framework for full UAS integration. An economic analysis by AUVSI projects that the expansion of UAS technology will create more than 100,000 jobs and generate more than $82 billion to the economy in the first decade following full integration in to the national airspace. After witnessing the growth of the industry over the last few years and now with Part 107 in place, these figures will likely go higher under the right conditions and once we achieve full integration.

Specifically with regard to delivery, many companies are already testing and discovering the possibilities of UAS. For example:

- A^3, which is the Silicon Valley arm of Airbus, is building an aircraft that "doesn't need a runway, is self-piloted, and can automatically detect and avoid obstacles and other aircraft. Designed to carry a single passenger or cargo, they are aiming to make it the first certified passenger aircraft without a pilot. Their goal is to fly a full-size prototype before the end of 2017."[1]

- UPS recently tested a drone that launches from the top of a UPS package car, autonomously delivers a package to a home and then returns to the vehicle while the delivery driver continues along the route to make a separate delivery. UPS conducted the test with Workhorse Group, an Ohio-based battery-electric truck and drone developer. Workhorse built the drone and the electric UPS package car used in the test.[2]

- Amazon Prime Air is a delivery system designed to safely get packages to customers in 30 minutes or less using UAS. Prime Air has great potential to enhance the services Amazon already provides to millions of their customers by providing rapid parcel delivery that will also increase the overall safety and efficiency of the transportation system.

These are, of course, just a handful of cases. And while we've seen most excitement around the prospects of UAS deliveries, unmanned systems are also transforming deliveries over water and on the ground. Maersk has tested ship-to-ship deliveries[3] in the North Sea, while just a few weeks ago in Dallas at AUVSI's XPONENTIAL, Intel showcased Loomo Go, an autonomous delivery robot created by Segway Robotics that incorporates Intel's RealSense camera. The robot can be operated like an actual Segway, but by using RealSense, "Loomo is able to perceive the world around it and operate through it, doing so as part of an overall delivery process to bring humans objects."[4]

These advancements make it clear that we are at the dawn of a new American renaissance in technology,

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[1] https://vahana.aero/welcome-to-vahana-edfa689f2b75
[2] https://pressroom.ups.com/pressroom/ContentDetailsViewer.page?ConceptType=PressReleases&id=1487687844847-162
[3] http://www.maersk.com/en/hardware/2016/03/flown-out-by-drone
[4] http://www.geeky-gadgets.com/loomo-go-delivery-robot-15-05-2017/

one that deserves government attention and support. In the past, government invested heavily in physical infrastructure – from the nation's air traffic control system to its interstate highway system – which ultimately had a tremendous impact on commerce. The benefits, however, did not stop there. Over time, the safety, security and efficiency gains we achieved as a nation have vastly outweighed the costs, and the unmanned systems industry will be no different.

In the 1930s, the U.S. airline industry experienced significant growth, with the number of annual passengers on U.S. domestic flights more than quadrupling between 1934 and 1939. In order to enhance the safety of the skies and provide the necessary conditions to support the fledgling industry, the Department of Commerce began to operate airway traffic stations – some of the earliest air traffic control facilities – starting in 1936. Congressional funding supported the Department of Commerce and, by 1941, the federal government fully funded and operated the nation's air traffic control system. As a result of these early investments, today the U.S. airlines generate more than $160 billion in annual operating revenue, employ nearly 700,000 people and safely transport two million passengers every day.

In the 1950s, President Eisenhower had a vision for more easily moving goods and people across the country. Decades earlier, he had participated in the first transcontinental Army motor convoy, which traveled from Washington, D.C., to San Francisco. It took 62 days. While he was the Supreme Allied Commander during World War II, Eisenhower saw the Autobahn system in Germany and a faster way to transport troops. Later when he was president, Eisenhower championed the Interstate Highway System and, in 1956, Congress authorized $25 billion for its construction – the largest public works project in American history at the time. In the decades that followed, costs fell sharply across dozens of industries due to easier and cheaper transportation. Today, millions of vehicles on average use this system daily.[5]

Beyond physical infrastructure, government has also made significant investments in technology that has become ubiquitous in our daily lives, from the Global Positioning System (GPS) to the Internet.

These examples illustrate how the government has seized on the opportunity before it to positively impact commerce and our daily lives. Facilitating interstate commerce is the responsibility of the federal government, but these investments didn't originate solely from a sense of obligation; they came from

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[5] https://www.fhwa.dot.gov/policyinformation/tables/02.cfm

necessity coupled with vision and an embrace of what's possible. Today, we stand at the dawn of another such moment in history. Technology is advancing at lightning speed, especially in the realm of UAS. Our industry stands to create enormous economic value for the country. UAS deliveries are not held back by innovation, imagination or technology, but by a lack of regulatory clarity.

We need a new national imperative in unmanned systems that, like the air traffic control system, and interstate highway system before it, provides the resources to advance and support this growing industry. Industry is bringing the technology; government needs to do more to support it and advance innovations such as delivery services.

A vital prerequisite for advancing UAS is an appropriately-funded FAA that can meet the employment and staffing needs required for the future, including the federal rulemaking processes to achieve full UAS integration. Equally as important, is additional federal investment to update the FAA's IT infrastructure. This will allow them to automate its UAS processes in collaboration with industry in order to meet the growing demand for UAS services and enhance the safety and security of the national airspace.

Of course, the industry is not relying on the FAA and government alone to advance UAS. Industry is currently shouldering many of the research and development costs to spur innovation, finding solutions to make UAS fly higher and farther, more safely and efficiently.

Industry has partnered with government to advance UAS Traffic Management (UTM) concepts, beginning with Low Altitude Authorization and Notification Capability (LAANC). It has also been a partner in helping to develop standards for remotely identifying operators and owners of UAS, building on earlier registration efforts with real-time tracking of UAS operators. AUVSI recently collected papers on remote identification solutions for UAS from industry stakeholders to help the FAA meet its congressional directive under the 2016 FAA reauthorization extension to develop consensus for such standards.

Another key example of collaboration is the Drone Advisory Committee (DAC), of which I am a member. RTCA is the supporting organization for this Federal Advisory Committee and it "was formed to provide an open venue for the FAA and key decision-makers supporting the safe introduction of UAS into the National Airspace System. Members of the committee work in partnership with the FAA to identify and propose actions to the FAA on how best to facilitate the resolution of issues affecting the efficiency and

safety of integrating UAS into the NAS."[6] Through its Drone Advisory Subcommittee and three task Groups, the DAC is working on providing consensus-based recommendations to the FAA on roles and responsibilities for federal, state and local governments. It is also working on providing recommendations on access to airspace and short-term FAA funding. These important collaborative measures will continue to be important to the growth and security of the UAS industry.

Industry and government will continue to collaborate on outstanding issues as required to facilitate more complex operations, such as developing a cohesive spectrum strategy. This will require dialogue between industry stakeholders and all federal agencies involved in spectrum, such as the Federal Communications Commission, the National Telecommunications and Information Administration and NASA, and will help ensure that spectrum is available for UAS without inefficiencies or constraints.

The UAS industry is primed for incredible growth, thanks to industry representatives and government regulators nurturing innovation that helps businesses be competitive in the marketplace. We hope that these efforts can be sustained and that we continue to reach new historic milestones in integrating this technology into the national airspace and pave the way for regular and widespread UAS deliveries.

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

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[6] https://www.rtca.org/content/drone-advisory-committee