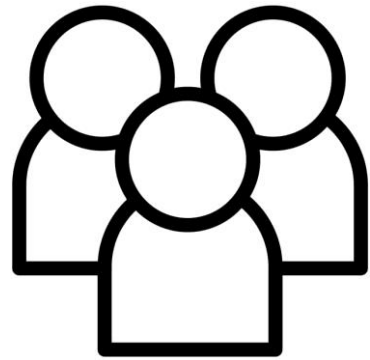
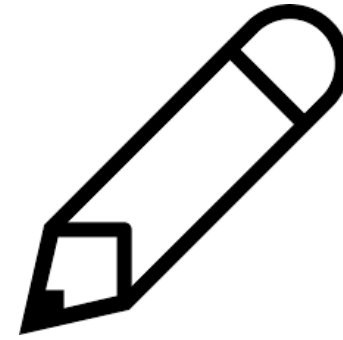




**Building research partnerships between industry, municipalities,  
public agencies, and our universities**



**Public-Private Partnerships**



**Research Initiatives**



**University Advancement**

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[www.tradfw.org](http://www.tradfw.org)**

# TRA Board of Directors



Kim Quirk  
Interim President



Dale Petroskey  
President & CEO



Michael Jacobson  
President & CEO



Brandom Gengelbach  
President & CEO



# Texas Research Alliance



## Who we are:

- 501C-3 Non-profit
- Founded by four of the largest chambers of commerce in the region
- Aligned with the premier research universities and colleges across the region
- Engaged to ensure that Dallas-Fort Worth industries, non-profits, municipalities, and public agencies can access and leverage regional research and innovation resources



# Texas Research Alliance



## **How we work with companies, municipalities, public agencies, and non-profits:**

- We work with you to understand your research and innovation needs and bring our network of university faculty, high-growth companies, and startups to help meet your challenges
- Participate in Texas Research Alliance led industry collaborations
- Partner with the Texas Research Alliance to find expertise, talent, and ideas to further your company mission
- There is no charge to work with us and we can work under non-disclosure agreements

# Texas Research Alliance



## **Toyota Motors North**

- Relocation to DFW and needed introduction to regional research and innovation assets
- Connected TMNA to regional universities through visits and discussions: UTA, UTD, SMU, and UNT

## **Elbit USA**

- Required assistance with video applications for defense
- Connected Elbit to faculty working in this arena leading to a two-year project resulting in improved performance and university publications

## **Multi-University Collaboration**

- Identified Federal funding opportunities
- Brought multi-university teams together for proposals

## **Skybase, New Zealand, Cleveron, Estonia**

- Connected these autonomy and robotics companies to regional resources
- Facilitating move to DFW

# **NORTH TEXAS CENTER FOR MOBILITY TECHNOLOGIES (CMT)**

**A community driven approach supporting mobility, talent,  
research, and commercialization needs in North Texas**



# North Texas Center for Mobility Technologies (CMT)



**Mission:** CMT brings the coordinated expertise of our North Texas research universities to mobility challenges faced by industry, municipalities, non-profits, and public agencies in the region, across Texas, nationally, and globally.

[www.tradfw.org/ntcmt](http://www.tradfw.org/ntcmt)



# CMT Objectives



- Provide a readymade R&D network for mobility innovation and commercialization for companies, municipalities, and public agencies
- Use the network to attract industry and academic talent to DFW
- Develop transportation-related research capabilities within DFW universities
- Facilitate communication and collaboration among DFW universities involving R&D projects and pursuit/execution of grants
- Facilitate university-public sector partnerships on transportation-related projects
- Facilitate mobility and transportation internships for workforce enhancement



# CMT Project Funding Criteria



Project must be:

1. Sponsored by a non-university party  
(e.g., industry, non-profit, municipality, public agency);
2. Related to mobility technology and systems;
3. Supported by contributions from industry sponsors and university; and
4. Advance a regional goal:
  - Improved access to jobs across the region
  - Environmental protection/resiliency
  - Economic development
  - Equity
  - Technology innovation leadership

# CMT Funding



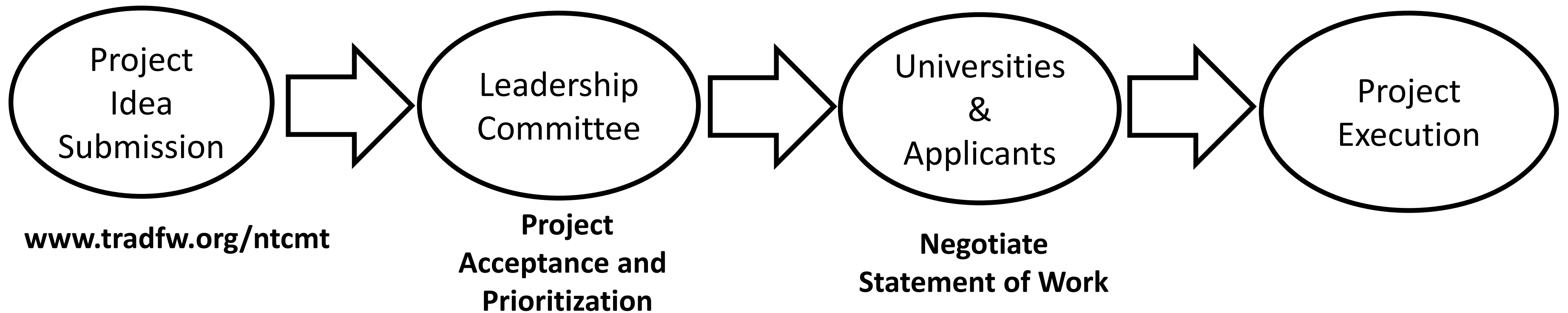
- Project sponsors negotiate a Sponsored Research Agreement (budget, schedule, and deliverables) with the lead university. The lead university will engage other universities as required for the project.
- CMT will cover 50% of the project budget.
- The Sponsor covers the remaining 50% of the project budget.

## Three Projects submitted

- Cyclist safety (UNT)
- Hazard identification for autonomous air vehicles (UNT)
- 5G Network for Advanced Urban Air Mobility (UNT)

# CMT Overall Process

Competition/Coordination/Partnerships



# CMT Mobility Proving Grounds (MPG)



- The Metroplex has 169 cities, 22 independent school districts, and 31 special districts. The area of the region is approximately 12,800 square miles, which is larger than nine states, and the population of the region is over 6.5 million, which is larger than 38 states
- MPG makes it easier and less costly for municipalities to engage with advanced mobility technology companies for demonstrations and implementation.
- Catalogues and markets common mobility technology needs, opportunities, and demonstration sites
- Prepares mobility innovation companies for productive interactions with municipalities
- Identifies and facilitates municipal point of contacts and discussions, including project managers and procurement.
- Partnered with the North Texas Innovation Alliance and consults with NCTCOG

# HOW TO CONNECT AND WORK WITH THE TEXAS RESEARCH ALLIANCE



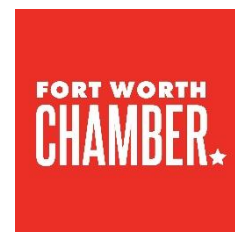
# 4 Ways to Connect with the TRA & CMT



- Reach out for personalized service connecting to faculty and resources at North Texas universities
- Partner with TRA to build industry collaborations
- Leverage CMT for your mobility research needs and proposals
- Consider a Capstone Project, Class Project, and/or Sponsored Research Project
- These are all ideal ways to solve engineering and development problems you just don't have the resources for while working with teams of students that may one day be your employees.



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**www.tradfw.org**







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# Airspace Monitoring Service Pilot Program Review

Arlington, TX

Safety Through Sensing™





## Agenda

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- **AMS Background**
- **Pilot Program Objectives**
- **Entertainment District Results**
- **Lessons Learned**
- **Next Steps**

# Airspace Monitoring Service (AMS)



## Infrastructure Deployment

Hidden Level owns and maintains sensors deployed on rooftops and cell towers



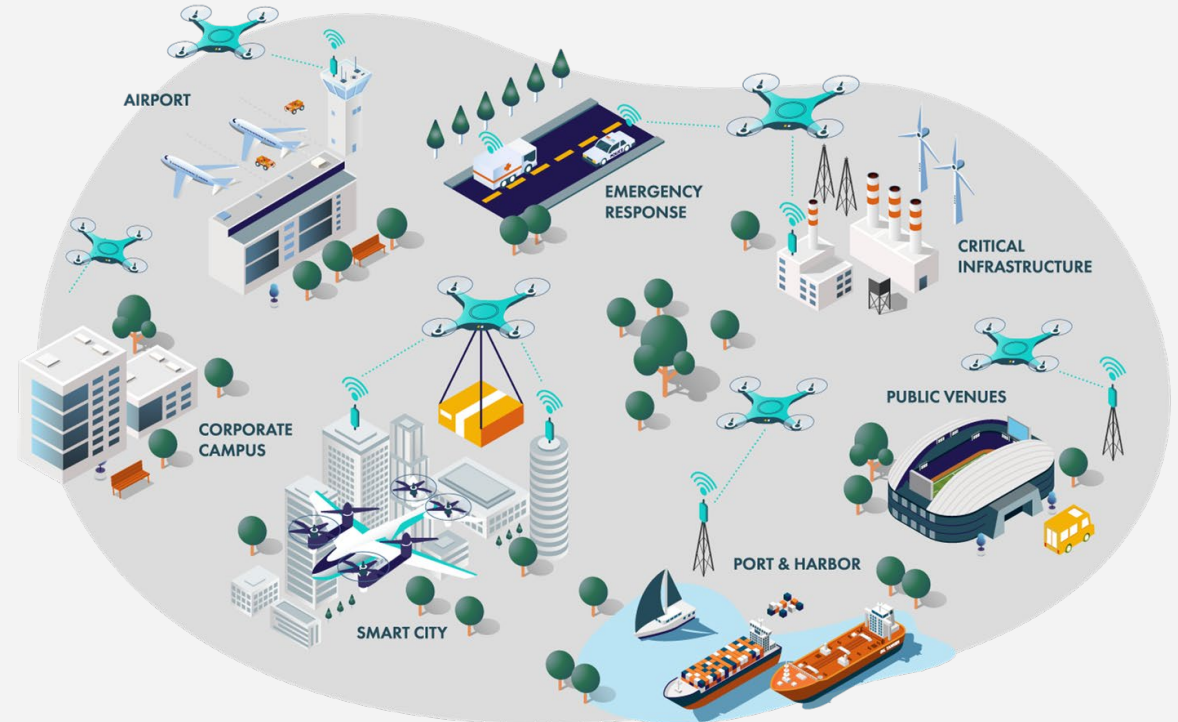
## Cloud Based Data as a Service

3D UAS Positions, Classification, Trend Monitoring, Data Analytics



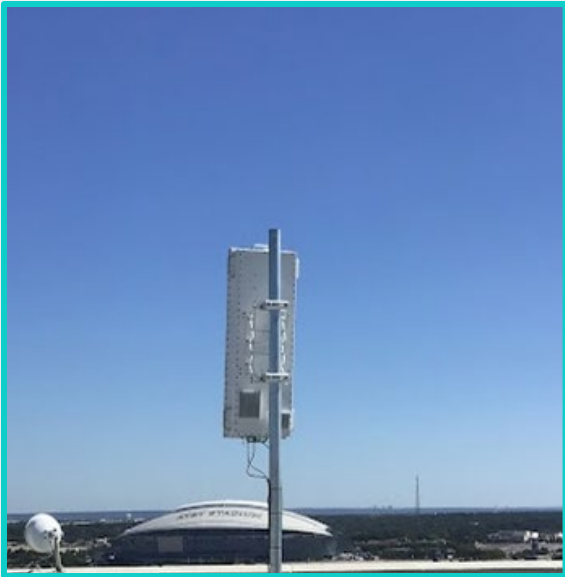
## Coverage Volumes and Data Packages

Tailored coverage volumes and data packages provided direct or through B2B partnerships



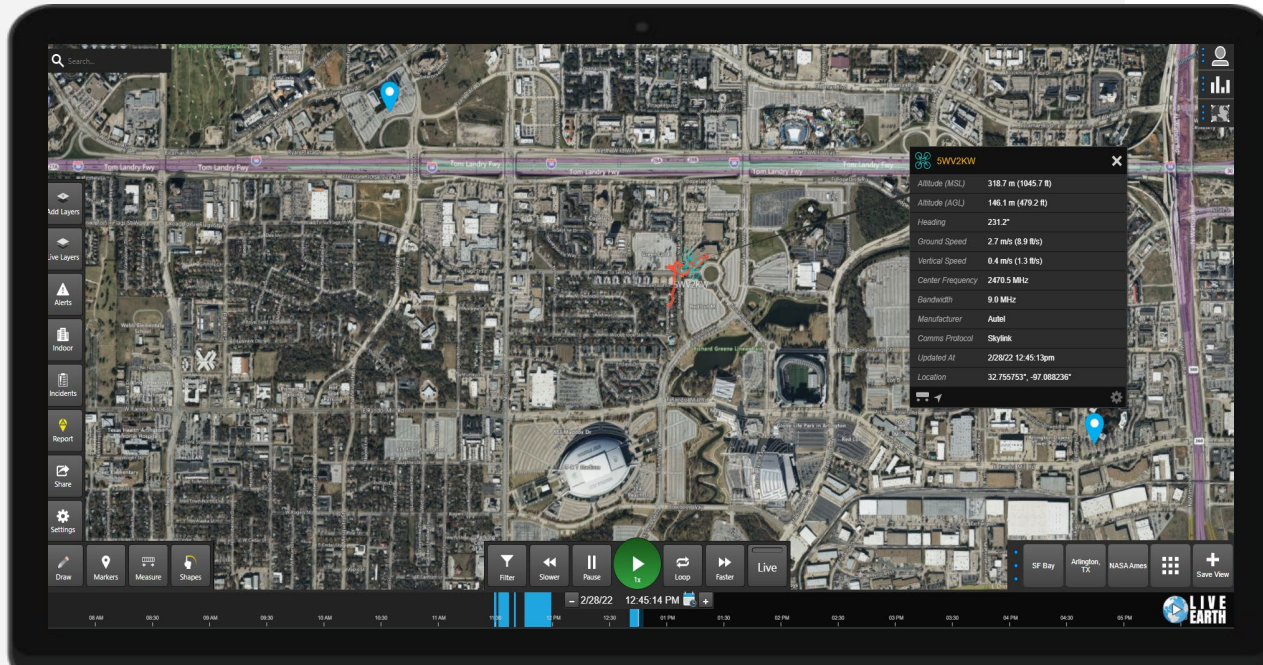
**One city-wide deployment,  
multiple applications**





# Hidden Level Pilot Program (1<sup>st</sup> 6 months)

1. 3 Installed HL1000 sensors
2. Partnership providing Airspace Monitoring Service (AMS) data feed to Arlington Police Department
3. AMS Coverage Over Arlington Entertainment District
  - o Realtime Data and Historical Reports
4. Support for Area R&D Initiatives



Hidden  
Level



LAKE VIRIDIAN

360

30

30

ARLINGTON EXPO CENTER

SIX FLAGS OVER TEXAS

AT&T STADIUM

UNAUTHORIZED PARTICIPANT

COVERAGE AREA

GENERAL MOTORS

360

GLOBE LIFE PARK & FIELD

180

ARLINGTON POLICE FLIGHT

180



PUBLIC SAFETY PILOT PROGRAM  
ARLINGTON, TEXAS



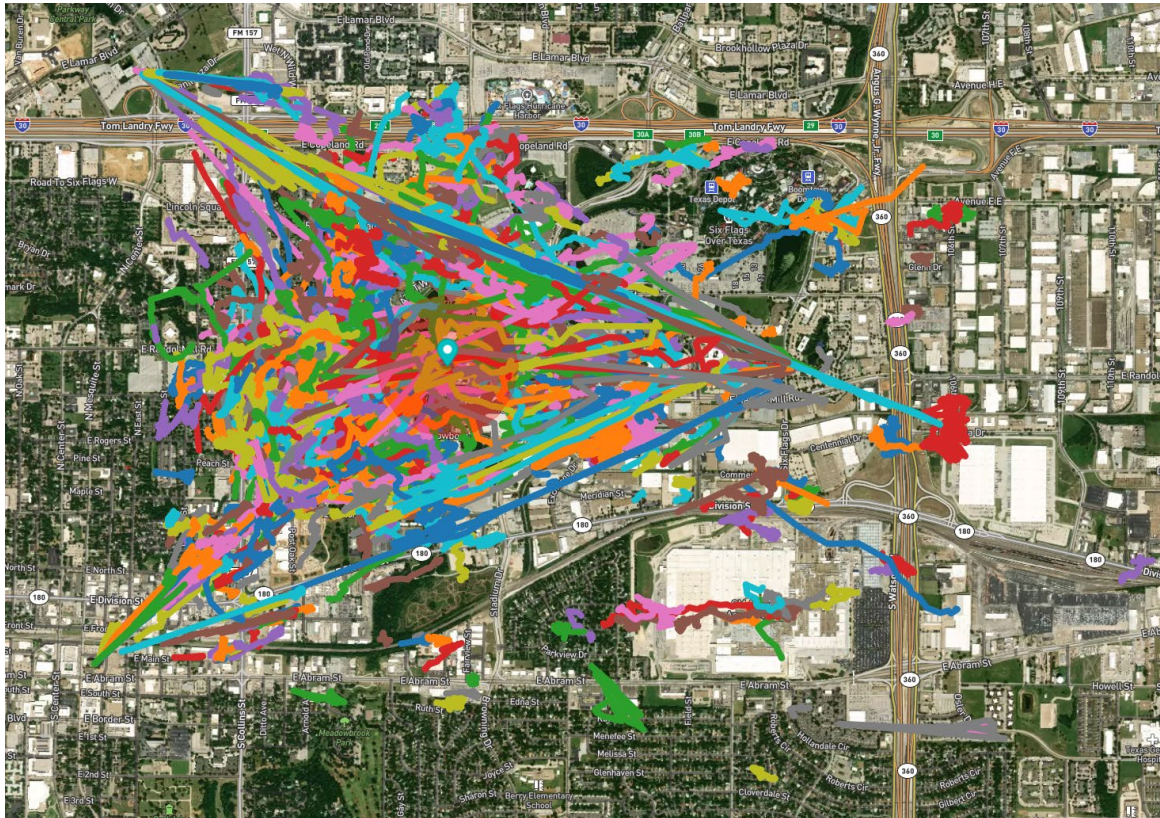
# Overall Data

150 days of operation

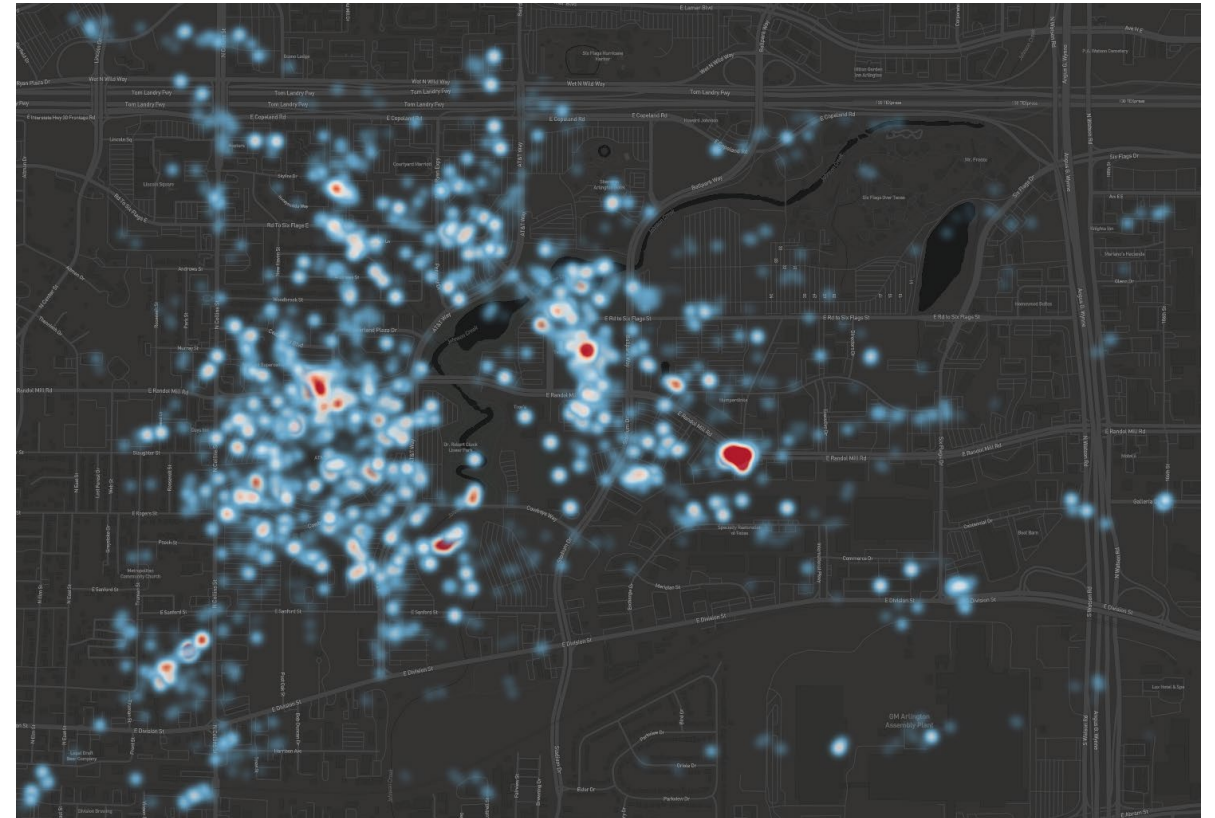
1022 tracked drone events of flights of significance

Estimated 485+ unique flights\* over 150 days (~3 flights per day)

1 or more tracked drone events recorded in 95% of all days



All recorded flight paths (excluding APD operations)



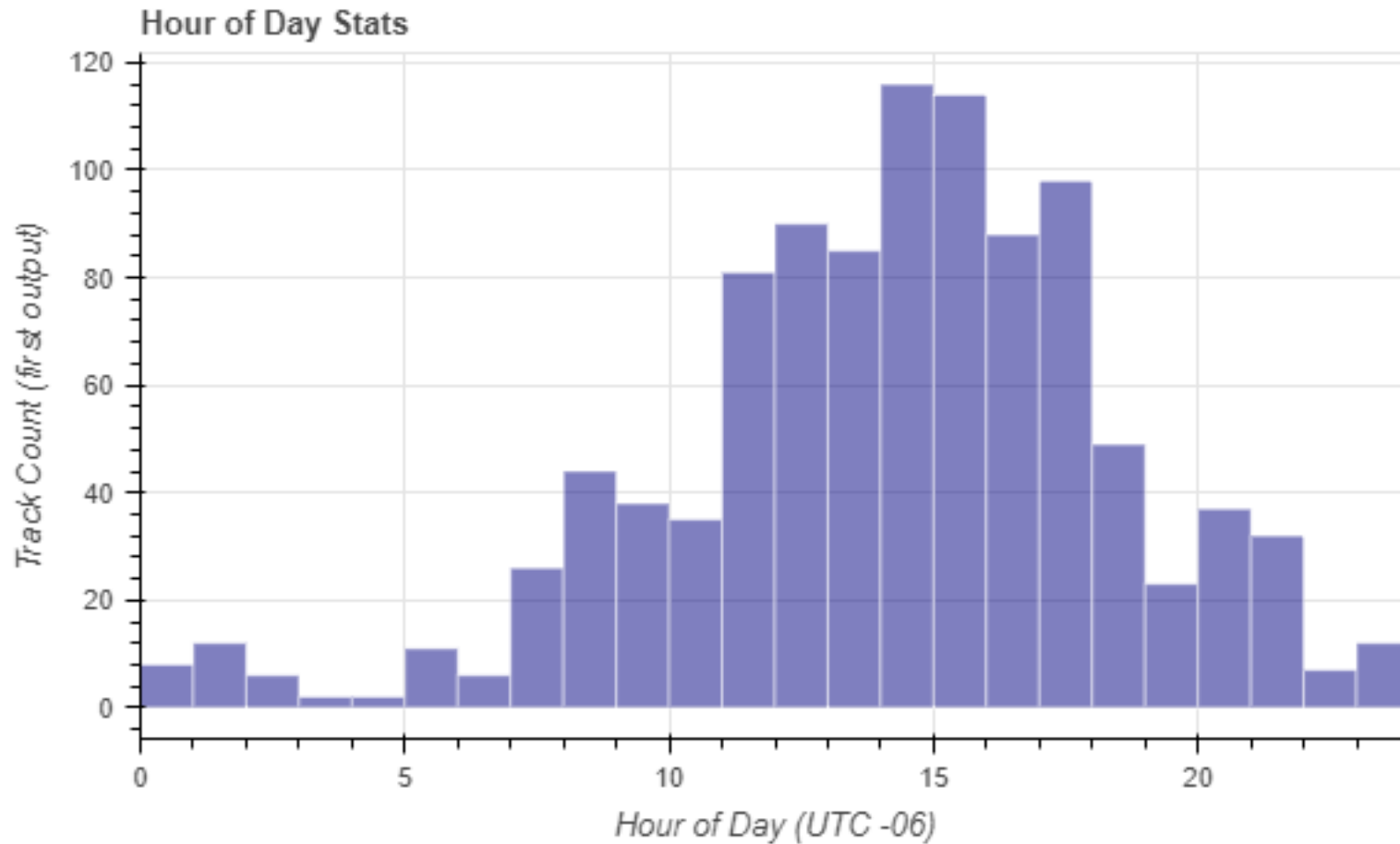
Heat map of all drone take off locations (excluding APD operations)

## Entertainment District saw A LOT of activity in a short amount of time

\*Unique flights representing same operator/drone which may have operated multiple take off and landings in a given time period. Arlington PD flights were filtered out of the data, resulting in less total flights reported than occurred in the airspace overall.

# Flights: Time of Day

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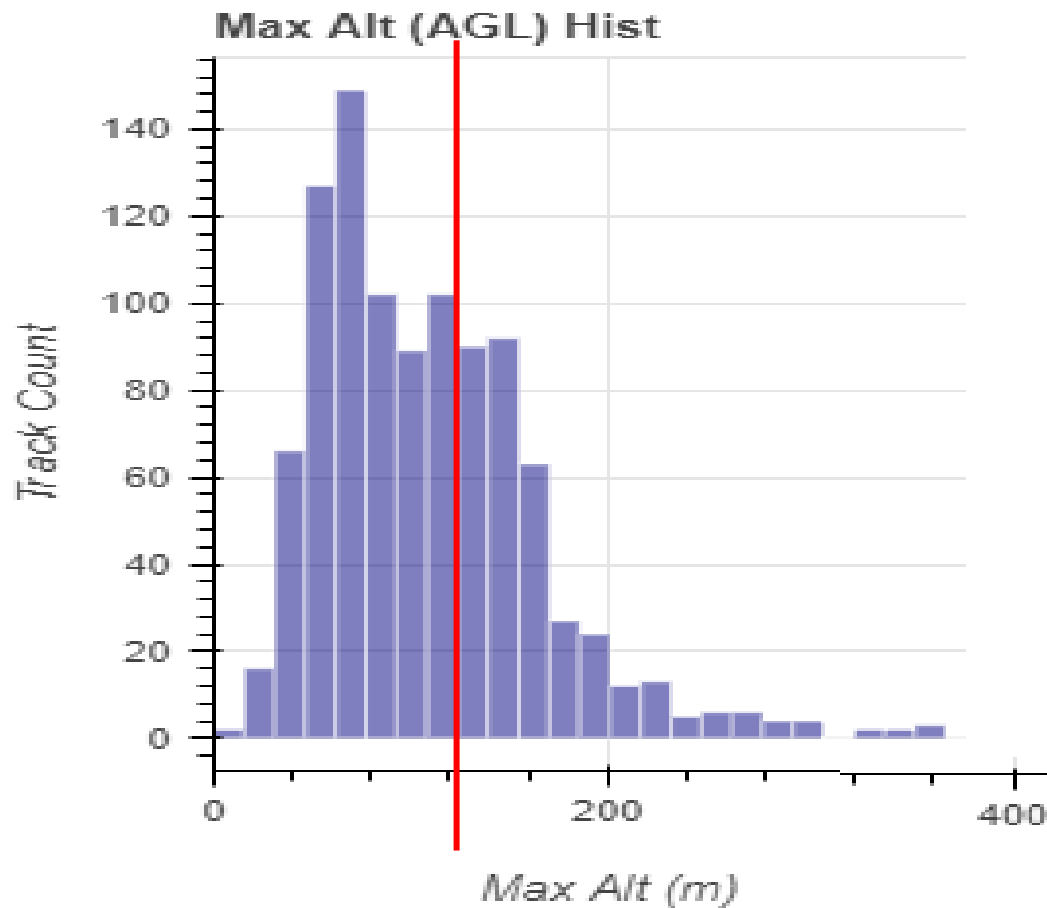


**An interesting amount of night/dusk flights**



# Flights: Altitude

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**Numerous flights  
above 400ft AGL  
ceiling**

# NFL Data

Date	Game	Kickoff Time	Tracked Drone Event	Unique Drone Flight	Unsafe Flights
2021-09-27	PHI @ DAL (MNF)	19:15 CST	2	1	1
2021-10-03	CAR @ DAL	12:00 CST	2	2	2
2021-10-10	NYG @ DAL	15:25 CST	2	2	2
2021-11-07	DEN @ DAL	12:00 CST	1	1	1
2021-11-14	ATL @ DAL	12:00 CST	4	3	3
2021-11-25	LVR @ DAL (Thanksgiving Day)	15:30 CST	6	4	2
2021-12-26	WAS @ DAL	19:20 CST	4	4	4
2022-01-02	ARI @ DAL	15:25 CST	16	6	4
2022-01-16	SF @ DAL (Playoffs)	15:30 CST	11	5	3
			<b>48</b>	<b>28</b>	<b>22</b>

## Criteria:

- 3 hours before kickoff to 3 hours after kickoff
- Removes Arlington PD Drone Flights that were also tracked
- **Tracked Drone Event:** Hidden Level AMS positively ID'd and geolocated drone. Multiple tracked events may constitute a single drone user / flight.
- **Unique Drone Flight:** Same operator, same flight that may be a combination of multiple tracked drone events
- **Unsafe Flights:** Flights over pedestrians, stadium operations, inside of TFRs

**Significant public safety issue during events!**



# Case Study: Successful Application of AMS



## NFL Playoffs 2022-01-16

- Hidden Level AMS Detected flight during TFR (Temporary Flight Restriction) period, 25 minutes before kickoff
- Arlington PD alerted who used their own drone to get visual on operator location based on Hidden Level AMS
- Operator located; report sent to FAA

	<b>41CYD1</b>	
Altitude (MSL)	202.9 m (665.8 ft)	
Altitude (AGL)	30.0 m (98.3 ft)	
Heading	4.7°	
Ground Speed	3.6 m/s (11.9 ft/s)	
Vertical Speed	-0.4 m/s (-1.2 ft/s)	
Center Frequency	5745.0 MHz	
Bandwidth	4.0 MHz	
Comms Protocol	WiFi	
Updated At	1/16/22 4:07:45pm	
Location	32.750555°, -97.093602°	

Today 3:15 PM

Good teamwork, hidden level combined with the m210 we intercepted an illegal drone operation.



# What We Learned

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- **Significant Amount of Drone Flights During Event**
  - Monitored 9 NFL Games, 2 NCAA football games
  - 25 drone flights during those events alone that introduced public safety concern and/or violated airspace regulations
- **Deeper Integration To APD CONOPS**
  - Including orientation of tethered drone to Hidden Level notification location increases ability to locate operator
  - Tie take off location data to camera network and social media monitoring feeds
- **Variety of Aircraft**
  - More than DJI aircraft were flown within entertainment district
  - Parrot, Autel, Skydio, Basic WiFi, and custom FPV drones

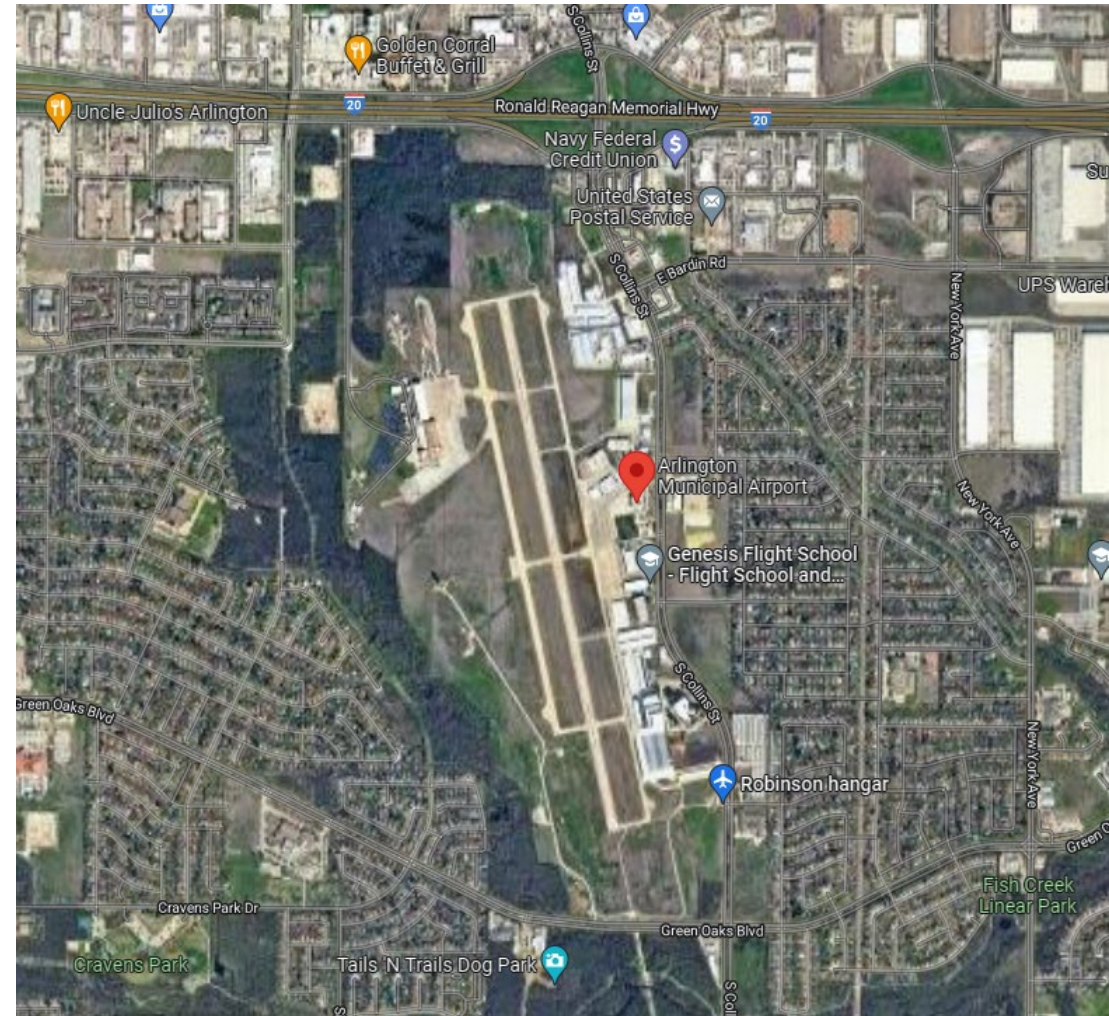


**The data collected during the pilot program has shown that the airspace around the entertainment district regularly has public safety issues**

# Next Steps

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- **Update Entertainment District Coverage**
  - Minor adjustments to existing sensor laydown
  - Increase performance
- **Expand to Include Municipal Airport**
  - Include up to 5+ square miles surrounding airport
- **Support 2022 Event Season**
  - NFL / MLB / Concerts
  - Refine CONOPS
- **Collaborate on New Initiatives**
  - Smart City, UTM, UAM, Remote ID, FAA Research
  - Grant opportunities



**Expand the capability to continue supporting Public Safety and  
Airspace Integration Activities**

# Contact Us

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