eVTOL Technology

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EDS / HP – Global IT Solution Architect (BoA, GM, DCX)
Merchant Mariner

eVTOL Technology

FLYING CARS (ORBS)

Will rewrite how the Air Force and civil society do logistics and transportation... and Agility Prime is the program to help usher the 'not yet' into the 'now.'

[USAF Agility Prime Aims To Boost Investor Confidence In eVTOL Market]

Aviation Week· 2 weeks ago, USAF Aims To Boost Investor Confidence In eVTOL. The market is available to both Aviation Week & Space Technology.
www.agilityprime.com

Agilityprime.com

- The Air Force recently launched Agility Prime, a non-traditional program seeking to accelerate the commercial market for advanced air mobility vehicles (i.e., ORBS or "flying cars").

  Leveraging unique testing resources and revenue generating government use cases for distributed logistics and disaster response, the government plans to mitigate current commercial market and regulatory risks.

  Agility Prime also aims to bring together industry, investor, and government communities to establish safety and security standards while accelerating commercialization of this revolutionary technology.

  The Innovative Capabilities Opening (ICO), establishes a rapid contracting mechanism beginning in 2020 with a “Race to Certification” series to drive government procurement of operational capability by 2023.

http://agilityprime.com/#/

INNOVATIVE CAPABILITIES OPENING – ICO

The Air Race overarching legal document which provides a framework for Agility Prime to write no cost (in-kind) OTA's (Other Transactional Authority) contracts at a rapid pace to suit the development timeline and structure of potential partners.

AREA OF INTEREST

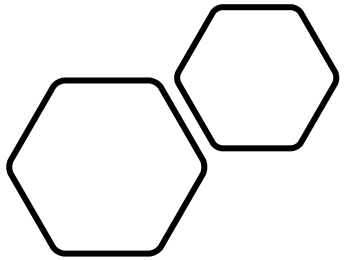
This area of interest is focused on those mature platforms with specifications focused on human transportation over significant distances with more than 3 passengers.

AREA OF INTEREST

This AOI is governed by the Agility Prime ICO (or Opening) and will help the Government assess the transformative vertical flight market and Vertical Takeoff and Landing (VTOL) technologies.

AREA OF INTEREST

As these systems mature toward certified commercial operations, the Government will identify opportunities for early adoption, with the potential for procurement and fielding in the next three years.



Agilityprime.com

Defense Contract Management Agency (DCMA)

SBIR – Small Business Administration

- **THE DCMA CUSTOMER FACING COMMUNITY**
- https://www.dcma.mil/Customers/Customer-Liaisons/
- DCMA is the Department of Defense (DoD) contract manager, ensuring acquisition programs are delivered on time, within cost, and meet performance requirements. DCMA is integral to the entire end-to-end acquisition process - from pre-award through contract closeout. DCMA manages more than 352,000 prime contracts with more than 23,000 contractors worth more than $900 billion.
- **DoD Business Opportunities (FedBizOps)** - Conduct a more detailed search for DoD solicitations online.
- **System for Award Management (SAM)** - Current and potential government vendors are required to register here in order to be awarded contracts by the DoD, NASA and DoT. The Central Contractor Registration (CCR) system migrated to SAM.
- **NAICS Codes** - The North American Industry Classification System (NAICS) is replacing the U.S. Standard Industrial Classification (SIC) system.
- **Cage Codes** - Information on obtaining a cage code.
- **SBA News** - News releases from the U.S. Small Business Administration.
- **Listing of Procurement Technical Assistance Centers (PTAC)** - Obtain local assistance on marketing to the Federal, State and local Government.
- **SBA Small Business Development Centers** - Provide management and technical assistance to current and prospective business owners.
- **Doing Business with DoD** - Publications designed to assist small businesses in working with or marketing to DoD.
- **Defense Procurement and Acquisition Policy (DPAP)** - Information on DoD electronic commerce.
- **SBA Certification Page** - Information on certification(s) or qualification(s) requirement(s) for Small Business, 8(a), HUBZone and SDB.
- **GSA Small Business Utilization** - Its mission is to promote increased access to GSA's nationwide procurement opportunities.

eVTOL Technology - Challenges

Learn how to do business with the Government – Department of Defense.

Have a Staff person responsible for SBIR and DCMA.

Use the DCMA Customer Liaison.

Attend PTAC classes – Free training.

Questions ?

AERIAL VEHICLE AUTOMATION

Giant Drones in Texas
Winged X8 Flying Robotic Platform

We create large fixed pitch electric & hybrid electric multirotor platforms that can autonomously carry payloads 200 lbs or greater through the sky in 3D.

We build key enabling hardware & software.

Previously raised $300k of investment with another $200k in commitments upon milestones

Product Roadmap: A + B + C

A

Propulsion System: Core Thrust Generating Components

B

All Electric Multirotor Platform: Heavy Lift Multirotor for Shorter Missions

C

Hybrid Winged Multirotor Platform: 300 + mile range, 5 hours of endurance, 200 lbs cargo

Performance of Tech & Company

- Previously designed, developed, flew, tuned and tested 400 lb thrust quadrotor (completed)
- Designed and built large electric speed controller to control our giant electric motors (completed)
- Created, tested and validated software for precise motor control (completed)
- Achieved thrust of 188 lbs of thrust per rotor peak with propulsion system (completed)
- Established robust supply chain to build our parts and components including propellers optimized for static thrust (completed)
- Ruggedization of components for production and certification (to be completed)



Deep Markets

- “1 Billion people in the world today do not have access to all-season roads,” – Raptopoulos TED Talk, 2013
- UPS delivers 2.6 million packages and documents every day by air in the US. 18.3 million are sent total by all modes of transport.
- The FY 2019 Department of Defense budget request includes $9.39 Billion in drone related funding, 26 percent more than the FY 2018 request.
- United States business logistics costs reached $1.6 Trillion in 2018 (8% of GDP).

- Target short term strategic markets initially for USA. Flights over uninhabited areas and water. Delivery to rigs and construction sites, remote inspections.

- Will target overseas delivery markets with less regulation, established operators to fly our vehicles (like Zipline).

- Longer term: will target established delivery companies in US once FAA grants wider approvals (FedEX, UPS, USPS, DHL)

- Traditional Helicopter: $200-$300/hr direct operating costs[1]
- Traditional Small Fixed Wing: $128/hr direct operating costs[2]
- AVA Winged Multirotor Platform: $8.90/hr direct operating costs[3]

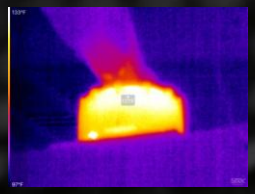
References:

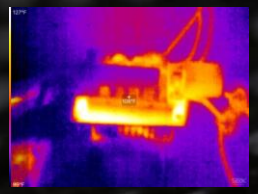
1 From https://www.conklindd.com/CDALibrary/ACCostSummary.aspx $275/hr for Robinson R44, does not include pilot

2 From https://www.conklindd.com/CDALibrary/ACCostSummary.aspx $128/hr for Cessna 172P, does not include pilot

3 $5000 overhaul cost every 2000 hours = $2.50/hr amortized overhaul cost -
Fuel burn of 3.2 gallons/hr @ $2/gallon = $6.40 estimated fuel cost/hr
Total $6.40 + $2.50 = $8.90

- Patent(s) Pending Vehicle Architecture

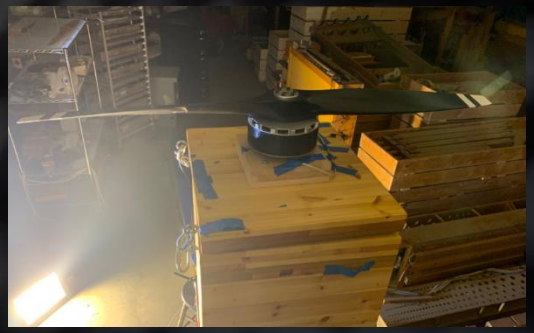


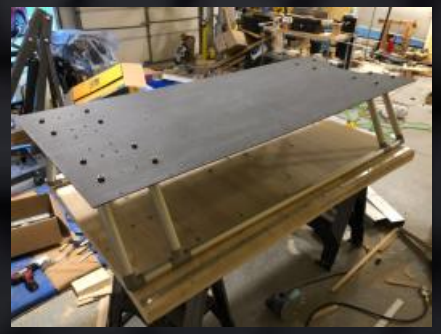


- We created our own proprietary large speed controller; the core enabling technology for large drones.

- We have proprietary code & supply chain elements.

- Our approach to manufacturing is cost-centric, which is a key advantage over traditional aerospace (Think Henry Ford Production vs Other Early Expensive Car Companies)





AERIAL VEHICLE AUTOMATION

David Gonzales II, Co-Founder

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www.avapropulsion.com

Urban Air Mobility Project – NASA Grand Challenge: UNT Team and Its Purpose

Urban Air Mobility Project – NASA Grand Challenge Teams and Their Purpose

NASA Grand Challenge Overall Objective

The objective of the challenge is to test the capabilities and readiness of vehicles and systems that could revolutionize mobility in and around densely populated metropolitan areas.

Phases and time frame

Phase I: April 1st, 2020 to March 31st , 2021

Phase II: 2021 to 2025

Selected teams and their focus areas

11 teams including UNT have been selected under “airspace” category. There are two more categories: Platform and Information Exchange

Team UNT

Team UNT includes 6 additional partners (2 universities: University of Massachusetts, Texas A&M @ Corpus Christi, and 4 companies: OneSky, Freqnetis, Unmanned Experts, Resilienx). Our objective is to develop “Resilient Air Space Operations and Services”, a software system capable of providing real-time alerts about airspace hazards.

Urban Air Mobility Project – UNT Role

Goal: Develop tools and technologies under NASA's grand challenge and to support Urban Air Mobility (UAM) ecosystem

Table 1: Partnerships, Roles, Responsibilities, Contributions

Partner(s)	Organization	Role
Kamesh Namuduri	University of North Texas (UNT), Denton, TX	Integrated Service Architecture
Mike Sanders, Joe Henry, Eric Bird and Tye Payne	Lone Star UAS Center of Excellence, Texas A&M University, Corpus Christi, TX	UAS Flight Test Demonstrations
Chris Kucera	OneSky, Exton, PA	UAS Traffic Management
Andrew Carter	ResilienX, Inc., Syracuse, NY	Airspace Management Systems
Keven Gimbald	Unmanned Experts Inc. (UMEX), Denver, CO	UAS Traffic Management
Brenda Philips and Apoorva Bajaj	University of Massachusetts (UMass), Amherst, MA	UAS Airspace Services
Lawrence Major and Joseph d'Hedouville	Frequentis USA, Inc., Columbia, MD	UAS Airspace Management

Resources: Each partnering company/university will invest its own resources to develop the technologies. NASA will provide guidance and allows the partners to interact with their systems for interoperability testing.

Urban Air Mobility Project – Impact on DFW

UAS Testing

UNT will be in the forefront of UAM ecosystem in the nation and provide leadership to the UAM industry in DFW area.

Coordination with DFW Airports

UNT will work closely with DFW International and Alliance airports in intelligent transportation related development projects and logistics.

Business Expansion

UNT will work with companies including Bell which are engaged in UAM grand challenge as a platform providers. Such collaborations are expected lead to businesses expansion in DFW.

Certification Programs

UNT will wok with community colleges and companies interested in developing UAS operator and platform certification programs.

K-12 Outreach

UNT has already begun working with DFW school districts to develop educational programs and projects for high school students.

Urban Air Mobility Project – UNT's Engagement

Benefits to UNT: UNT has an opportunity to be in the forefront of Urban Air Mobility Project and lead the state of Texas and support the UAV industry in developing the tools and technologies for the UAM ecosystem.

UAM Ecosystem: The UAM ecosystem includes UAS platforms, vertiports, traffic management tools, command, control, communication, and navigation technologies, sensors, and tools for autonomy, human-machine interface, machine leaning, artificial intelligence, and edge computing, among others.

NASA's Contribution: NASA provides the overall vision and leadership and commits to human resources, platforms, information exchange, and guidance to support the grand challenge. NASA's vision is to build the ecosystem together while every partner invests its own resources to develop their own products.

Partners Contribution: UNT's partners will invest their own resources into this project to develop and deploy their systems. They will provide access to their systems to UNT. They will work with UNT to develop the air space alert system

Contacts

UNT Engineering and Business Leadership: Andrey Voevodin and Terry Pohlen

UNT/UAM Project Leadership : Kamesh Namuduri

Kamesh.Namuduri@unt.edu, 940.369.8960

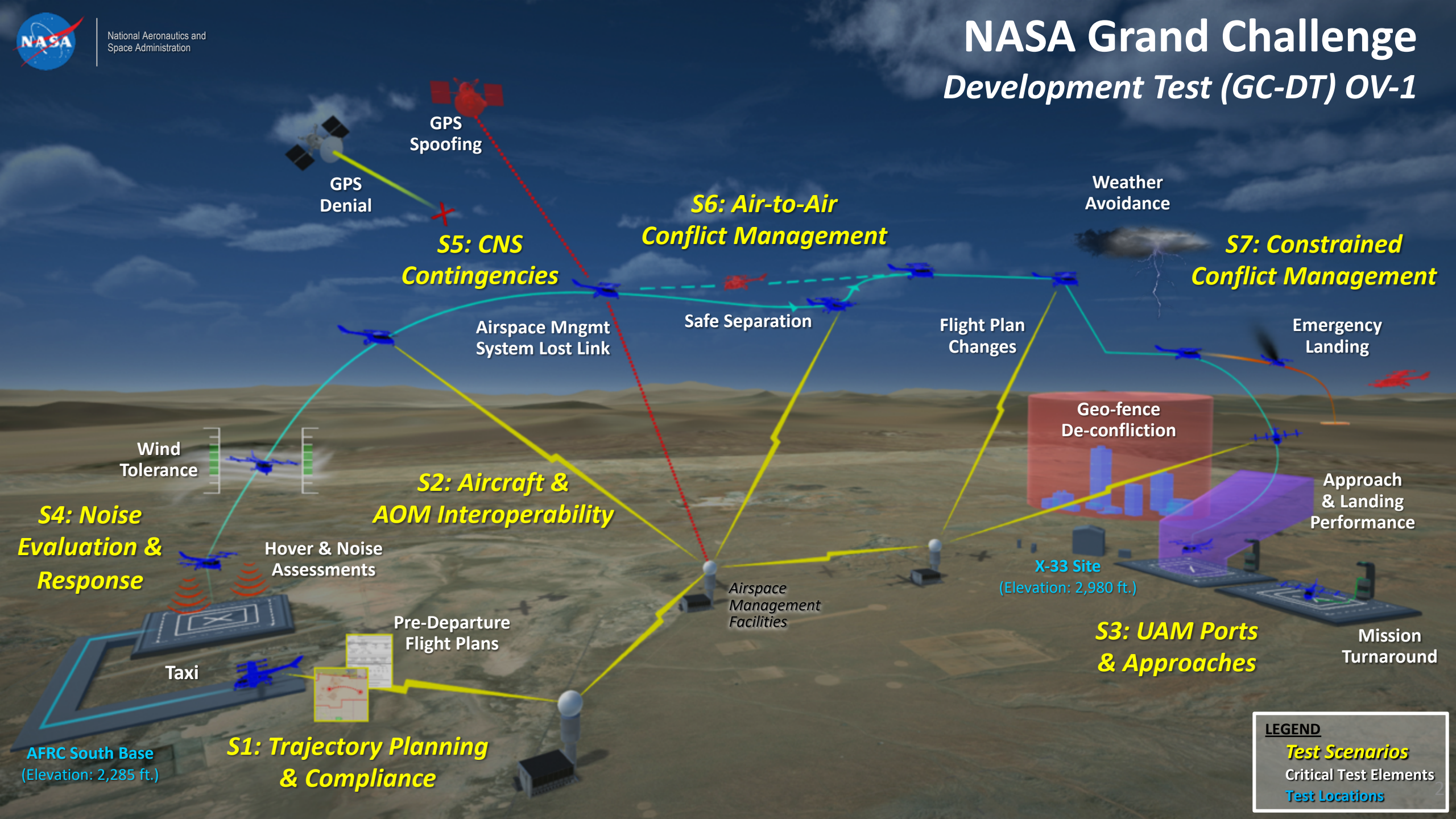
ARMD Urban Air Mobility Grand Challenge
Attachment A / Exhibit A
Grand Challenge Safety Scenarios

September 17, 2019

National Aeronautics and Space Administration

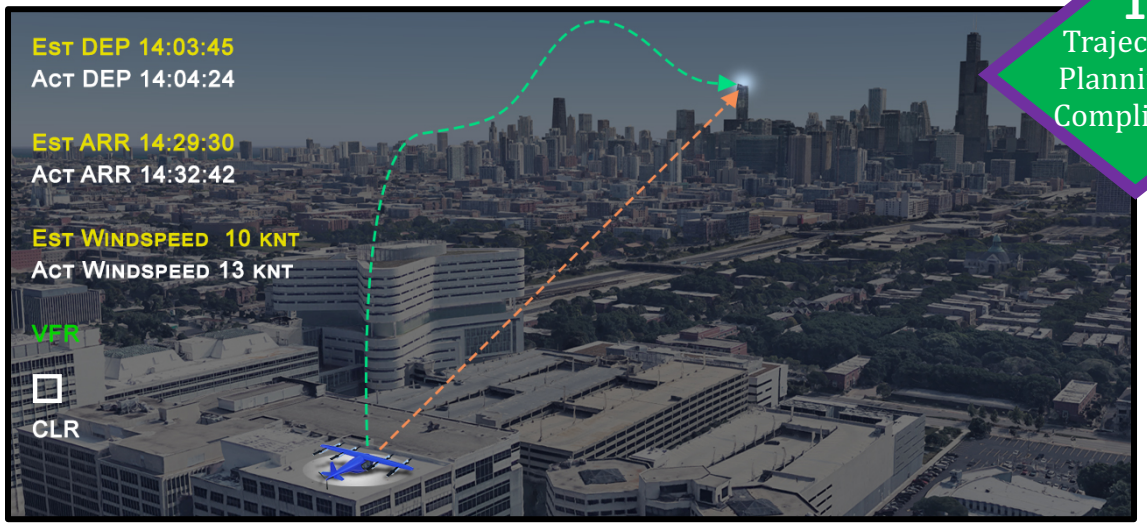
NASA Grand Challenge

Development Test (GC-DT) OV-1



Scenario 1 – Trajectory Planning & Compliance

Flight and operation planning for nominal operations that accommodates Airspace Operations Management (AOM) system and aircraft constraints as well as precision of aircraft trajectory conformance to the flight plan across a range of density altitudes. Evaluate format for exchange of trajectory information between aircraft and AOM system.



1 Trajectory Planning & Compliance

GC Series Aircraft Functional Objectives

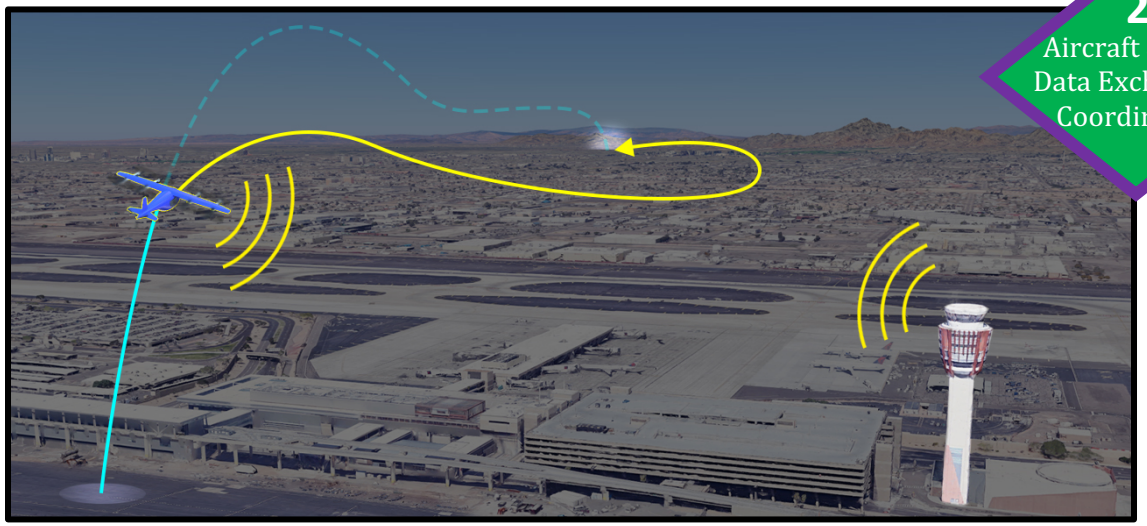
- Airspace Data Exchange – Demonstrate transmission to the ground of aircraft state, flight plan and revisions, etc. per a UTM API.
- Pre-departure Plan – Pre-departure flight plan generated, submitted and negotiated and accepted.
- Execute Flight Plan – Takeoff at pre-approved time and execute approved flight plan (via closed loop guidance and control) while continually reporting required trajectory and ETA, while attempting to maintain the original schedule.
- Trajectory Compliance – Evaluate laterals, altitude and time variations from intended 4-D route plan, in dynamic environmental conditions.
- Flight Plan Constraints – Evaluate ability of aircraft to comply with known pre-flight airspace and scheduling constraints.

GC Series Airspace Functional Objectives

- Pre-departure Plan – Pre-departure flight plan negotiation with aircraft including; Scheduled Time of Arrival slots, weather, airspace constraints and vertiport information.
- CNS Infrastructure – Demonstrate Communication Navigation Surveillance (CNS) infrastructure, weather infrastructure and other operational needs for 4D trajectory planning, tracking and monitoring.
- Trajectory Compliance – Evaluate laterals, altitude and time variations from intended 4-D route plan, in dynamic environmental conditions.

Scenario 2 – Aircraft & AOM Data Exchange & Coordination

In-flight re-planning, negotiation and execution that accommodates Airspace Operations Management (AOM) system and aircraft constraints, and responds to real-world uncertainties. Exercise exchange of trajectory information, AOM system and aircraft constraints, and user preferences between aircraft and airspace management systems.



GC Series Aircraft Functional Objectives

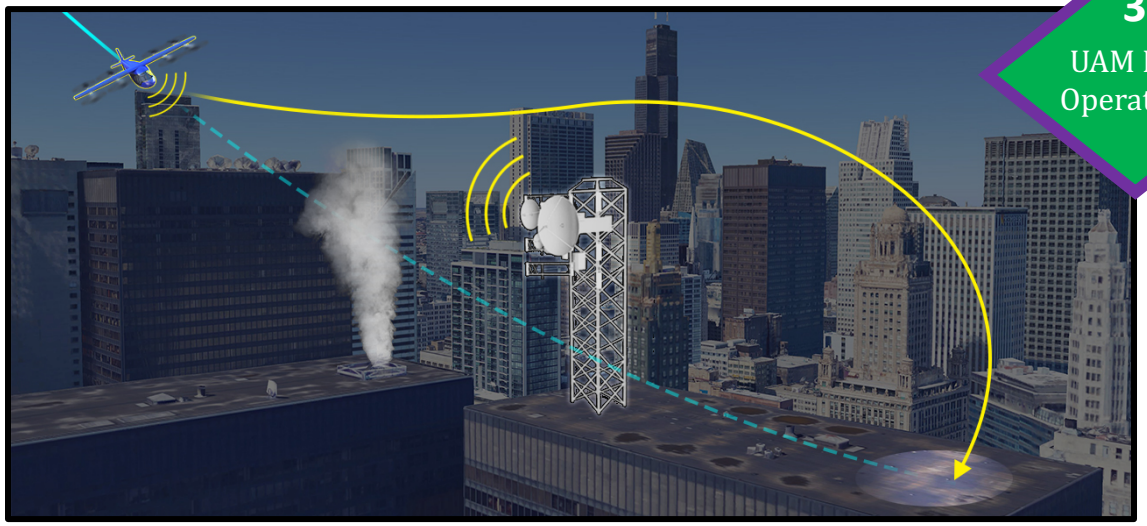
- All functional objectives from Scenario 1 apply to Scenario 2.
- Flight Plan Changes – Aircraft receives and responds to AOM system advisories for in-flight changes of planned routes, including: new scheduled time of arrival, new landing location, etc.
- Flight Plan Changes – Aircraft generates and requests in-flight trajectory changes and negotiates with AOM system.
- Interoperability – Evaluate airspace and aircraft system interactions with communications and negotiations.
- Flight Path Changes – Aircraft flight path performance will be evaluated, including energy reserves.
- Emergency Landing – Demonstrate emergency landing, including communication with AOM system.

GC Series Airspace Functional Objectives

- All functional objectives from Scenario 1 apply to Scenario 2.
- Flight Plan Changes – AOM system generates, sends and negotiates updated advisories (directly or indirectly) to the aircraft in-flight. E.g., new scheduled time of arrival, new landing location, conflict management, new routing, etc.
- Flight Path Changes – AOM system receives and responds to in-flight trajectory changes from the aircraft.
- Interoperability – Evaluate airspace and aircraft system interactions with communications and negotiations.
- Flight Path Changes – Trajectory conformance to the negotiated clearance will be evaluated.
- Emergency Landing – AOM system responds to aircraft declaration of emergency by clearing required airspace and making appropriate reroutes.

Scenario 3 – UAM Port Operations

Develop scalable UAM Port design and procedures, and explore influencing factors such as turn-around times, ground operations, airspace scheduling impacts around UAM ports, localized weather information, and impacts of balked landings/go-arounds.



GC Series Aircraft Functional Objectives

- UAM Port Procedures - Demonstrate UAM Port Procedures that include approach, landing, surface operations, take-off, departure, Actual Navigation Performance (ANP) / Required Navigation Performance (RNP), sequencing, holding patterns, operations at closely spaced UAM ports and pads, and stationary obstacles (e.g. trees, buildings, telephone poles and lines, power lines, water tower, etc.).
- Turn-around Operations – Demonstrate time to launch a prepped aircraft from "cold" start and time to quick-turn the aircraft for new flight and evaluate mission-planning system including mission turn-around, recharge/refuel, servicing and ground maintenance, aircraft pad and passenger occupancy time, etc.
- Port Design – Develop and evaluate best practices for fire safety, downwash considerations, first responder access, closely spaced ports, etc.
- Terrain and Other Obstacles (i.e., ground collision avoidance) – Demonstrate ability to perform conflict resolution maneuvers with awareness to surrounding obstacles and terrain.
- Balked Landing – Demonstrate ability to perform a balked landing, including touchdown at original landing pad, through a variety of dynamic environmental conditions.

GC Series Airspace Functional Objectives

- UAM Port Procedures - Demonstrate UAM Port Procedures that include approach, landing, surface operations, take-off, departure, Actual Navigation Performance (ANP) / Required Navigation Performance (RNP), sequencing, holding pattern, operations at closely spaced UAM ports and pads, and stationary obstacles (e.g. trees, buildings, telephone poles and lines, power lines, water tower, etc.).
- Scheduling - Evaluate throughput of UAM port operations considering aircraft turnaround times, closely spaced UAM ports and pads, airspace and port capacity, traffic flow management, fleet resource optimization, and density of landing/takeoffs .
- Weather information – Measure wind for crosswind check. ATM system broadcast measurements to aircraft.
- Terrain and other obstacles – Demonstrate ability to generate conflict resolution advisories providing awareness of surrounding obstacles and terrain.
- Balked Landing – AOM system demonstrates ability to safely and efficiently provide the aircraft that performed a go-around another approach/landing attempt.

Scenario 4 – Noise Evaluation and Response

Evaluate aircraft noise and response through typical UAM mission flight profiles, including takeoff, climb, transition, cruise, descent, and landing. Exercise integrated (aircraft and airspace) planning, in-flight modification, and execution of low noise flight trajectories and profiles to minimize fleet noise impacts from UAM operations.

GC Series Aircraft Functional Objectives

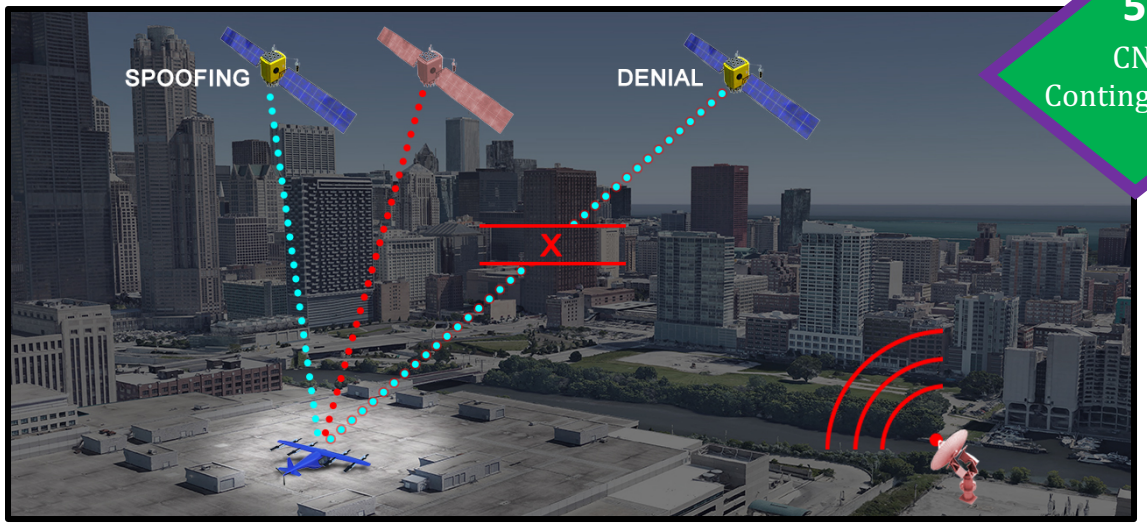
- Noise Characterization – Measure aircraft noise through standard flight conditions, maneuvers and profiles, including takeoff/landing, transition, cruise, etc. Precise and repeatable flight conditions flying over a microphone array.
- Noise Variability – Measure the effect of dynamic environmental conditions (winds, turbulence, altitude, etc.) on the noise produced by UAM aircraft.
- Low Noise Flight Profiles – Calculate and demonstrate flight profiles (all phases of typical UAM missions) to minimize noise exposure on the ground towards minimizing fleet noise impacts of UAM aircraft operations. Integrate local atmospheric measurements and predictions into calculations of low noise flight profiles and/or accept low noise flight profile generated by AOM service(s).
- Community Response – Assess community response to noise exposure from UAM aircraft using the noise measurements for the aircraft included in the Grand Challenge.

GC Series Airspace Functional Objectives

- Flight Profile Planning – Demonstrate prediction and planning of low noise flight profiles within the airspace management system. Integrate local atmospheric measurements and predictions into the calculation of low noise flight profiles, as well as considerations for the time of day.
- Flight Profile Impact – Evaluate the impact of low noise flight profiles and trajectories on airspace system performance (efficiency, predictability, throughput).
- Noise Exposure Management – Demonstrate multi-aircraft flight plan prediction and management to minimize the fleet noise impact in areas of UAM aircraft operations.

Scenario 5 – CNS Contingencies

Identification, mitigation, and response to contingencies related to degradation/loss of primary aircraft navigation, aircraft and airspace communications, and/or airspace surveillance. Exercise ConOps that incorporate robust, reliable, and fault tolerant CNS system, including the ability to safely land in event of failure(s).



5
CNS
Contingencies

GC Series Aircraft Functional Objectives

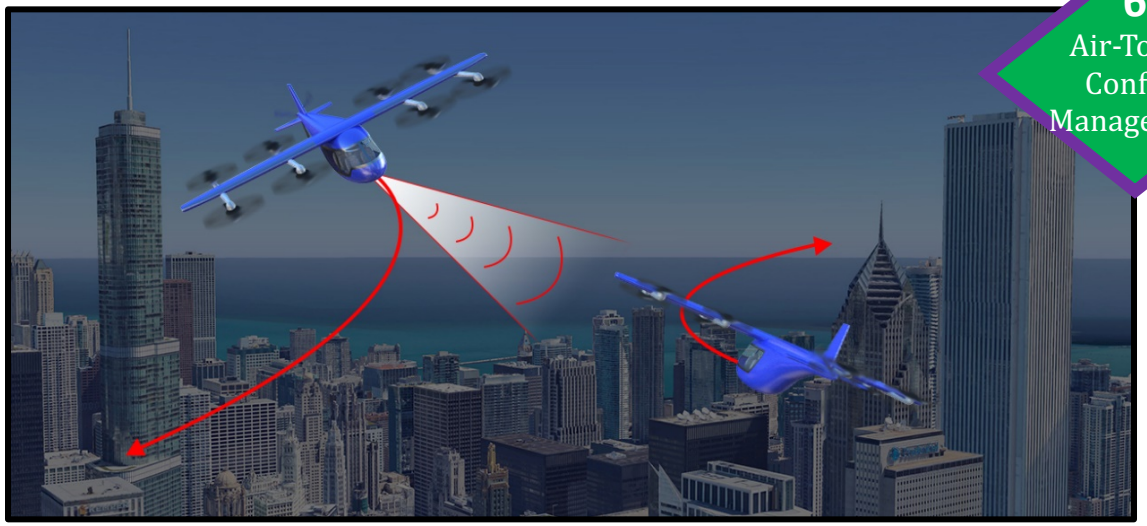
- Degraded Navigation – Evaluate system response and accuracy to primary navigation system sensor jamming/denial/degradation through a simulated loss of primary navigation system upon NASA command, requiring use backup navigation system(s) to execute response strategy.
- Aircraft Lost Link – For remotely piloted aircraft, loss of aircraft communication / control from the ground station. Demonstrate ability to recover from loss of communications.
- Airspace Lost Link – For all aircraft, loss of communications between aircraft and airspace systems. Demonstrate aircraft and mission procedures for loss of communications.
- Airspace Interoperability – Appropriate coordination with airspace management system in response to CNS contingency situations.
- Automation – Demonstrate automatic aircraft control and procedures in response to CNS contingency situations.
- Precautionary/Emergency Landing – Through a variety of dynamic environmental conditions, demonstrate precautionary landing with an on-board system failure.

GC Series Airspace Functional Objectives

- Degraded Navigation – Evaluate airspace system response to loss of precision navigation of as single or multiple aircraft following a loss of their primary navigation system.
- Aircraft Lost Link – Evaluate airspace redundancy plan based on ConOps for loss of communications with one or more aircraft, accommodation of non-conforming aircraft, and real-time response to aircraft that do not follow current instructions.
- Degraded Surveillance – Evaluate airspace system response and mitigation procedures to loss of surveillance of aircraft in small or large areas of operations.
- Aircraft Interoperability – Appropriate coordination with aircraft and the ATM in response to CNS contingency situations.
- Precautionary/Emergency Landing – AOM system responds to aircraft declaration of emergency by clearing required airspace and making appropriate reroutes.

Scenario 6 – Air-to-Air Conflict Management

Demonstrate individualized components of traffic conflict management in order to evaluate interplay between essential layers of separation assurance and collision avoidance.



GC Series Aircraft Functional Objectives

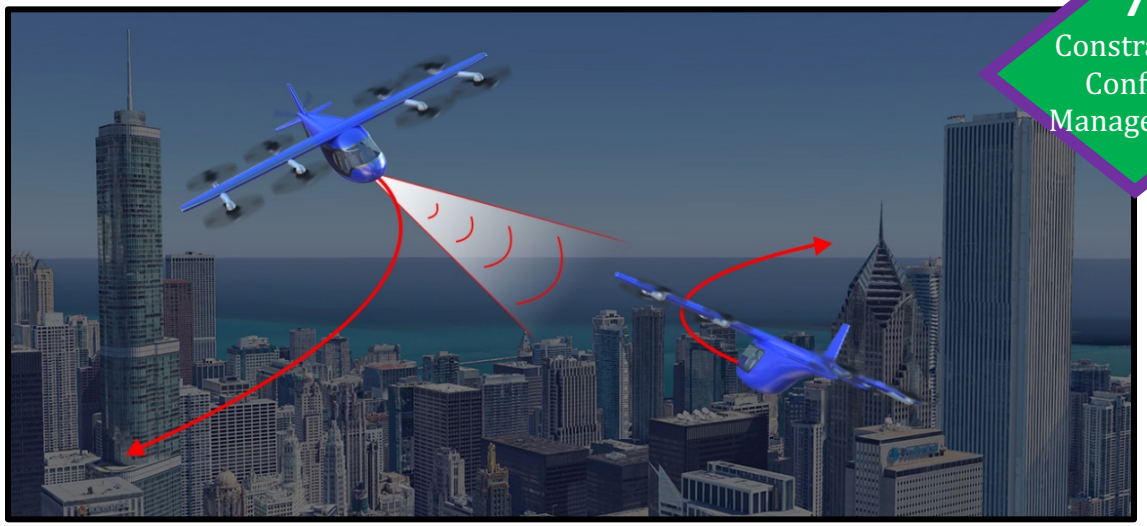
- Intra-Urban Tactical Conflict Management – Demonstrate in-flight separation assurance, collision avoidance, and appropriate airspace management information exchange (i.e., flight plan amendments) including:
  - Various geometry setups, test altitudes, aircraft sizes (general aviation, sUAS, Urban Passenger transport), cooperative and non-cooperative and speed of airborne intruders.
  - Various environment backgrounds (sun, clouds, terrain clutter, etc.).
- Legacy Aircraft Tactical Conflict Management – Demonstrate interoperability with legacy aircraft (e.g. commercial, general aviation, etc.), specifically when operating in terminal areas, including coordination with ATC, TCAS/ACAS interoperability, etc.

GC Series Airspace Functional Objectives

- Intra-Urban Tactical Conflict Management – Demonstrate in-flight separation assurance services, ability of airspace management system to support/provide traffic conflict management, provide airspace advisories, and detect secondary conflicts.
- Legacy Aircraft Tactical Conflict Management – Demonstrate interoperability of UAM aircraft with legacy aircraft (e.g. commercial, general aviation, etc.), specifically when operating in terminal areas, including coordination with legacy ATC, TCAS/ACAS interoperability, etc.
- Scheduling - Demonstrate ability of UAM AOM system scheduling to respond to traffic conflict resolutions including negotiating route updates and STA's for all impacted aircraft.

Scenario 7 – Constrained Conflict Management

Conflict management that considers simultaneous issues across the aircraft and AOM that must be solved together while considering spatial constraints (e.g., no-fly zones), temporal constraints (e.g., sequencing and scheduling), service boundaries (e.g., CNS service areas), and aircraft state of health (e.g., when aircraft is in a degraded mode). Builds upon Scenario 6, increasing complexity of operations.



GC Series Aircraft Functional Objectives

- Obstacle and Aircraft Avoidance – Demonstrate ability to detect and avoid ground and air obstacles, including non-cooperative intruder aircraft intersecting intended flight path.
- Cooperation with other UAM aircraft – Demonstrate ability of UAM aircraft to perform tactical collision avoidance maneuvers without triggering follow-on collision avoidance maneuvers, including when the aircraft is in a degraded state.
- Cooperation with AOM service supplier – Demonstrate ability to perform tactical collision avoidance without creating cascading effects to the AOM system, including when the aircraft is in a degraded state.

GC Series Airspace Functional Objectives

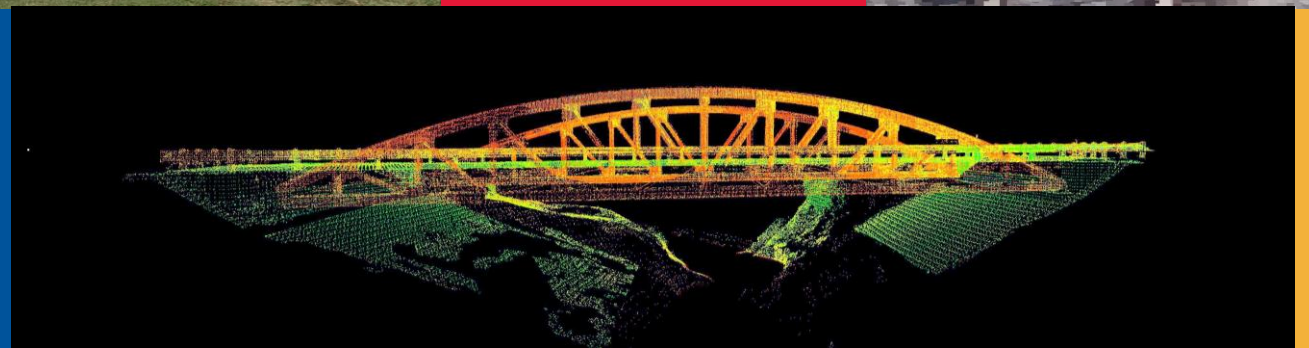
- Obstacle and Aircraft Avoidance – AOM system responds appropriately to avoid cascading failures when an aircraft depart from planned trajectories due to an obstacle/aircraft avoidance maneuver.
- Cooperation with other AOM service suppliers – AOM can interoperate with other AOM service suppliers, not sending instructions to aircraft that will disrupt other AOM service supplier's traffic management.
- Cooperation with UAM aircraft – Demonstrate ability to send directions to aircraft that do not create cascading impacts of tactical maneuvers from aircraft to avoid collisions, including when aircraft are in degraded states.

sUAS and Professional Services

MAY 26, 2020

HALFF

TBPELS Survey Firm No. 10029600



HALFF GEOSPATIAL | SPEAKER BACKGROUND

Bill Swope, CP
Geospatial & Survey Business Development Manager
Richardson, TX

- Certified Photogrammetrist #1604 (2016) American Society of Photogrammetry and Remote Sensing (ASPRS)
- 13 years of experience in Photogrammetry, LiDAR, Terrestrial scanning, & Remote Sensing
- BA English, University of Nebraska (1997)

- TxDOT Pre-certified Aerial Mapping (15.3.1)
- ASPRS Member 2016 – Present
- ASPRS Professional Practice Division Assistant Director
- PM on projects in AZ, CA, NM, NV, TX
- 2019 Geospatial Professional of the Year, Texas Society of Professional Surveyors (TSPS)
- TSPS Chapter 5 Secretary/Treasurer 2018-2019
- TSPS State Director 2019
- United Surveyors of Arizona Board of Directors 2016-2017

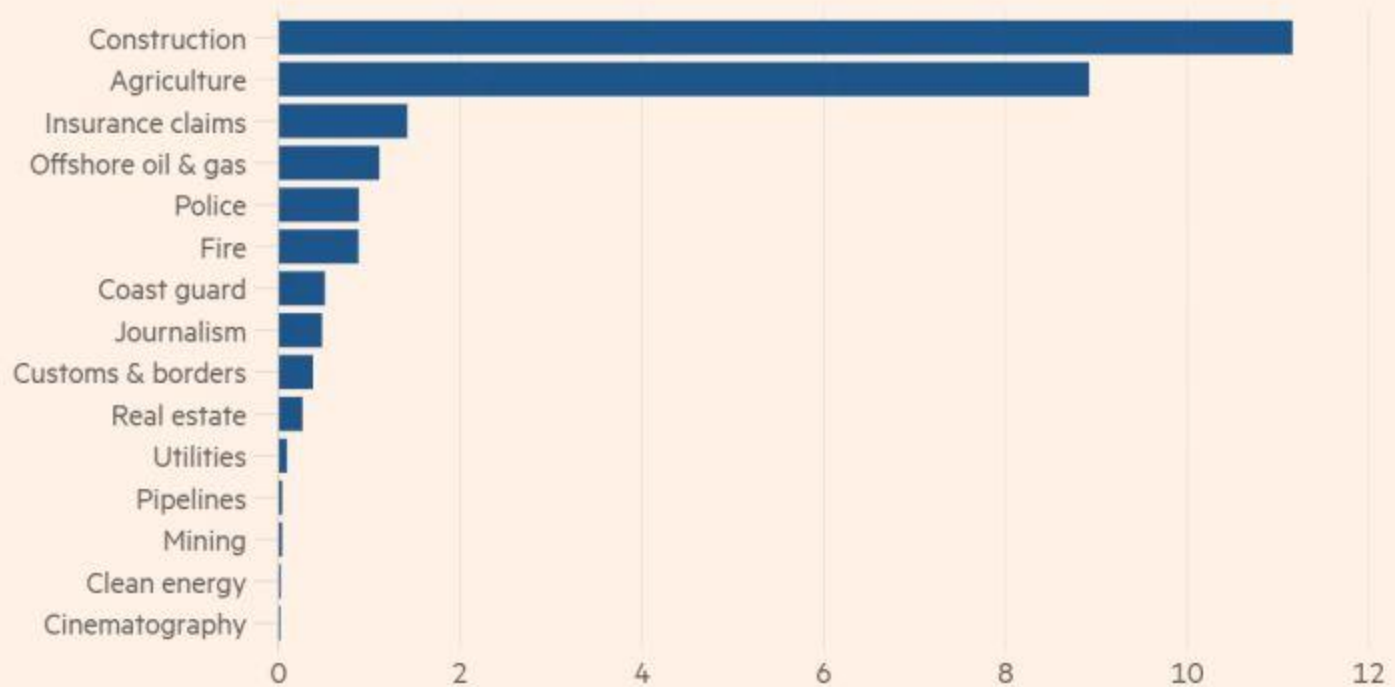
sUAS and Professional Services

FAA estimates that more than 450,000 commercial drones will be in service in 2020*

- Patrick McGee, “How the commercial drone market became big business,” The Financial Times Limited 2020, https://www.ft.com/content/cbd0d81a-0d40-11ea-bb52-34c8d9dc6d84

Potential uses for commercial drones

Total addressable market size ($bn)



Source: Goldman Sachs

Barclays analysts estimate the global drone market will grow tenfold in next five years…

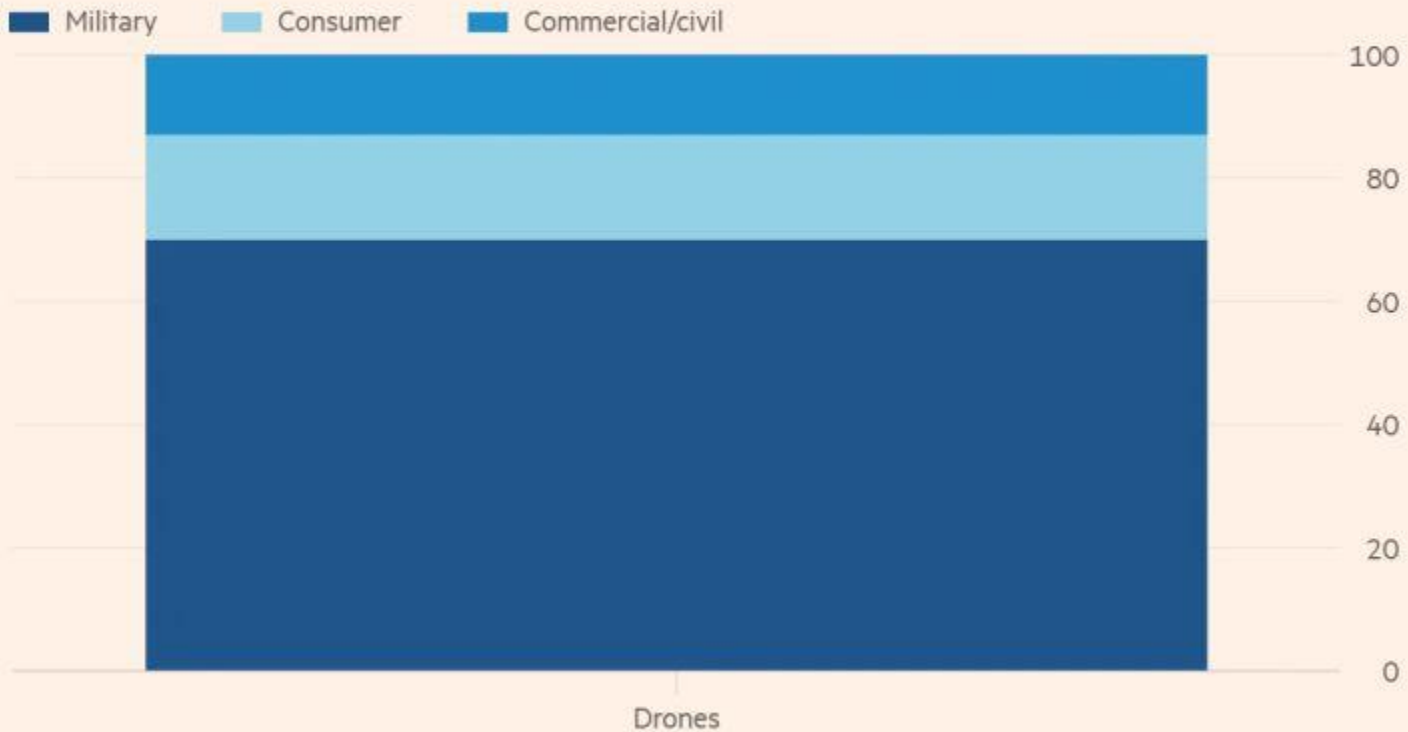
2019 - $4bn
2024 - $40bn

AND believe the use of drones will result in a cost savings of some $100bn

- Patrick McGee, “How the commercial drone market became big business,” The Financial Times Limited 2020, https://www.ft.com/content/cbd0d81a-0d40-11ea-bb52-34c8d9dc6d84

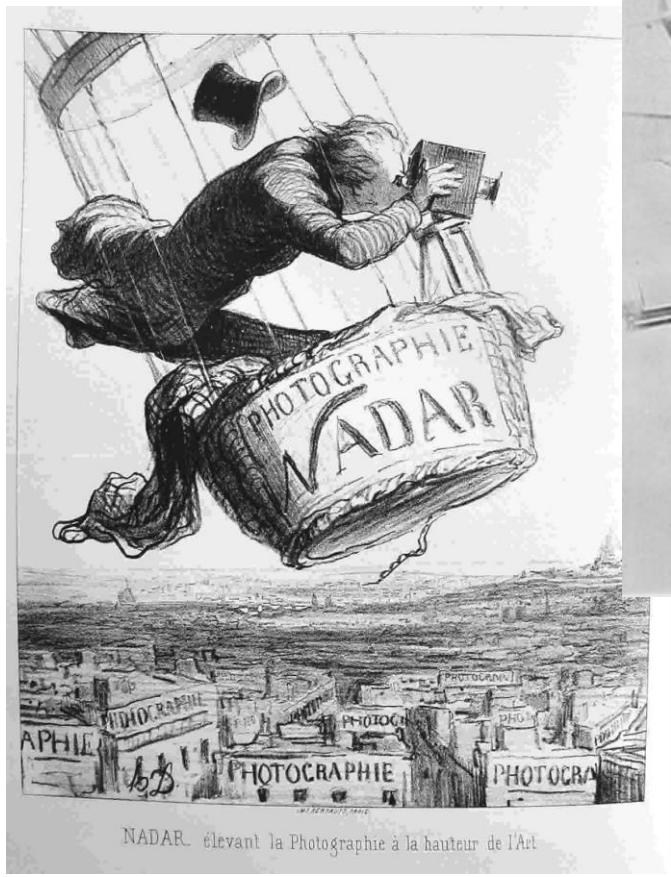
The market opportunity for drones

Estimated sales, 2016 to 2020 ($bn)



Source: Goldman Sachs

DRONES & PHOTOGRAMMETRY



NADAR élevant la Photographie à la hauteur de l'Art

PHOTOGRAMMETRY

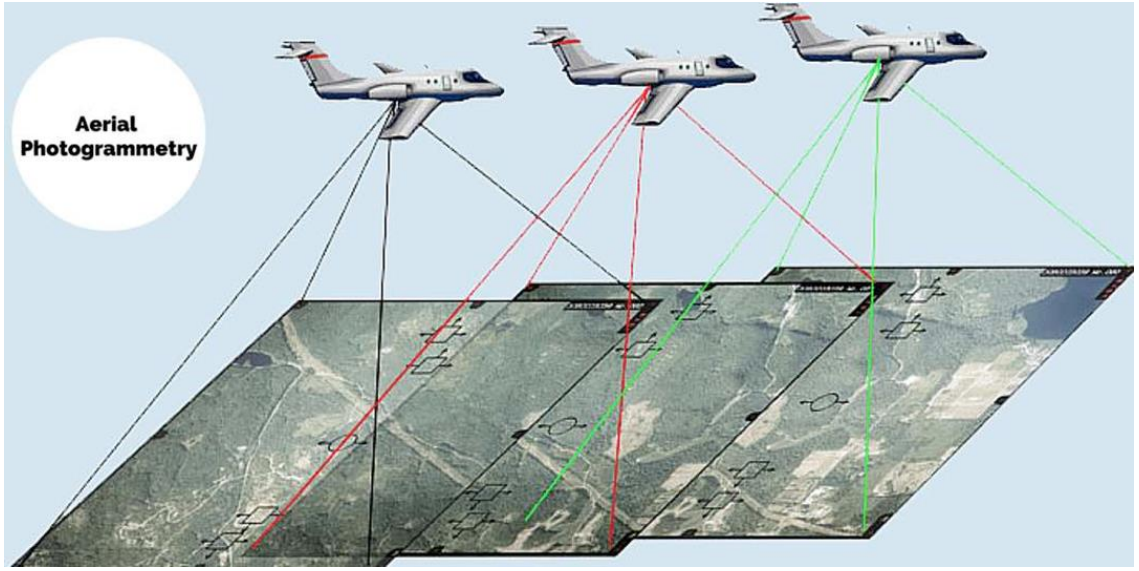
DEFINITION:

The art, science, and technology of obtaining reliable information about physical objects and the environment through processes of recording, measuring and interpreting photographic images and patterns of recorded radiant electromagnetic energy and other phenomena.

asprs

THE IMAGING & GEOSPATIAL INFORMATION SOCIETY

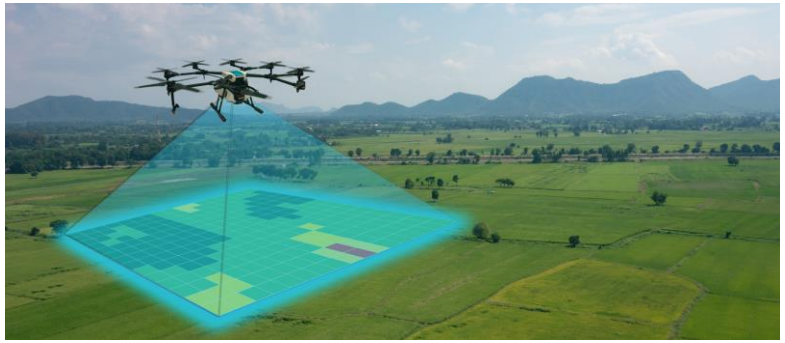
PHOTOGRAMMETRY

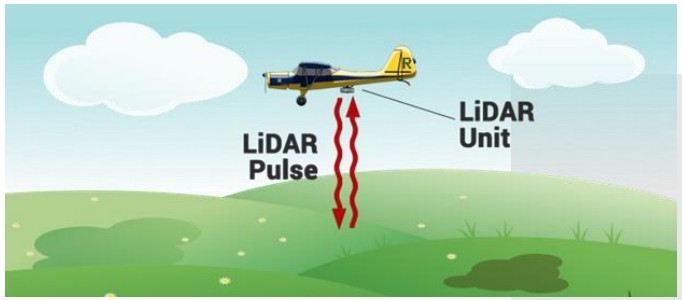


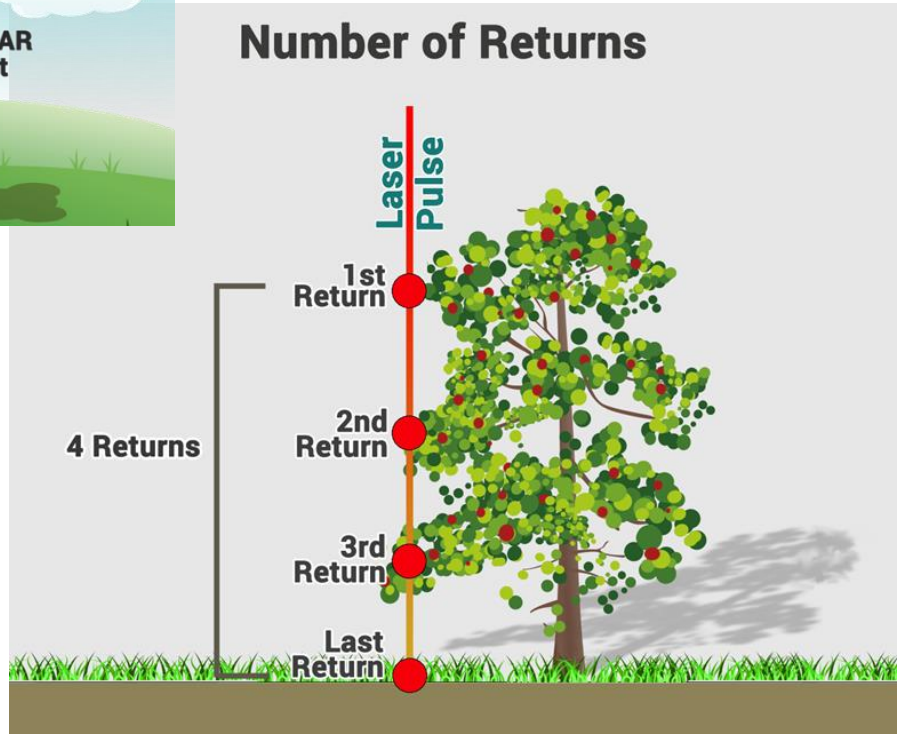
PROCESS SUMMARY

- Digital Camera System mounted in belly of aircraft/helicopter/sUAS
- Can be fixed wing or rotor-based aircraft
- Passive Remote Sensing
- Imagery collected in Stereo models
- Overlap/Sidelap
- Utilizes surveyed ground control
- Photographs used to map
- sUAS use Structure from Motion (SfM)
- Aircraft use Aero-Triangulation (AT)

LIDAR & PHOTOGRAMMETRY



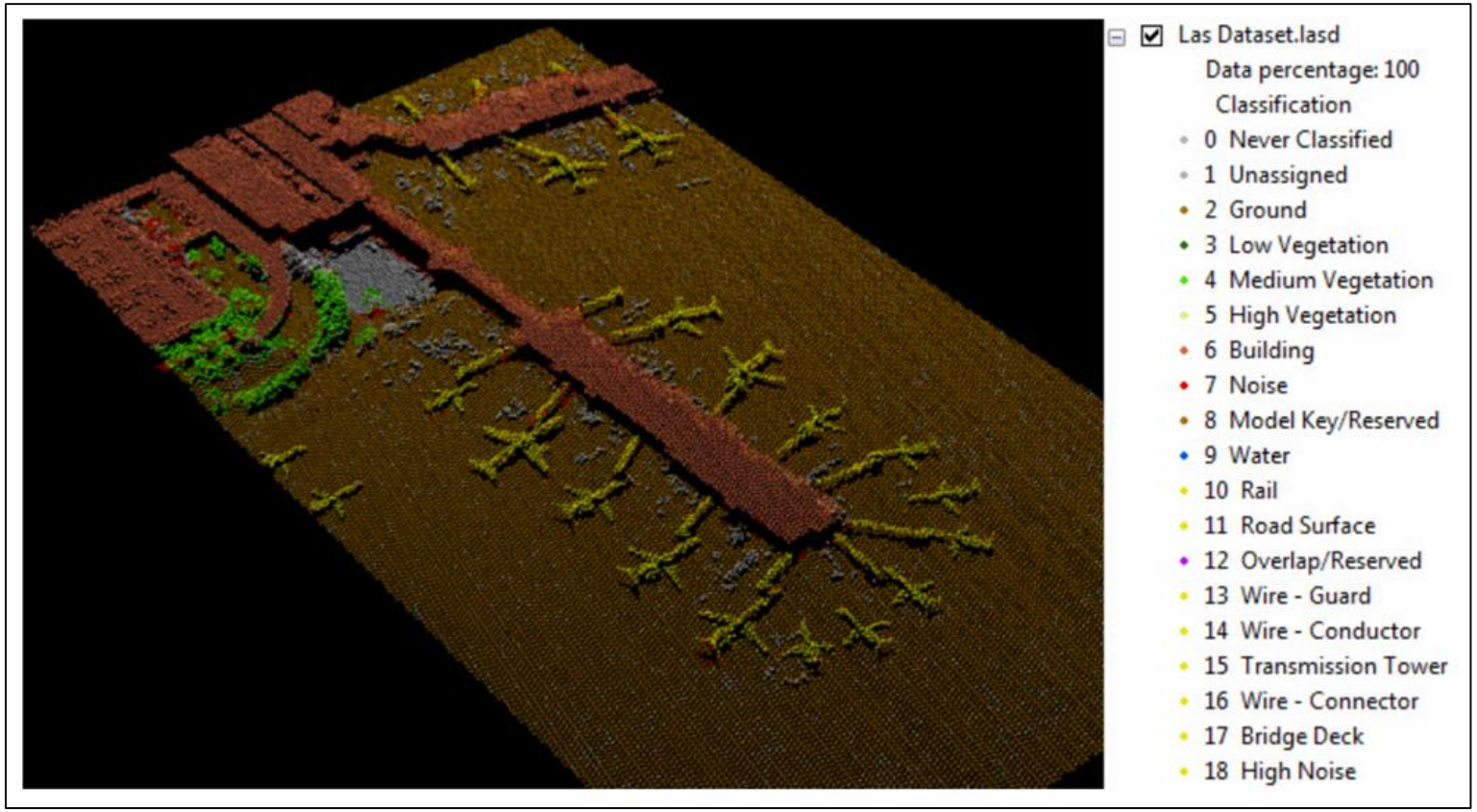




DEFINITION/TERMS

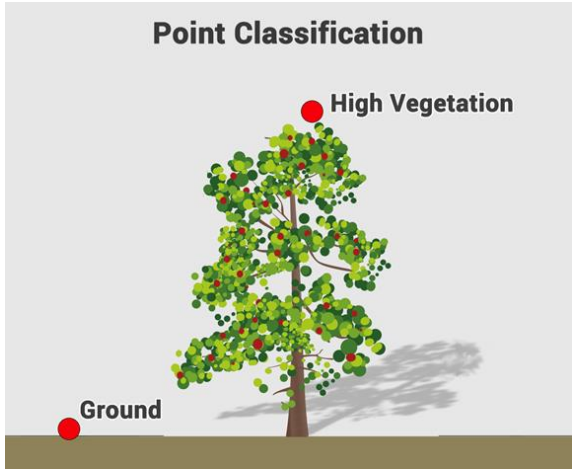
- Light Detection and Ranging (LiDAR)
- Use photogrammetric processes
- Collection method
- Light in the form of a pulsed laser to measure ranges (variable distances)
- Active versus Passive remote sensing
- Multiple returns per pulse
- LiDAR Density or PPSM needs to be defined

LIDAR & PHOTOGRAMMETRY

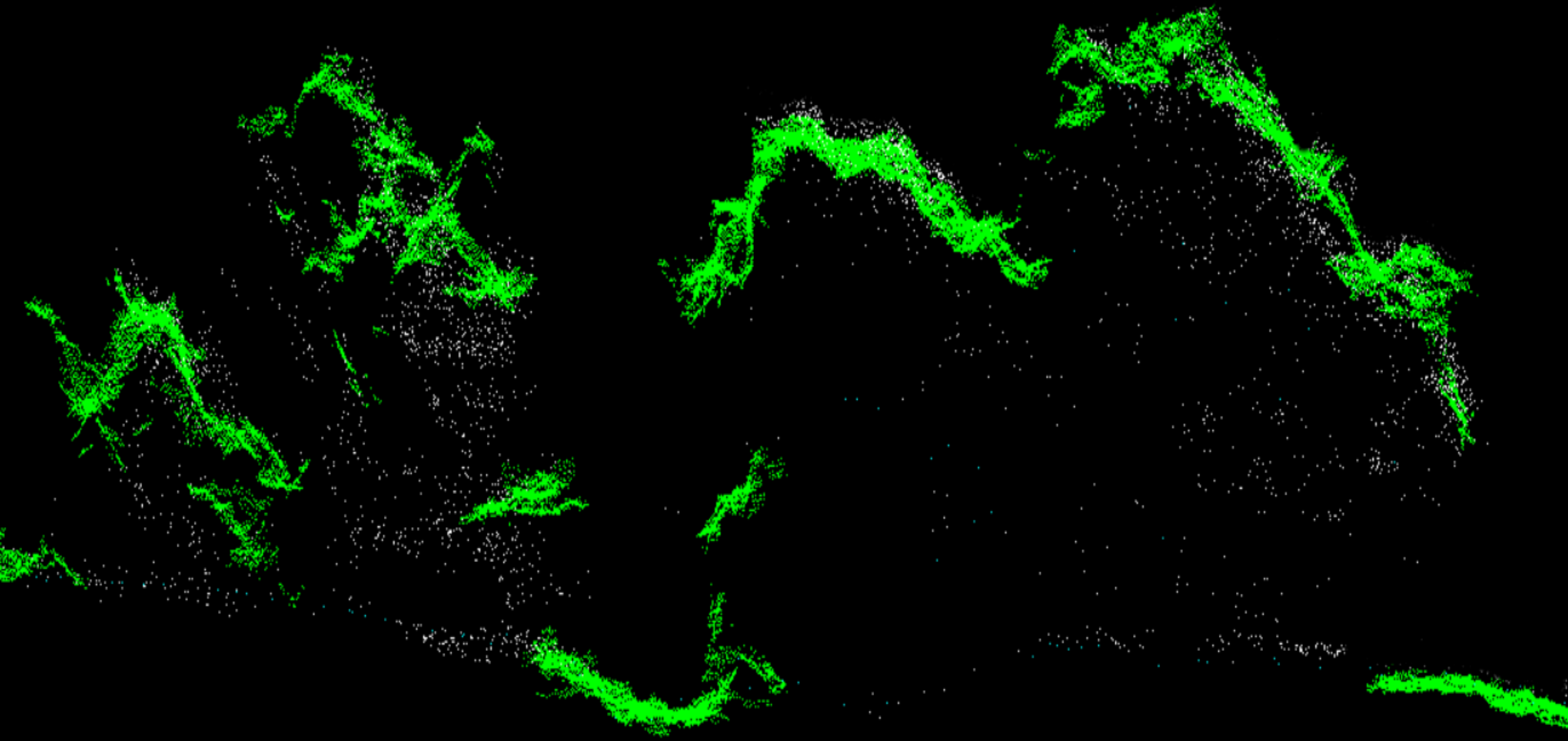


LIDAR DATA

- Point cloud data
- Data must be post processed
- Heavy data sets
- Calibration
- Classification
- Bare earth
- DTM/DEM/DSM



Point Cloud Data: Digital (derived from photos) vs. LiDAR



TYPES OF DRONES

- Multi-rotor
- Fixed-wing
- Single-rotor
- Hybrid VTOL (vertical take-off and landing)

UAS CONSIDERATIONS

BEFORE YOU FLY …

- Safety, safety, safety
- FAR Part 107 regulations
- Project size/location
- Canopy/vegetative cover
- Weather conditions
- Public perception

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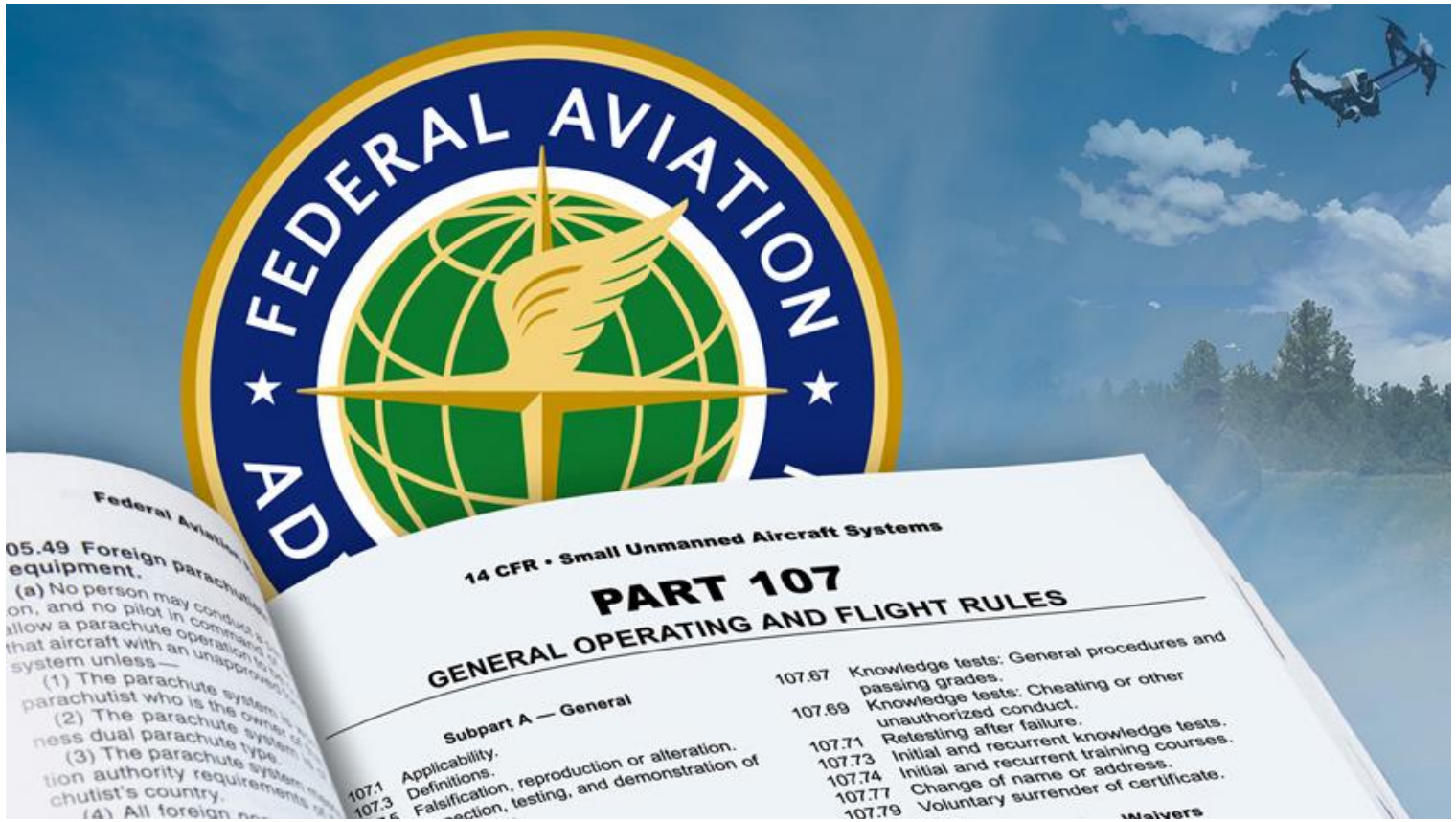

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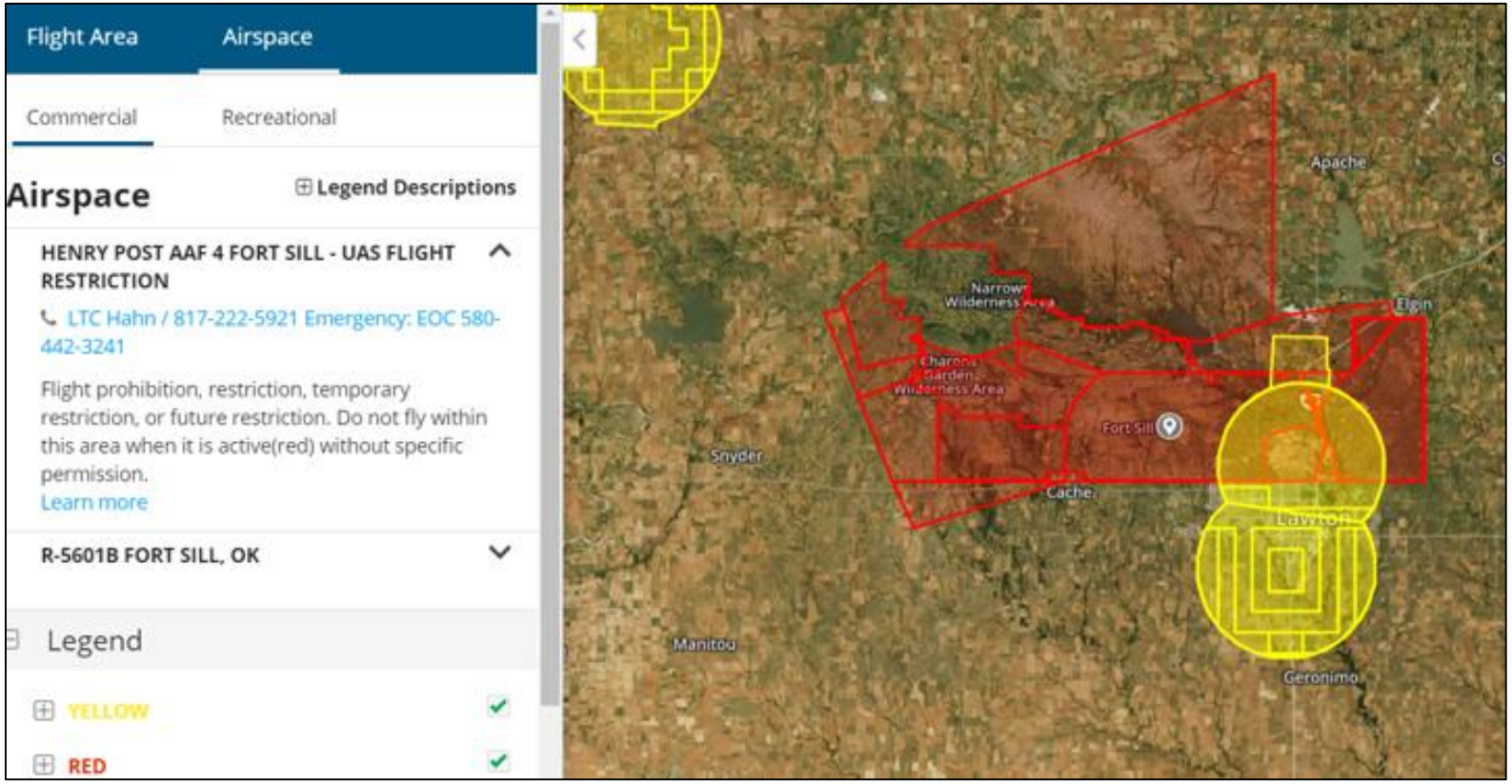

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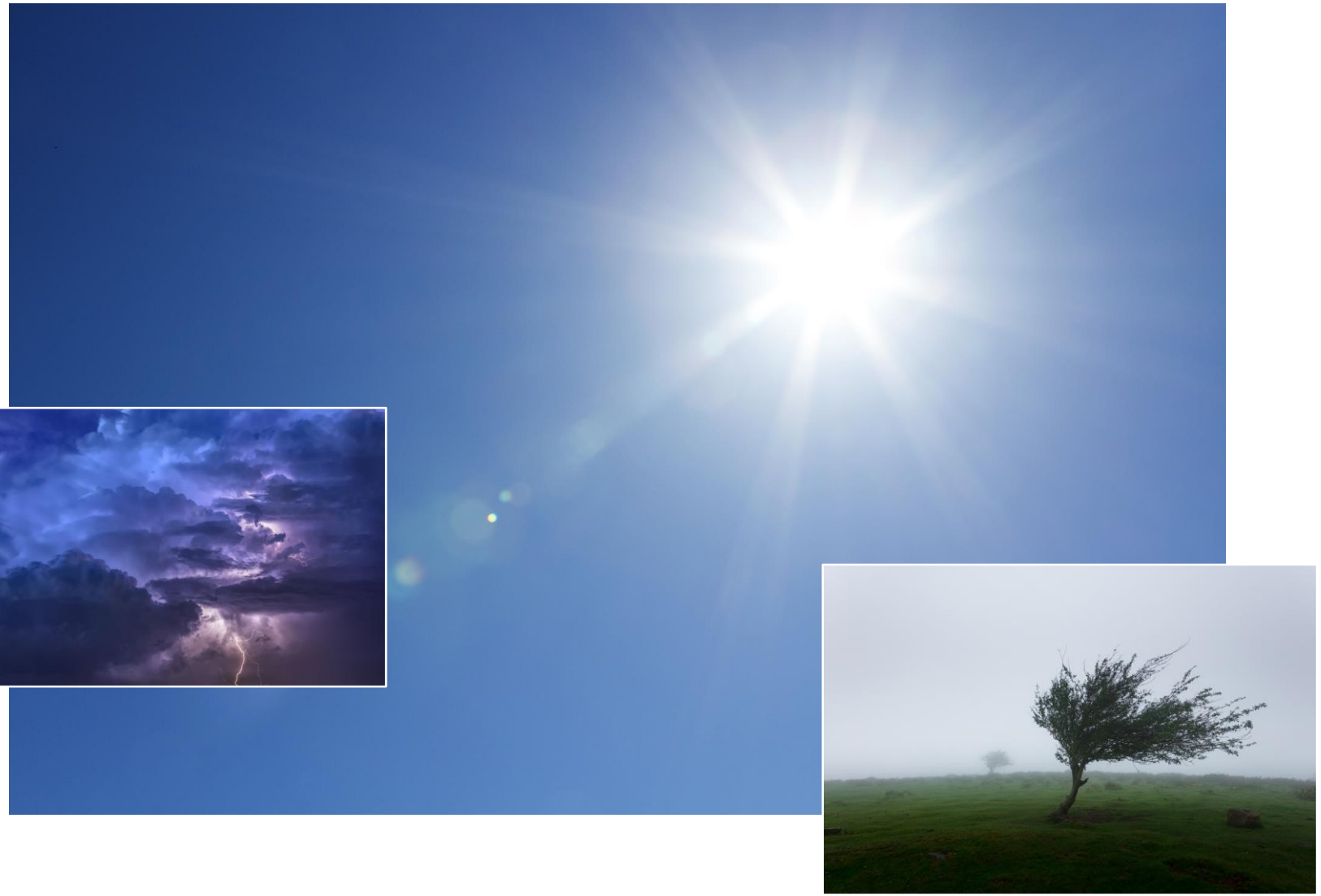

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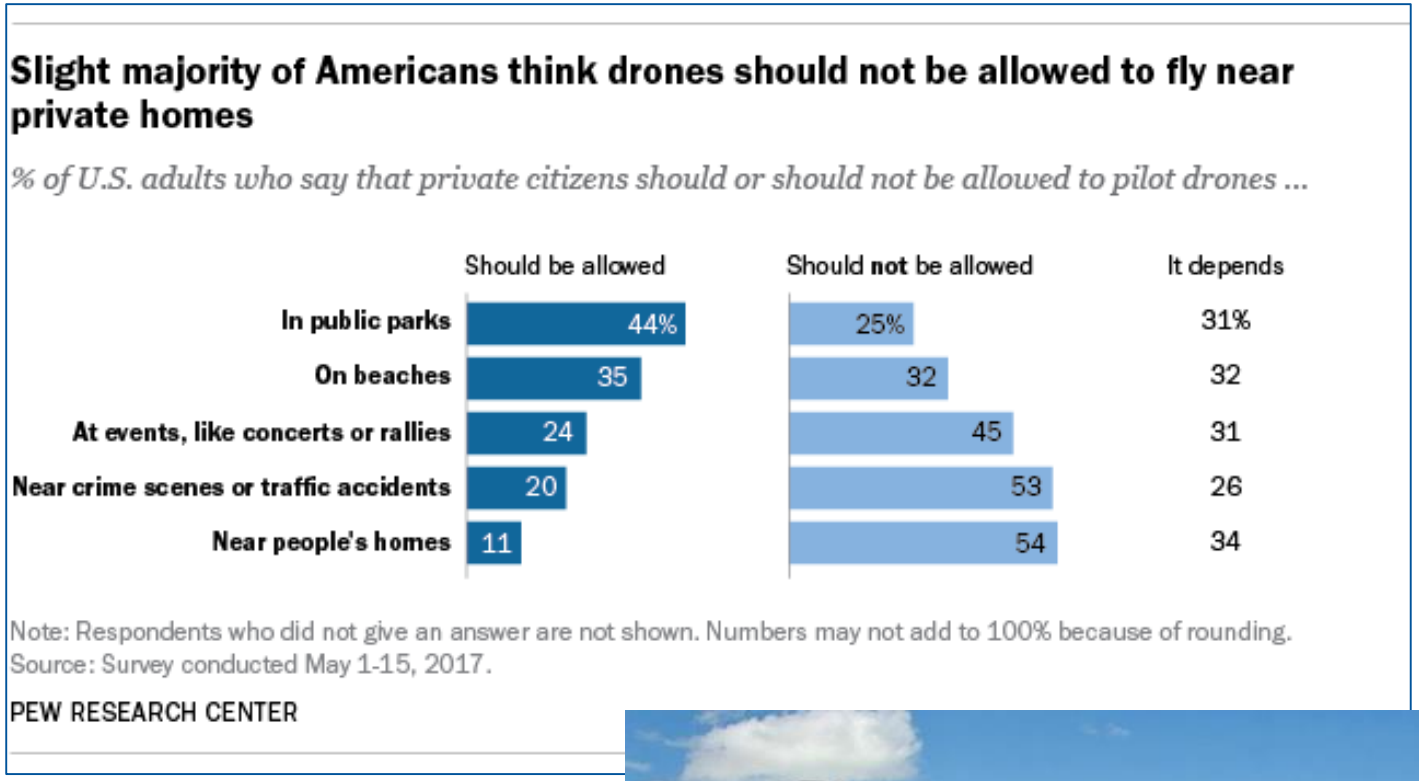
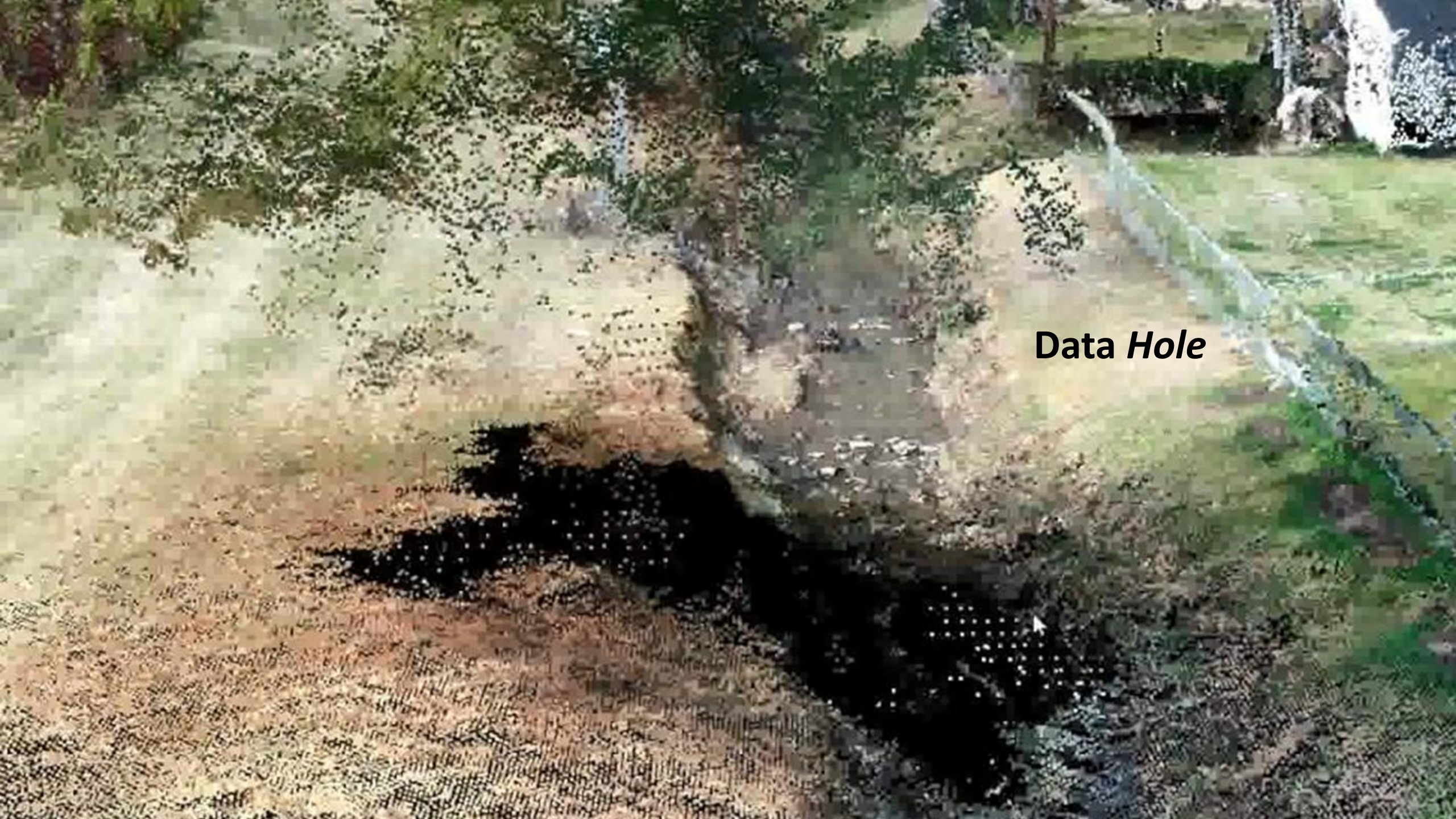
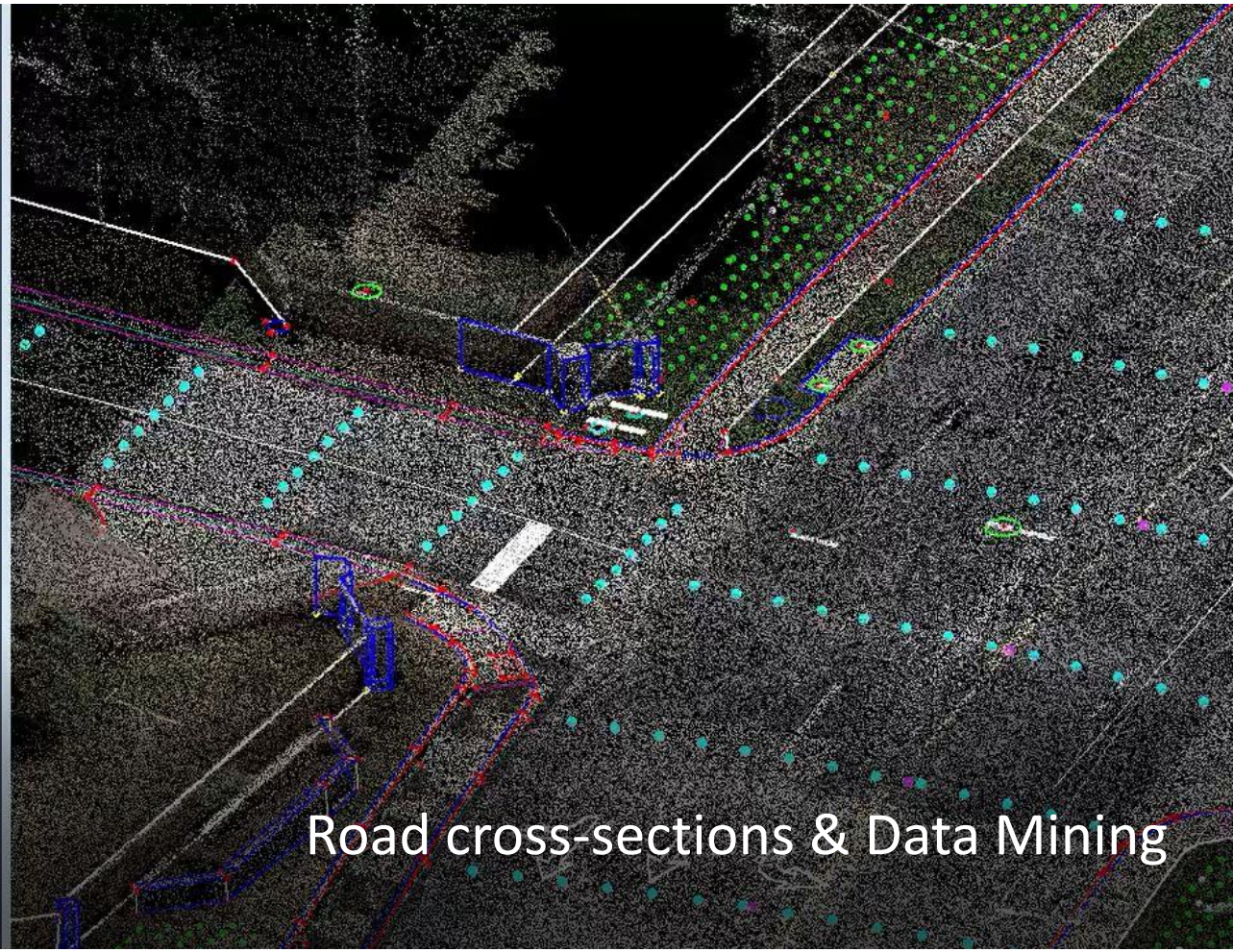


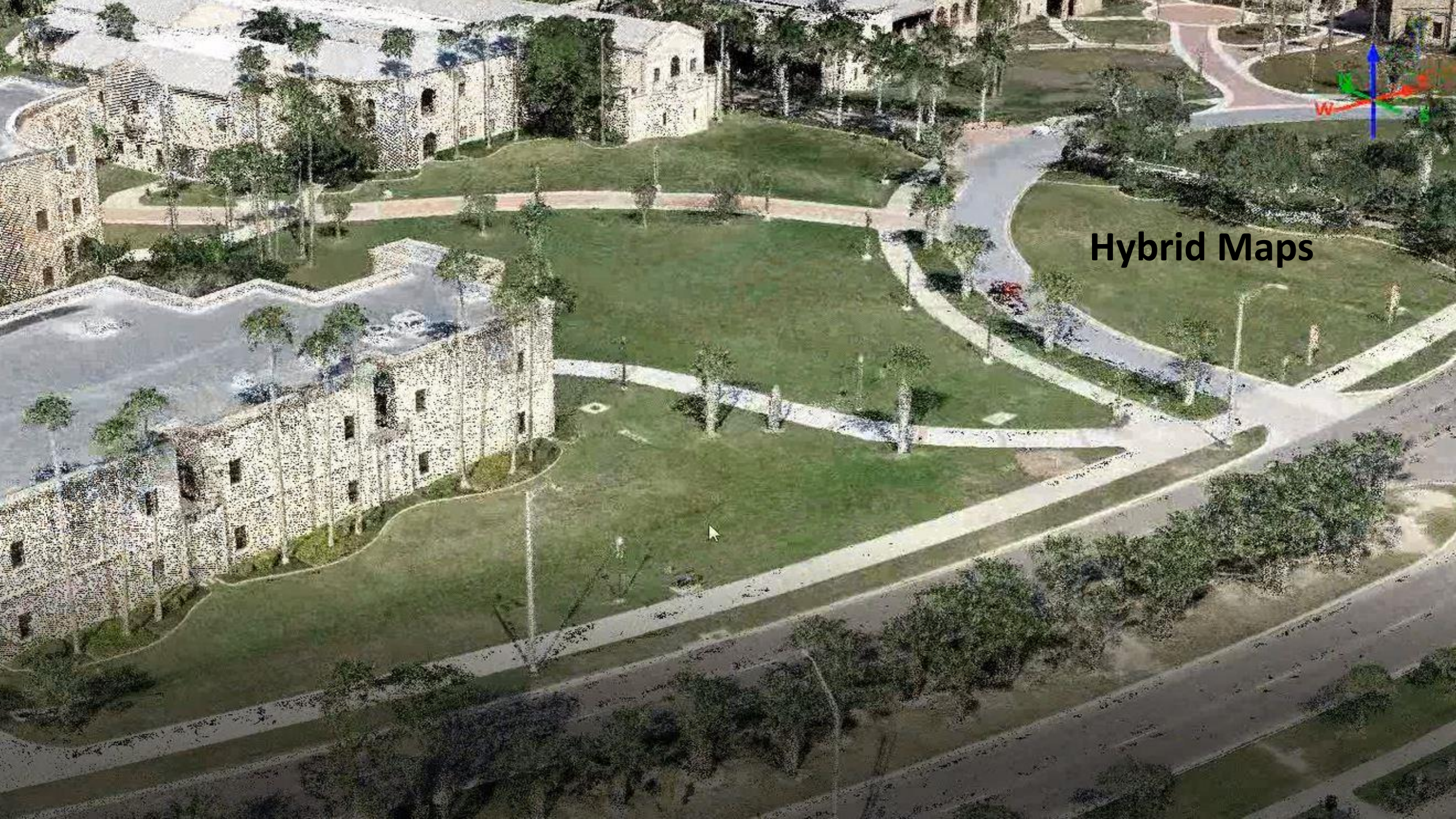

sUAS Point Cloud with RGB *imagery*


Data *Hole*


Street_sUAS


Road cross-sections & Data Mining

Project Size


W
Hybrid Maps

ACCURACY

- Aircraft
  - Horizontal = (+/-) 0.25’
  - Vertical = (+/-) 0.20’ DTM/0.30’ topo
- sUAS (SfM or LiDAR)
  - Horizontal = (+/-) 0.04’
  - Vertical = (+/-) 0.10’
- Mobile LiDAR
  - Horizontal = (+/-) 0.02’
  - Vertical = (+/-) 0.08’
- Terrestrial LiDAR
  - Horizontal = (+/-) 0.02’
  - Vertical = (+/-) 0.02’

PROFESSIONAL SERVICES USES

PHOTOGRAMMETRIC USES

- Topographic mapping
- Planimetric mapping
- 3D modeling
- Floodplain analysis
- Landfill volume calculations
- Traffic patterns/volume analysis
- Aerial imagery
- Aerial video production
- Data mining

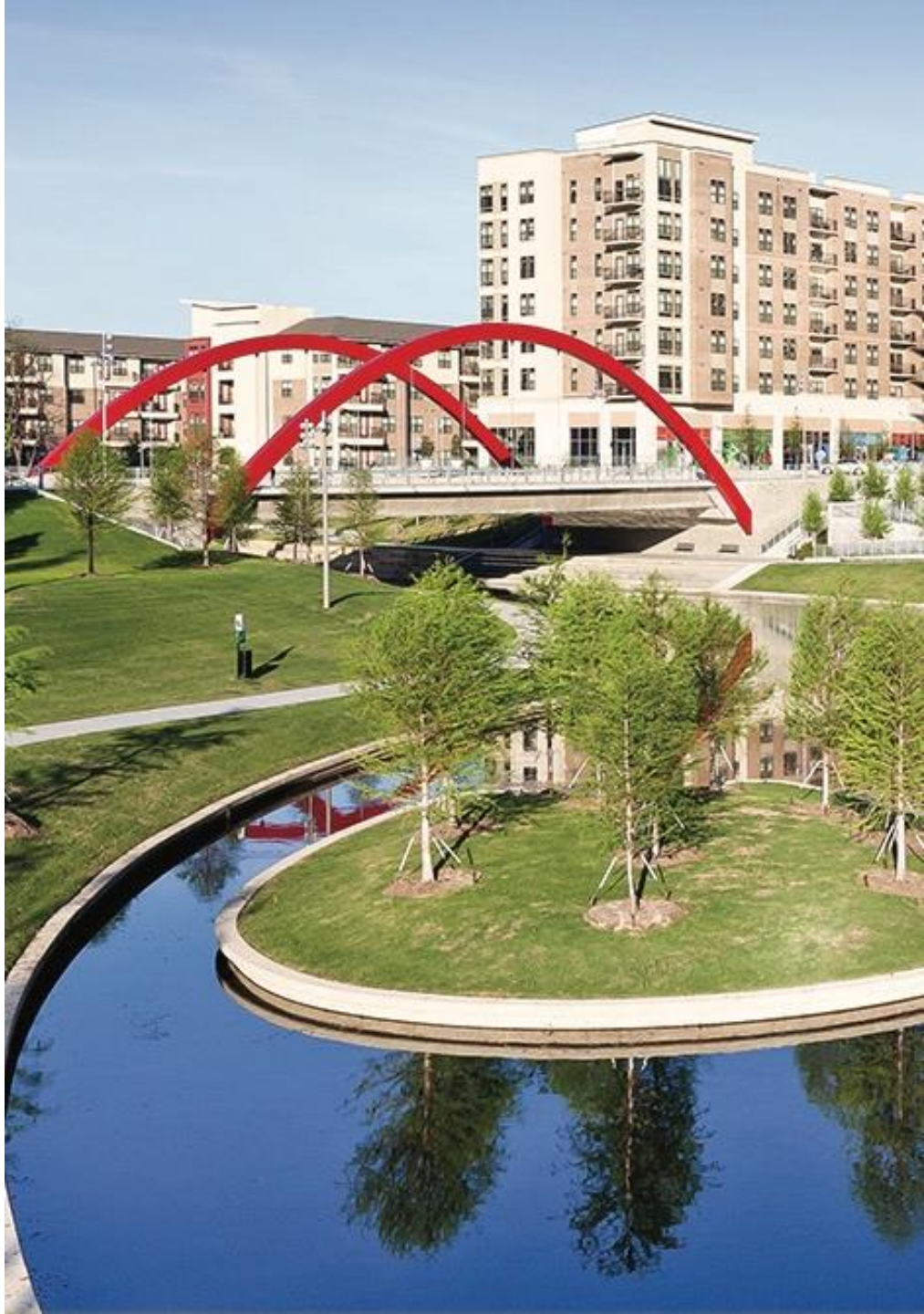
HALFF | GEOSPATIAL

QUESTIONS?

CONTACT:

Bill Swope, CP | 214-217-6484

bswope@halff.com



Welcome to Women And Drones

Presented by Maggie Schuster

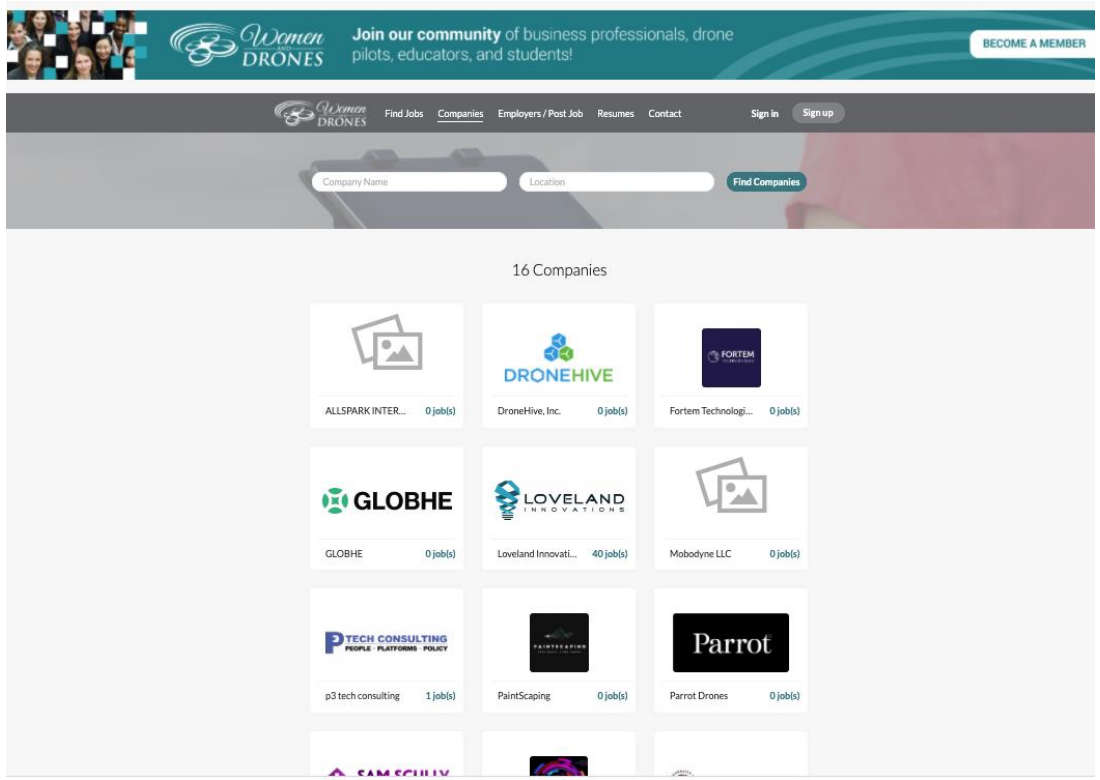
Our membership gives you access to the support, community and resources you need to succeed in the UAS/UAM industry

Women and Drones Members are..

- Not just pilots: 40% are professionals
- Not just women: 10% are men
- We are well educated
  - 80% of us have at least 4-year degree
  - 10% have a doctorate
  - 27% have a masters
- 63% of us are over 40 years old
- We come from around the world
  - 11% from outside USA

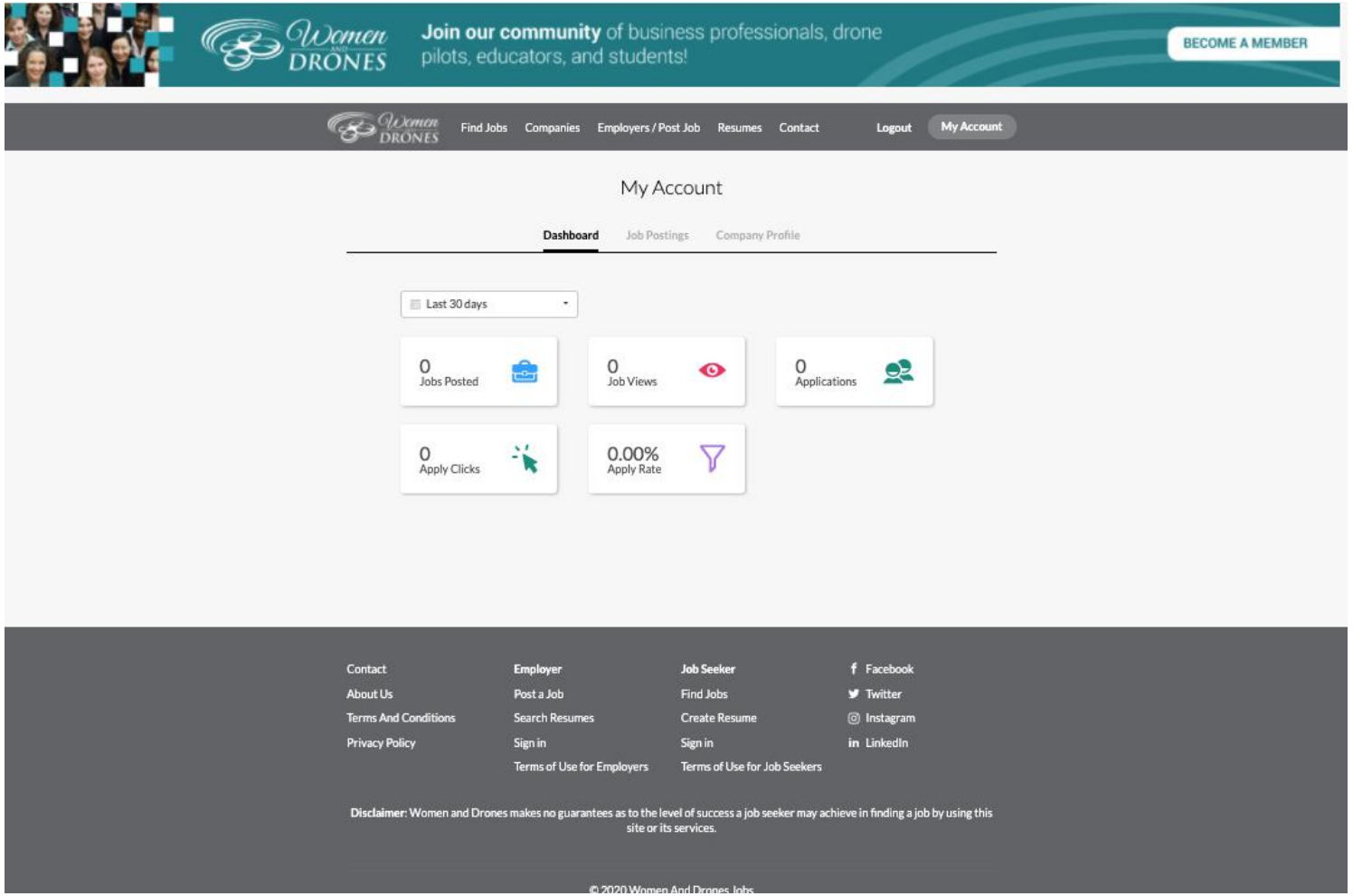
Women and Drones Jobs Board - Companies

- Connecting companies to qualified women to fill positions
  - Full time, career
  - Part time, contract
  - Internships
- Bringing diversity to UAS and UAM industry
- Companies post jobs for job seekers to apply and can search posted resumes to find qualified candidates
- Don’t have to be a member, but members get discounts



Women and Drones Jobs Board - Companies

- Each company has a dashboard to track activity
  - Number of jobs posted
  - Job views
  - Apply Clicks
  - Applications
  - Apply rate



Women and Drones Jobs Board - Companies

“We received multiple candidates for the contract drone pilots jobs we posted on W&D Jobs Board. We hired two of them, so far.” DroneHive

“We were looking for a highly qualified full time chief pilot for the Maryland test site. We received 2 good candidates from W&D Jobs Board. Thanks!” Maryland UAS Test Site

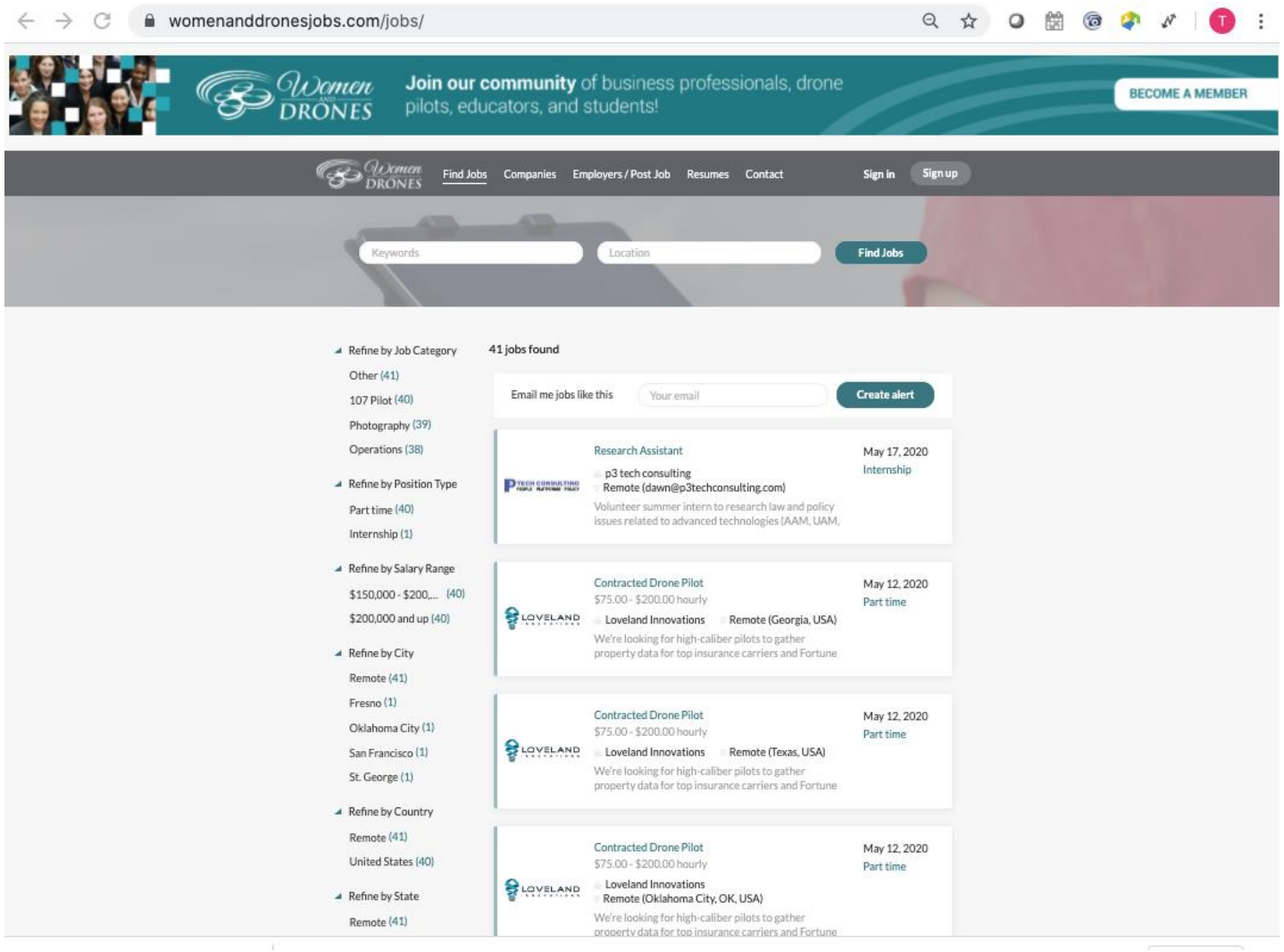
“We have been searching for a lead engineer career position for months. Thanks to W&D Jobs Board, we found a lot of candidates.” Fortem Technologies

“We just expanded our services nationwide and have been using the W&D Jobs Board since January to fill our positions.” Loveland Innovations

“I just posted our summer internship job. Looking forward to reviewing applicants.” P3 Tech Consulting

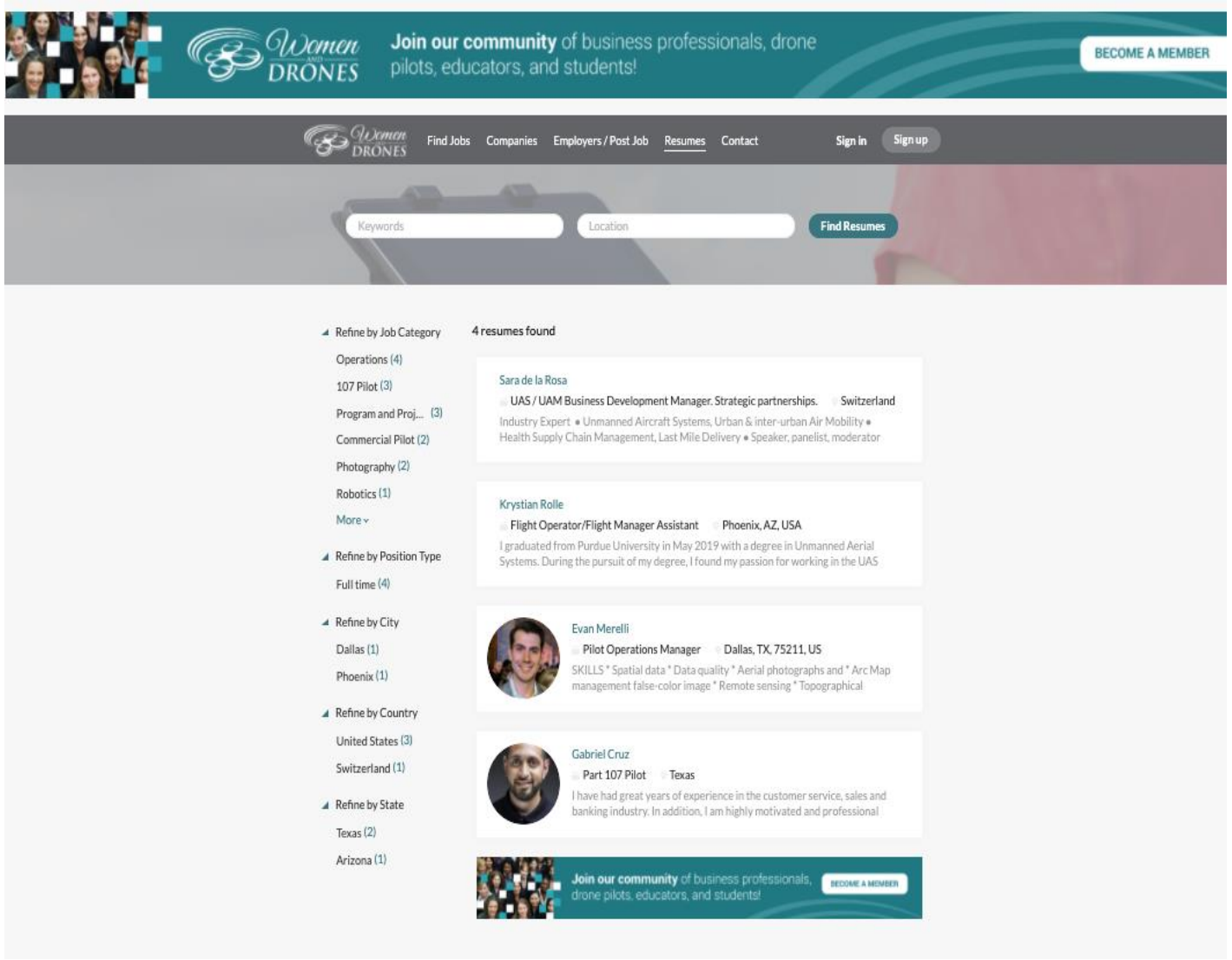
Job Seekers

- Search jobs
  - By different criteria
  - Apply directly to the company
- Set up alerts



Job Seekers

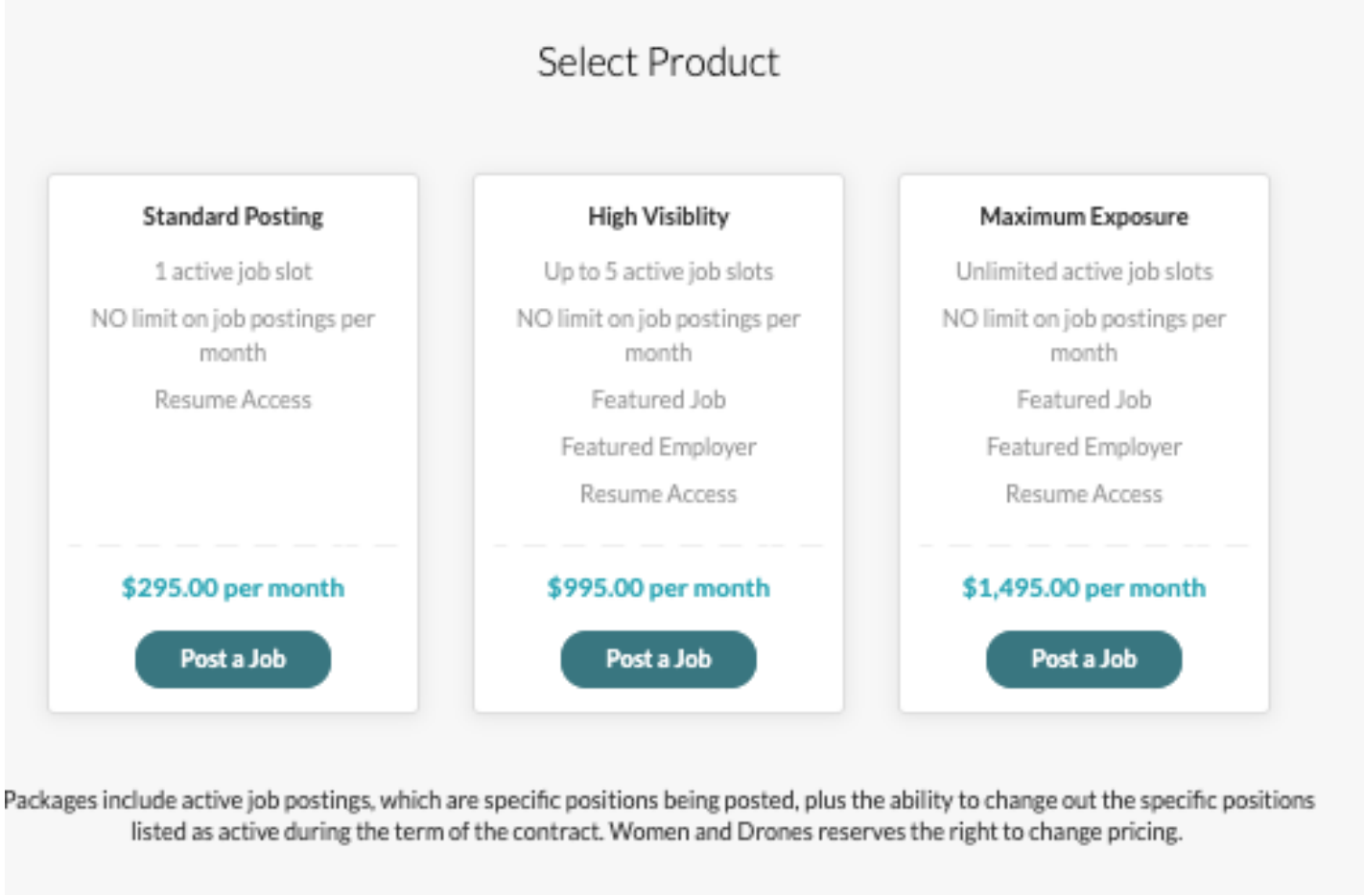
- Post resumes using simple template



Women and Drones Jobs Board - Pricing

No charge to job seekers

3 Packages for Companies – Members get discounts



Interested in joining Women And Drones?

Membership dues is non-refundable
Membership benefits subject to change
Membership is not limited to women, as our efforts will benefit every one of us who wants to see the industry opened up to more individuals, regardless of gender

FAA Survey of Unmanned Aircraft Systems Operators: Request for Comments

KYLE ROY

UAS SAFETY AND INTEGRATION TASK FORCE

NORTH CENTRAL TEXAS COUNCIL OF GOVERNMENTS

MAY 26, 2020

Background

FAA invites public comments about their intention to request approval from the Office of Management and Budget for a survey of UAS operators.

Section 376 of FAA Reauthorizations Act of 2018 requires a plan for integrating UAS into the national airspace system (NAS) through UAS traffic management (UTM) services.

Due to the lack of data on the flight behavior of UAS operators, the FAA is proposing an annual survey of UAS operators who have registered with the FAA under Section 349 or Part 107.

Survey data will be used to develop national forecasts of UAS activity and will be included in the Aviation Forecast published annually by the FAA.

Survey Content

Registered UAS operators would be invited via email to complete a voluntary Survey Monkey questionnaire.

Questionnaire contents:

- 6 questions on general flight behavior,
- 4 questions about the number and types of UAS operated,
- 5 questions for respondents who identity as commercial operators, and
- 7 questions for respondents who identify as operating for public safety agencies.

Majority of respondents will only answer the first 12 questions.

Estimated Average Burden per Response: 5.3 minutes on average.

Type of Feedback

FAA specifically requests feedback on four aspects of the proposed survey:

a) Whether the proposed collection of information is necessary for FAA's performance

b) the accuracy of the estimated burden

c) ways for FAA to enhance the quality, utility and clarity of the survey

d) ways that the burden could be minimized without reducing the quality of the collected information

Deadline

Written comments should be submitted by July 14, 2020.

More information:
https://www.federalregister.gov/documents/2020/05/12/2020-10139/agency-information-collection-activities-requests-for-comments-clearance-of-a-new-approval-of

Questions and Comments

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