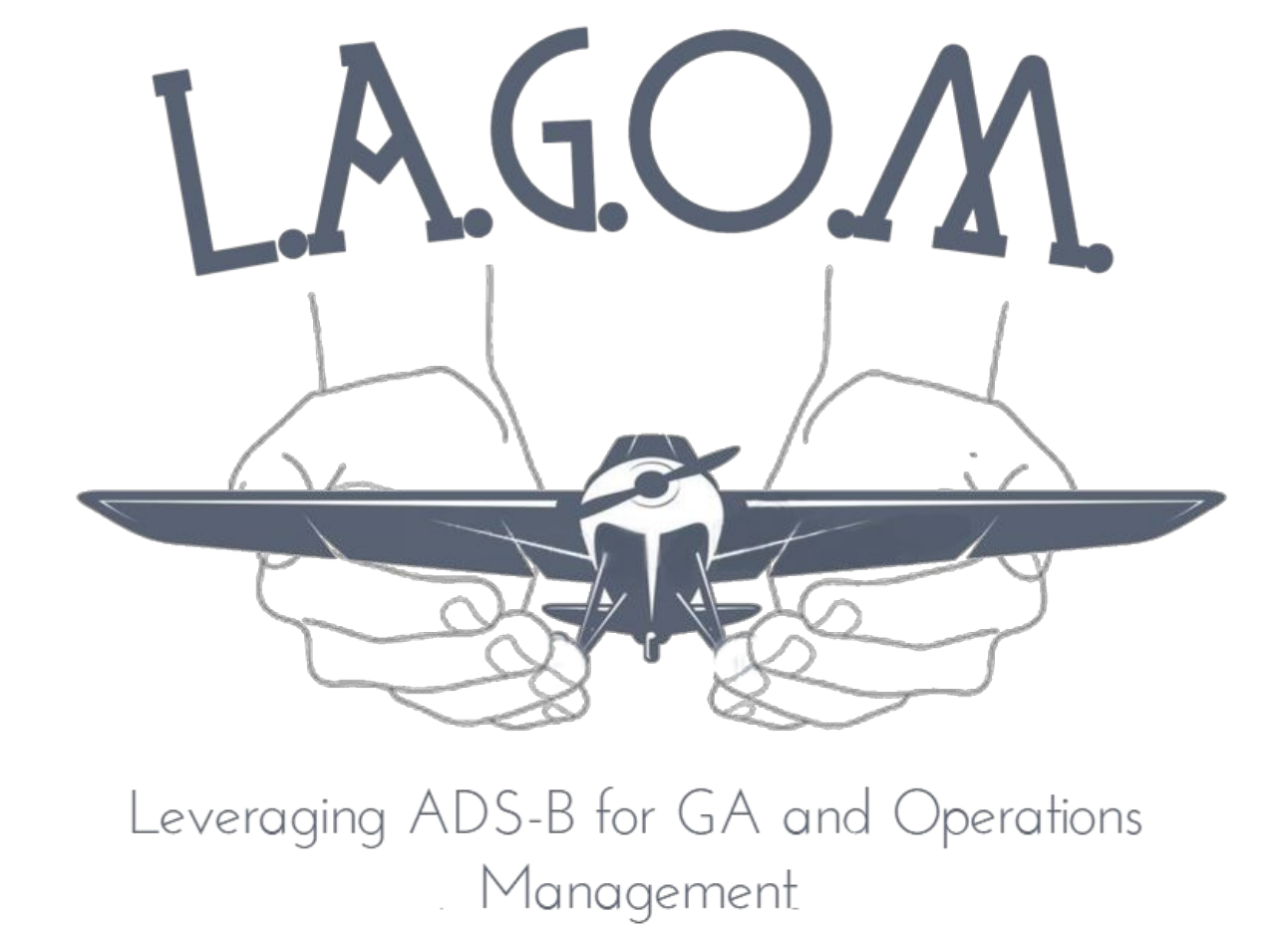
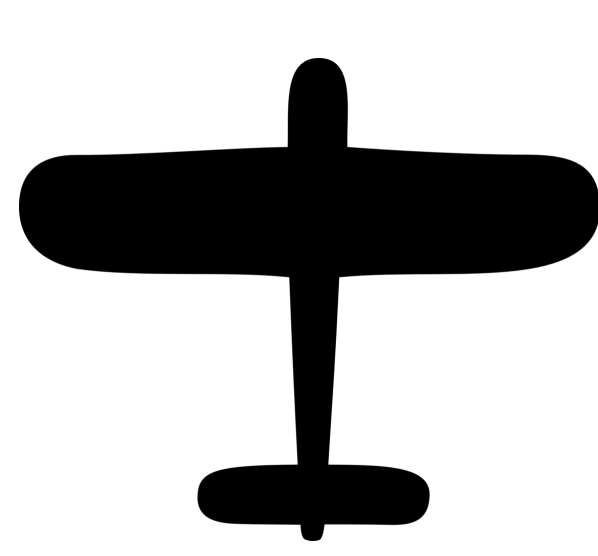


# Leveraging ADS-B for General Aviation (GA) and Operations Management of the National Airspace System (NAS)

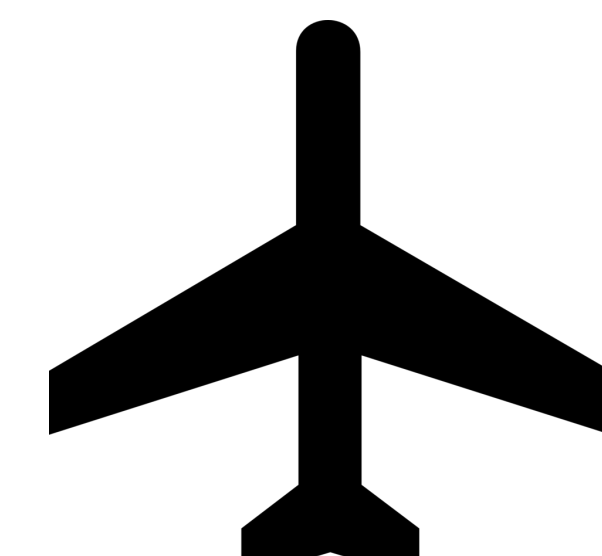
Jocelyn Ledin-Bruening, John Dulski, Ryan Peene, and Zachary Hoff



## Problem/Background



1.27 fatal accidents per 100,000 flight hours



0.06 fatal accidents per 100,000 flight hours

General Aviation (Part 91) has **21x more** fatal accidents than Part 121 Operators

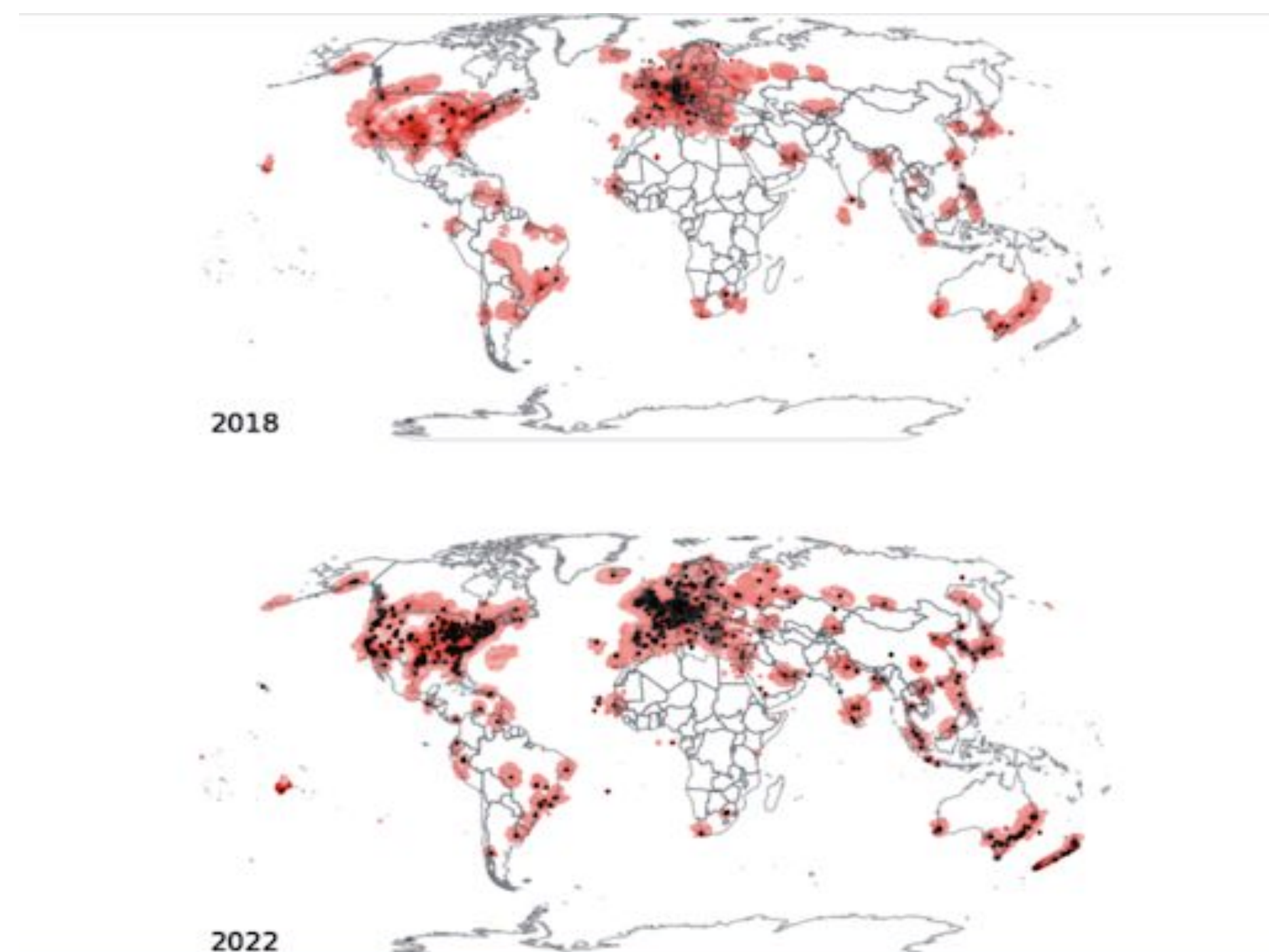
LAGOM will be an **accessible, uncomplicated** platform for operators to **monitor** and **analyze** their flight data.

## Scalability

- Antenna Expansion
  - Ground-Based Antennas
  - Satellite-Based Antennas
- Technological Innovation
  - Anticipating Increased Transmission rate
  - Entrants like UAS and UAM into the NAS

## ADS-B Accuracy

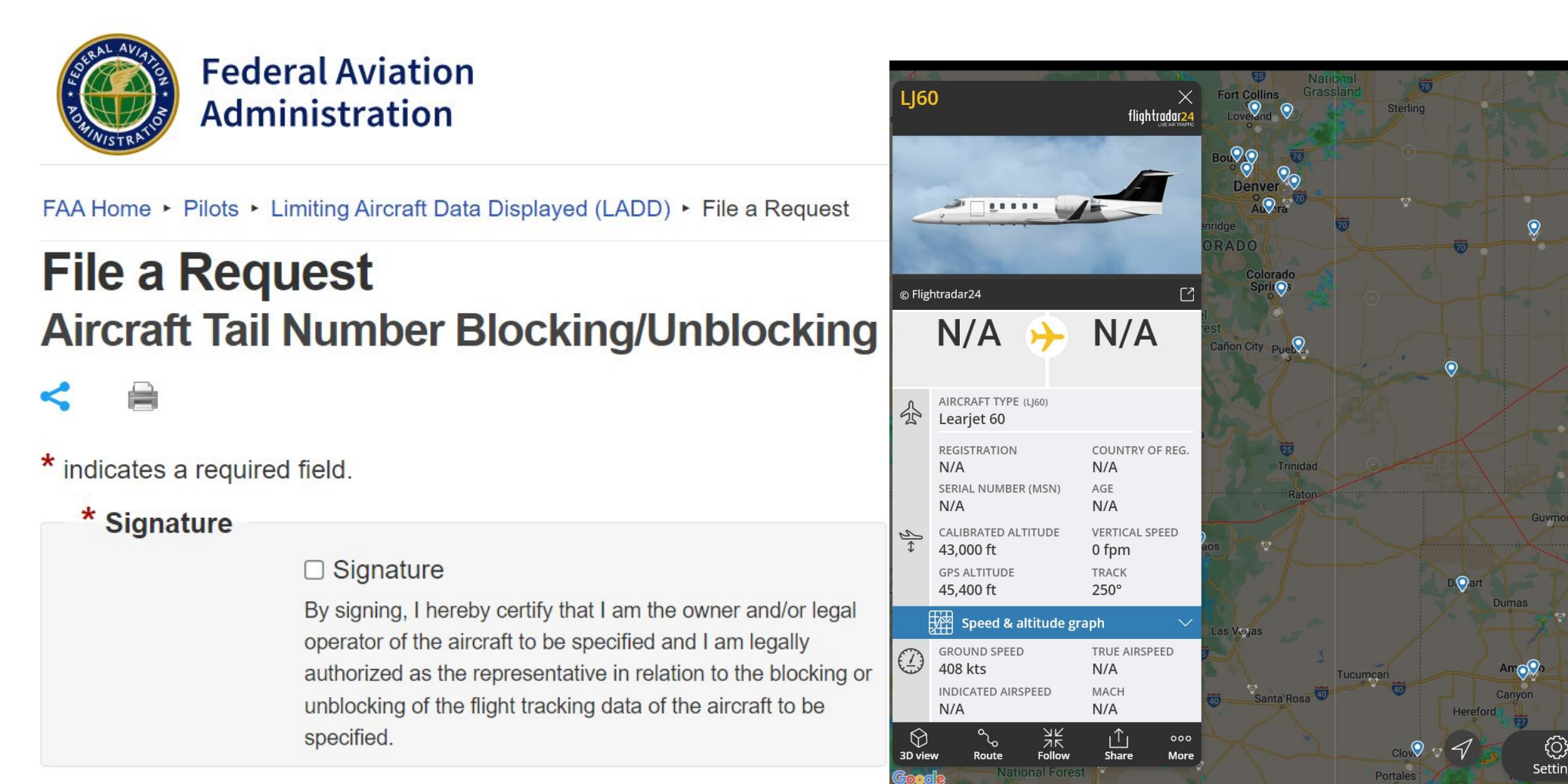
1. ADS-B data is more accurate than radar data (Zhang, 2011)
2. ADS-B is a promising technology (Verbraak et al., 2017)
3. Accuracy levels (Schäer et al., 2014)
  - Position: 25 ft.
  - Horizontal velocity: 4 kts.
  - Vertical rate: 64 ft/min.



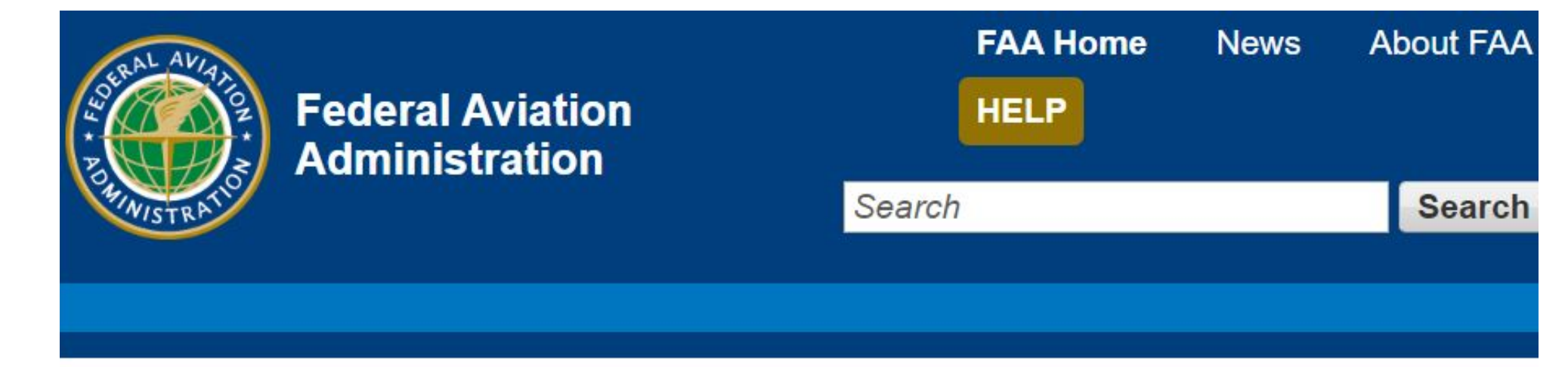
ADS-B Coverage Map (Sun, 2022)

## Privacy Concerns

### Limiting Aircraft Data Displayed Program (LADD)



### Privacy ICAO Address Program (PIA)



### Privacy ICAO Address Application: Checklist

The FAA Program Office provides this automated tool in order to assist aircraft owners and operators participating in the Privacy ICAO Address(PIA) program. Please complete the following pages to apply for a Privacy ICAO Address.

The following checklist provides a list of affirmation statements indicating your understanding of the legal and program requirements that must be met in order to participate in the ADS-B Privacy ICAO Address program. **All boxes must be checked in order to apply for a Privacy ICAO Address.**

Am I Eligible to apply for a Privacy ICAO Address?

I understand that by providing my information, it will be used for the purposes of verifying eligibility for participation in and processing of data for a Private ICAO Address provisioning as well as ongoing communications with the DOT/FAA. This information will be retained in DOT Privacy Act System of Records, DOT/FAA-801, Aircraft Registration

## Timeline

- Product Development Phase**
  - ADS-B data aggregated onto LAGOM servers
  - ADS-B antennas deployed throughout US
    - Targeting areas without consistent coverage
  - Possible satellite-based ADS-B In receivers
- Market Introduction Phase**
  - Flight training fleets and larger operators who don't have a data analytics program (GE EMS or NGAFID) will gain access
  - Feedback will be gathered during this phase from all stakeholders
- Growth Phase**
  - Program is spread to smaller GA operators (single operators - pilot/owners); separate user interface added
  - Updated and expanded algorithms to highlight unsafe flight conditions
- Maturity Phase**
  - Further improvements allowing for greater and greater data analysis
  - UAS/UAM traffic added to the system
  - Data-driven regulatory improvements by FAA

## AI/ML in LAGOM

**Example**

Operational Statistics		
Runway	Number of Operations	% of Total
35R	355	67.7
35L	169	32.3

**Approaches: RWY 35R**

Event Statistics		
Runway	Frequency	% of Total
Unstable Approach	112	59.6
High Speed on Approach	35	18.6
High Descent Rate on Approach	31	16.5
Low Altitude Stall	7	3.7
Risk of Spin	2	1.1
Risk of Collision	1	0.5

**Approaches: RWY 35L**

- Goal is to provide real time expert level data analysis with no additional effort from the user
- Point the user to specific actionable items that can improve in their operation
- Take advantage of large, pre existing datasets to develop a robust algorithm that can identify risks and eventually predict aircraft exceedances

## LAGOM Data Flow

