Volpe Center capabilities related to UAS integration

- Air traffic and collision hazard modeling
- Benefit-cost and economic impact analyses
- Concept gap and integration analysis
- Developing regulatory standards
- Engineering design and reliability
- Environmental measurement and analysis
- Human factors analysis and evaluation
- Policy management and workflow analysis
- Safety and operational data management
- Safety risk management analysis
- Technology, policy, economic, and data analysis
- UAS vehicle tracking and poor weather testing
- Project management

About the Volpe Center

Volpe is a leading federal research, analysis, and technology center within the U.S. Department of Transportation, dedicated to advancing transportation innovation for the public good. For over 45 years, our renowned multidisciplinary, multimodal experts have been a go-to resource for tackling the most complex national and global transportation challenges.

Visit us at **www.volpe.dot.gov**

The Volpe Center plays a key role in UAS integration, partnering with FAA, DoD, NASA, and others.

Safe, efficient integration of **unmanned aircraft** into the national airspace is a shared responsibility.

U.S. Department of Transportation
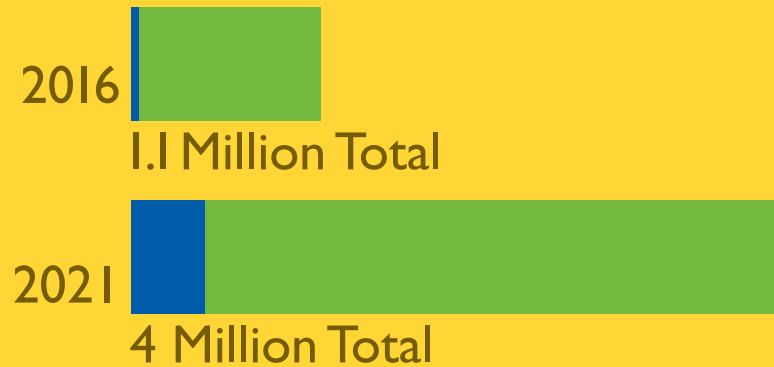**Volpe Center**

A new era in aviation

Rapid innovations in avionics, sensing technology, and software are enabling **a revolution in unmanned aircraft.**

Commercial and **Hobbyist** UAS fleet are predicted to more than triple by 2021.

2016

1.1 Million Total

2021

4 Million Total

In the next 10 years, the commercial drone industry is projected to generate **more than**

## $82 billion

for the U.S. economy.

Sources: FAA and AUVSI

Over the next few years, millions more unmanned aircraft systems (UAS), commonly called drones, will be flying in our nation's airspace. Aviation analysts expect the value of the drone hobby market alone to multiply many times over in the next several years.

- The commercial UAS fleet is expected to grow from **42,000** in 2016 to **442,000** by 2021.
- The hobbyist UAS fleet could grow from **1.1 million** in 2016 to as many as **3.5 million** by 2021.
- In total there could be as many as **4 million** hobbyist and commercial UAS vehicles in 2021.
- By 2025, the commercial drone industry could support as many as **100,000 new jobs.**

Volpe's role in the UAS sphere

Today, Volpe Center experts are working in partnership with several federal agencies on challenges and opportunities related to unmanned aircraft systems:

- **Federal Aviation Administration** (FAA)
- **U.S. Department of Defense** (DoD)
  - U.S. Air Force
- **National Aeronautics and Space Administration** (NASA)
- **U.S. Department of Energy** (DOE)
- **U.S. Department of Agriculture** (USDA)
  - U.S. Forest Service
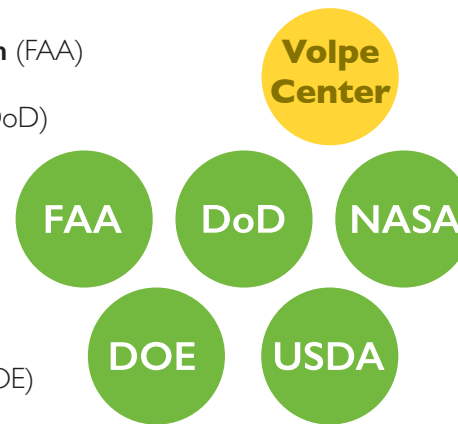
Volpe also collaborates with UAS researchers in government, industry, academia, and across the entire transportation community.

Volpe-supported UAS initiatives

Safety

- Creating modeling and fast-time simulation systems related to UAS integration. (NASA)
- Creating improvements to safety risk management processes relevant to UAS systems, software, and hardware. (FAA)
- Designing minimum operational performance standards and functional requirements for command-and-control communications link. (FAA)
- Developing safety case for detect-and-avoid systems. (FAA)
- Exploring human factors risks related to safely integrating UAS into the national airspace. (FAA)
- Planning and executing ground-based sense-and-avoid systems that provide government UAS operators with real-time displays of aircraft in nearby airspace. (DoD)
- Supporting the Drone Detection Pathfinder Initiative, which focuses on visual line-of-sight operations. (FAA)

At the Volpe Center, multidisciplinary, multimodal teams of **engineers** and **technology, policy, and data analysts** are working with partners across the transportation community to accelerate the **safe** and **efficient** integration of UAS into the national airspace system (NAS).

Efficiency

- Developing a draft application and processes for UAS operators to apply for airspace authorization. (FAA)
- National airspace integration planning and research through design and evaluation of automated flight systems. (NASA)
- Research and engineering analysis on opportunities, risks, and challenges related to the future development and deployment of UAS. (DoD)
- Reviewing how more UAS in the national airspace will affect current and planned operations and infrastructure. (DoD)

Sustainability

- Analyzing the noise characteristics of unmanned aircraft systems. (FAA)
- Benefits, costs, and recommendations for using UAS in Forest Service operations. (USDA)
- Creating an inventory and noise database of the national UAS fleet. (FAA)
- Developing an operational safety assessment for measuring high-altitude atmospheric radiation. (DOE/DoD)
- Developing standards, procedures, and regulations for UAS noise certification. (FAA)

Industry and policy analysis

- Collaborating with public, private, and academic institutions to establish an implementable plan for UAS integration in the NAS. (FAA)
- Developing voice-switch UAS pilot interface requirements. (FAA)
- Identifying technologies that will enable growth for military and commercial UAS markets. (DoD)
- Intelligence on complex multimodal systems, toward integrating UAS into new modes, such as for pipeline and rail inspections. (Cross-agency)
- Financial management support in estimating the costs of integrating UAS into the national airspace. (FAA)