

Developing a Drone/UAS Program for your Public Safety Agency



November 13, 2019

National Alliance for Public Safety GIS (NAPSG) Foundation

napsfoundation.org | [@napsfoundation](https://twitter.com/napsfoundation)

AGENDA

- 10:10 AM Welcome/Introductions – *Austin Worcester*
- 10:15 AM Review of Session Topics – *Austin Worcester, Civil Air Patrol*
- 10:20 AM Small Group Discussion: Have you attempted to start a UAS program? Was it Successful? Why or Why not?
- 10:35 AM Small Group Report-Outs
- 10:50 AM Drone/UAS standards and regulations – *Austin Worcester, Civil Air Patrol*
- 11:00 AM Local UAS Program - *Jason Warzinik, Boone County, MO*
- 11:15 AM Drone/UAS Imagery and platform for your mission needs - *Austin Worcester, Civil Air Patrol*
- 11:25 AM Facilitated Discussion: If your agency has used UAS, what mission types were they used for? How did you select imagery collected and platform used?
- 11:35 AM Drone/UAS Imagery End Products – *Austin Worcester, Civil Air Patrol; Catherine Bohn, Dewberry and Katie Picchione, FEMA*
- 11:45 AM Facilitated Discussion: Communicating your program, Discovering other Drone/UAS efforts.
- 11:55 AM Tracking Housing Recovery after California Wildfires - *Catherine Bohn, Dewberry*
- 12:00 PM Wrap-up

Small Group Discussion

- Have you attempted to start a UAS program?
- Was it Successful? Why or Why not?

Drone/UAS Standards and Regulations

Mr. Austin “Sauce” Worcester
Senior Program Manager for sUAS
Civil Air Patrol
Maxwell AFB, AL

UAS Standards and Regulations

Civilian Govt. COA vs FAA Part 107

U.S. Government Use (Civilian vs DoD)

State Regulation???

American Security Drone Act of 2019

FAA Reauthorization Act of 2018

Local UAS Program

Jason Warzinik, Boone County, MO

Who We Are

- Boone County Fire Protection District / Missouri Task Force 1
- Boone County Government
- Boone Electric Cooperative
- Missouri SEMA



Local sUAS History



August 23, 2013 6:43 PM

FAA grounds journalism school drones at MU and Nebraska

HIGHLIGHTS

Researchers were using the airborne robots to shoot aerial photos and video from difficult-to-reach news scenes, but the Federal Aviation Administration said they must stop flying outdoors until they obtain government permission.



COLUMBIA — The Federal Aviation Administration says it has approved the use of drones used by the journalism schools in Missouri.

Researchers at the University of Missouri and the U.S. Army Research Office are testing the use of the airborne robots to shoot aerial photos and video.

The Columbia Daily Tribune reported Thursday that the FAA ordered the universities to stop flying the drone without authorization.

Scott Pham of Missouri's university-owned station newsgathering drone test to the indoors. He suggests federal permission for outdoor use.

"There is a process for flying over a natural disaster but it is a lengthy, difficult process that is not well flying is still legal and we will do that for testing."



March 31, 2017

Hello community leader!

You are cordially invited and highly encouraged to attend an informational meeting to learn about new state-of-the-art news gathering technology that KRCG-TV will be implementing in our area very soon. KRCG 13 is thrilled to announce we have invested in a UAV (unmanned aerial vehicle), more commonly referred to as a drone. We've also invested in extensive training and FAA certification for two of our employees as licensed pilots for the aircraft. The drone will be equipped with the latest generation HDTV miniature camera lens with the ability to cover live and taped news events.

The purpose of our meeting is to provide local law enforcement, emergency services, government officials and other community public safety leaders with an understanding of our approach to safely and responsibly deploying this technology, and how and when we plan to use it. Above all else, public safety is our utmost priority. We will have our



Agreed to Standardize - DJI as sUAS

DJI Matrice 210 (m210)

All-Weather Professional sUAS

24-38 Minute Flight Times (depending on load)

Zenmuse Z30 (30X optical zoom)

Zenmuse FLIR XT

LumaCube Night Spotlights

SafeAir Safety System

Auto-Tensioning Tether Kit

2nd Controller & CrystalSky Monitor

Stinger Gas/Radiation Meter Mount

Claw Drop System - *5lb cargo*



Agreed to Standardize – FAA Part 107

Government/Public Safety Training Course

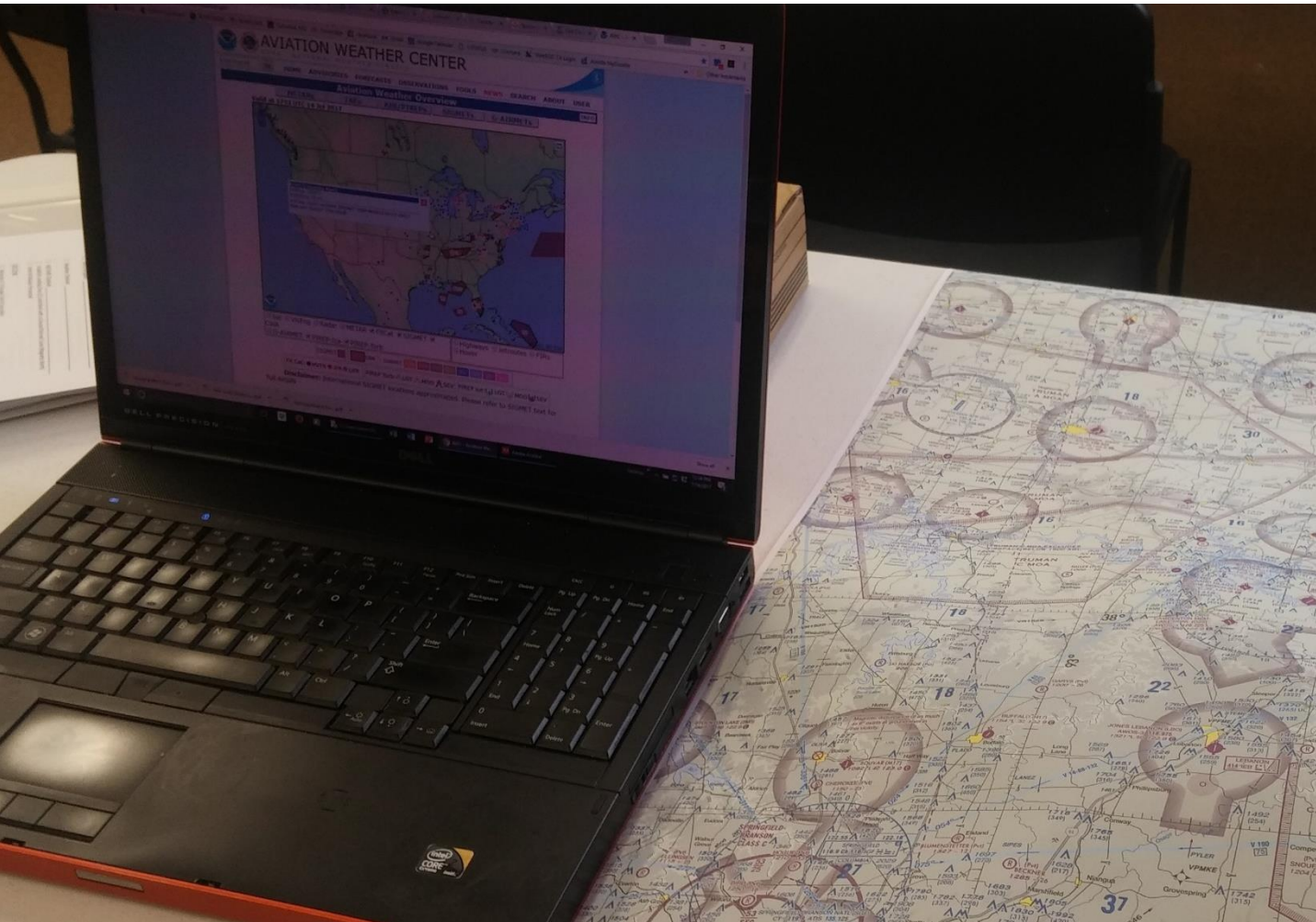


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Public Safety Training Course



Agreed to Standardize – FAA Part 107



**METAR: KCOU 011954Z 01007KT 10SM CLR
25/12 A3007 RMK AO2 SLP175 T02500122**

AREAS ON THE TESTS

- Applicable regulations, limitations, and flight operation
- Airspace classification, operating requirements, and flight restrictions affecting small unmanned aircraft operation
- Aviation weather sources and effects of weather on small unmanned aircraft performance
- Small unmanned aircraft loading
- Emergency procedures
- Crew resource management
- Radio communication procedures
- Determining the performance of small unmanned aircraft
- Physiological effects of drugs and alcohol
- Aeronautical decision-making and judgment
- Airport operations
- Maintenance and preflight inspection procedures

Agreed to Standardize – Flight Skills Training

- Pre and Post Flight Checklists
- Skills Training
 - Basic-to-Advanced
 - Manual and Autonomous
 - Mission Specific

sUAV Pilot Checklist

UAV No.: _____

Name: _____ Date: _____ Time: ____/____/____

☐ Check GPS Signal

☐ Check Camera Settings

☐ Update Home Point

sUAV Pilot Checklist

Name: _____ Date: _____

Mission Pre-Flight Checklist

Evaluation of Operating Environment and Landing Zone Set Up

☐ Perform Risk Assessment

Task VI: Loss of Visual Line of Sight

Objective: Gain experience in determining UA position after losing visual line of sight with UA.

Method: With UA at a location at least 1000 feet laterally from ground station position, student will look away from UA and allow instructor to manipulate controls to change the UA location. Upon turning back around at Instructor's direction, student will attempt to locate UA using telemetry interpretation, visual scanning, and utilizing the Return-to-Home feature if available.

Task VII: Distractions

Objective: Gain experience in responding to and mitigating distractions during UAS flight operations.

Method: During the course of flight, engage students in non-sterile environment where student may encounter during flight.

Task VIII: Observer Direct

Objective: Gain experience using observer direct control.

Method: At instructor's discretion, participant will direct the UA to a specific location.

Task IX: Camera Operations

Objective: Gain experience using camera function and gimbal movement.

Method: While the UA is in flight, participant will direct the camera to various angles, and utilize the camera to capture various images.

Flight Training Task Schedule

This flight training task schedule is used by the UA Student Pilot to develop the necessary skills to fly a UA. The student must demonstrate each task.

Before each flight the US Student Pilot will evaluate the following:

- Airspace
- Training area boundaries
- Multiple aircraft separation boundaries
- Area hazards

☐ **Task I: Powering-on and Takeoff**

Objective: Gain experience in powering-on and conducting takeoff with the UAS.

Method: Student will power on the UAS, confirm aircraft and systems are flight-ready and initiate the power-on and propeller startup procedure. Once the aircraft is successfully powered on, student will initiate a climb with the UA to 5 feet above the ground and allow the UA to hover in place.

☐ **Task II: Landing and Powering-off**

Objective: Gain experience in landing the UA and powering down the UAS.

Method: Student will initiate a descent above the Launch and Recovery Zone, land the UA in the specified location, initiate the propeller shutdown procedure and power down the UAS.

Date/Time	sUAS Unit & Registration Number:
sUAS Operator/Observer:	Weather/Wind Speed:
Data Products: ☐ Video ☐ Ortho ☐ Terrain ☐ Inspection ☐ Other:	Flight Location (address, parcel number, etc.):
Flight Purpose and Plan:	
Permission granted for flight by property owner/occupant full name, signature, and date:	

Pre-Flight FAA and County Requirements Checklist

☐ Permission form has been signed by the private property owner / occupant

☐ Flight plan minimizes coverage of non-subject area private property unless permission has been granted

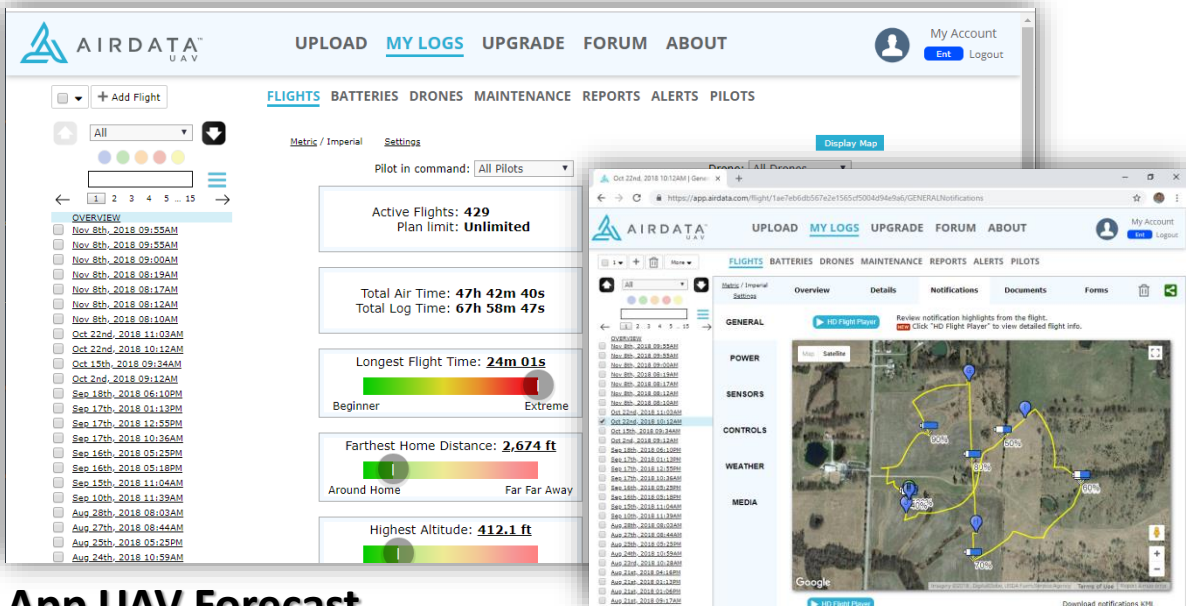
Agreed to Standardize – Flight Skills Training



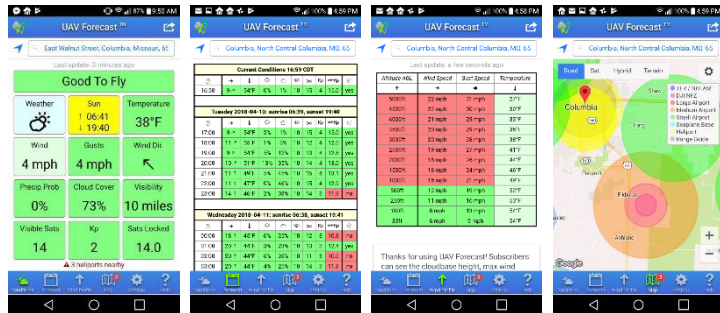
<https://www.nist.gov/el/intelligent-systems-division-73500/response-robots/aerial-systems>

Agreed to Standardize – Apps

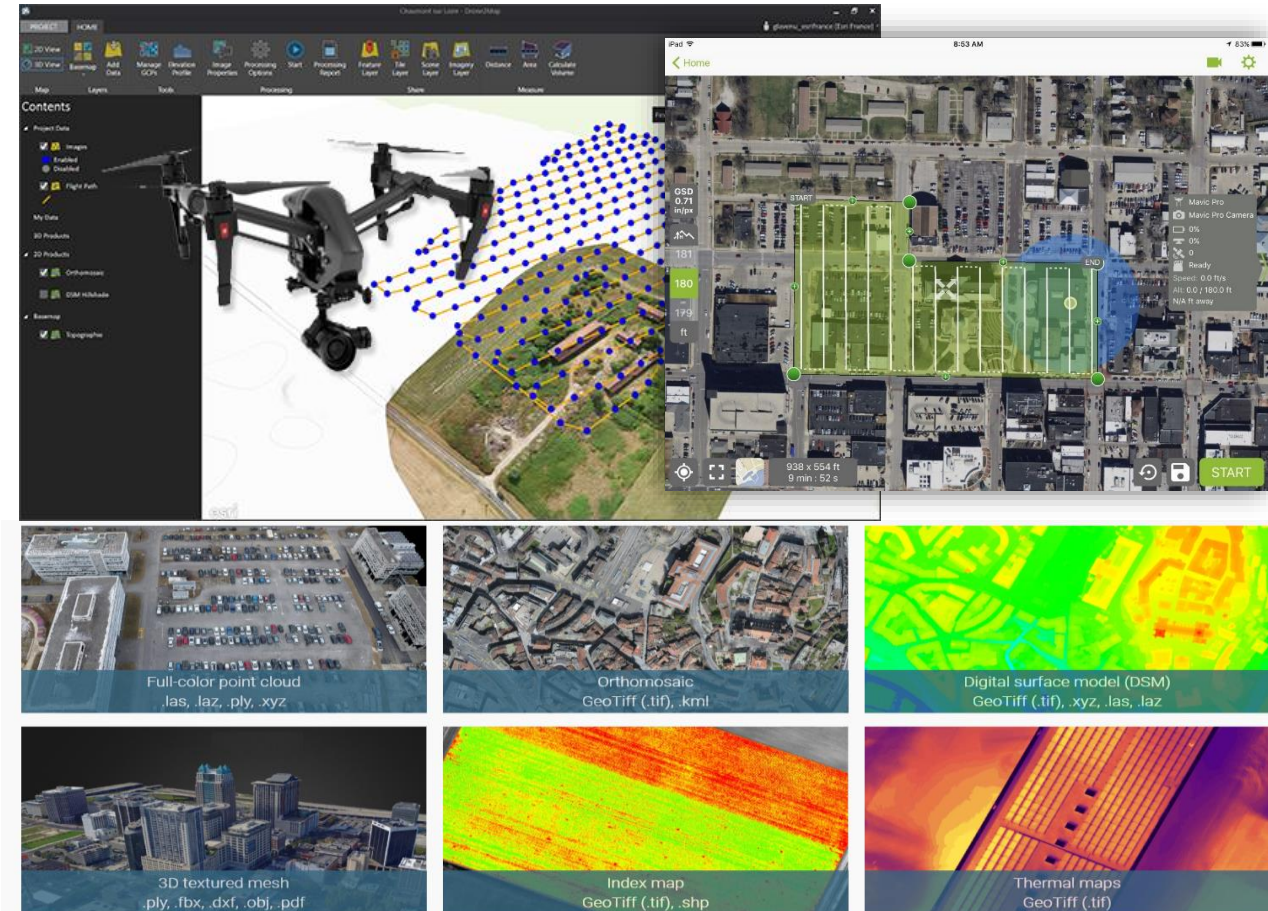
AirData.com - Flight Data Platform



App UAV Forecast



Pix4D Capture and ESRI Drone2Map Photogrammetry and sUAS Mapping Software



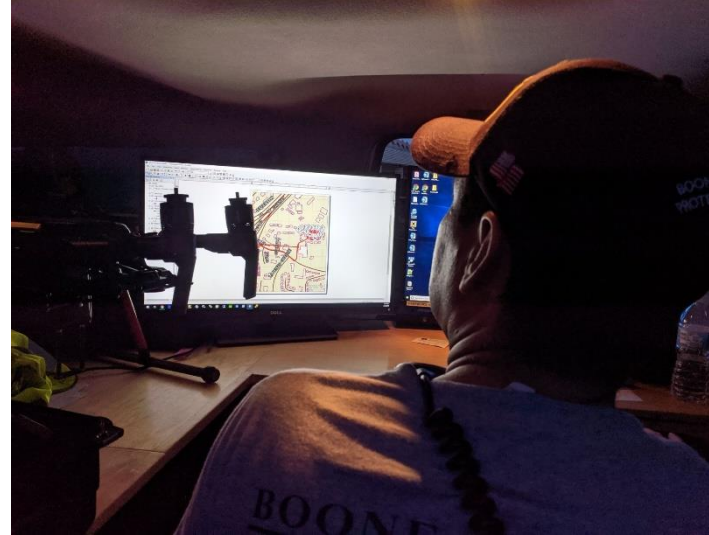
sUAS/GIS Response Vehicle

- Hardware

- Honda EU2000iS Generator & UPS Power (x2)
- DesignJet T120 24" Plotter
- LaserJet Multifunction 8.5"x11" Printer
- CradlePoint (Wifi/Satellite/Cell/LAN) Internet Access
- Mavic Pro sUAS (x4)
- M210 sUAS (x2)
- iPad Mini Tablets (x12)
- Icom IC-A6 FAA Communications Radio (x2)
- Garmin GPSMAP 64st Handheld GPS (x25)
- GIS Server/Workstation (dual monitors)
- GIS Mobile Laptop
- 37" HDTV with MicroPC - Map Viewer
- Tailgate Shelter Canopy
- Fire extinguisher (x4)

- GIS Software

- Drone2Map
- ArcGIS Pro & ArcMap Desktop
- Survey123 & QuickCapture
- Collector for ArcGIS
- Portal for ArcGIS
- ArcGIS Server Enterprise



sUAS/GIS Responses

Wildland Fire Reconnaissance

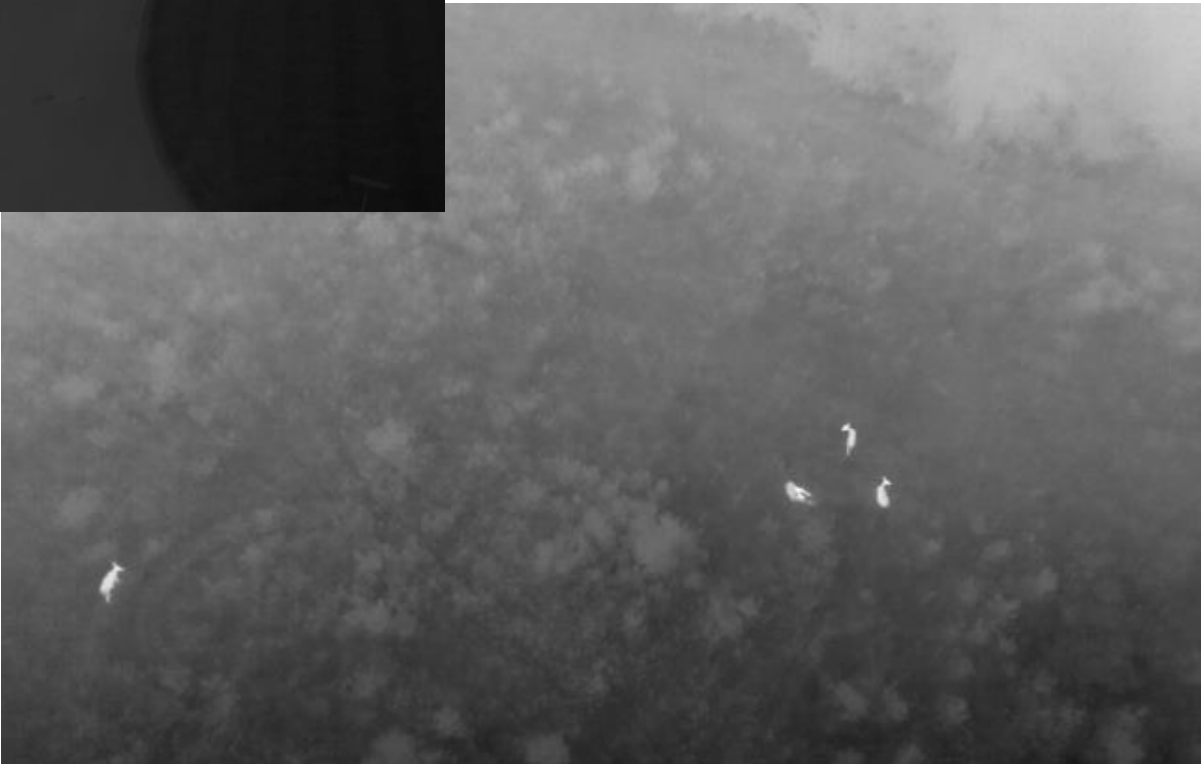


Non-dwelling fire

<https://bcfpdgis.org>

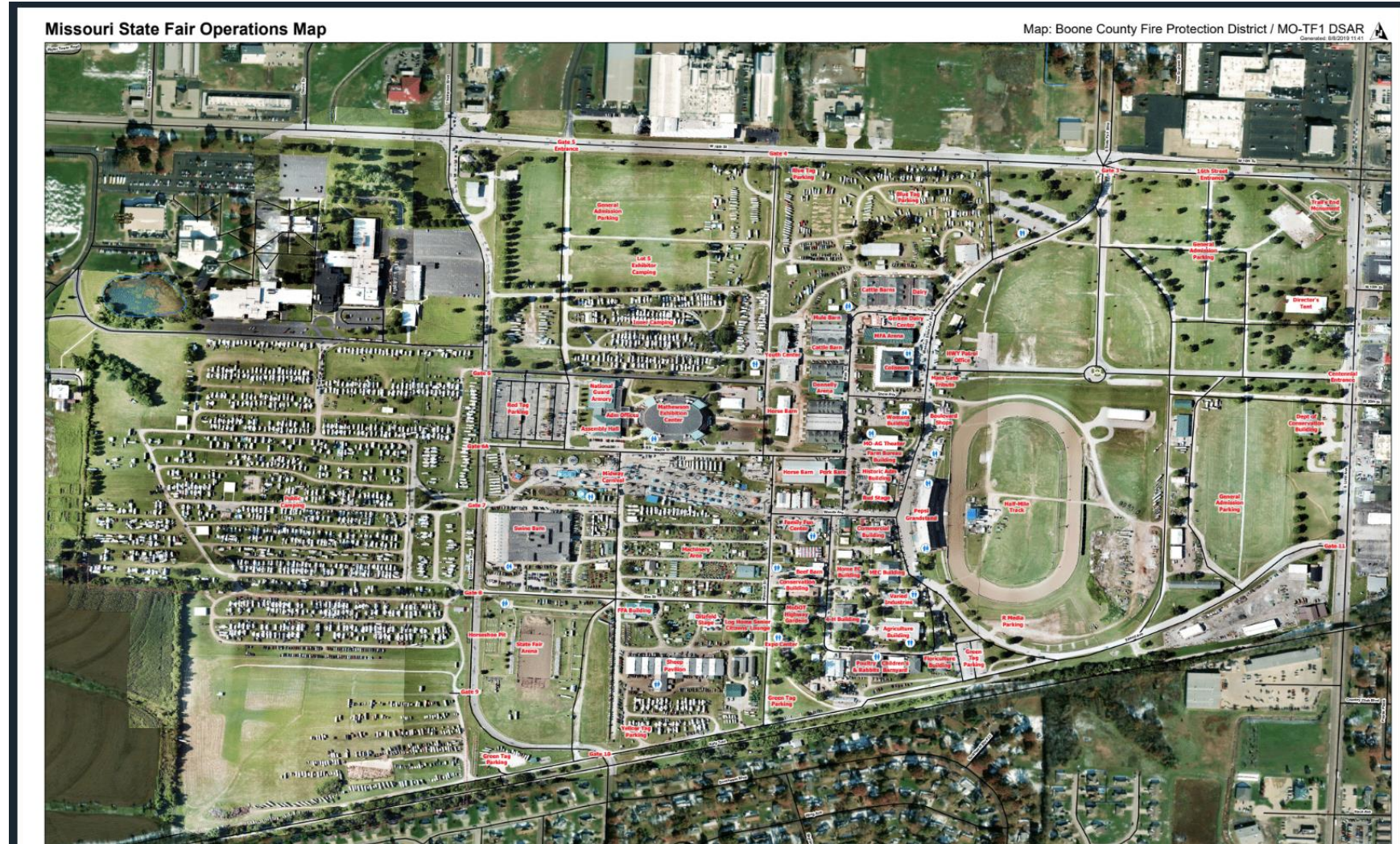
sUAS/GIS Responses

Person Search

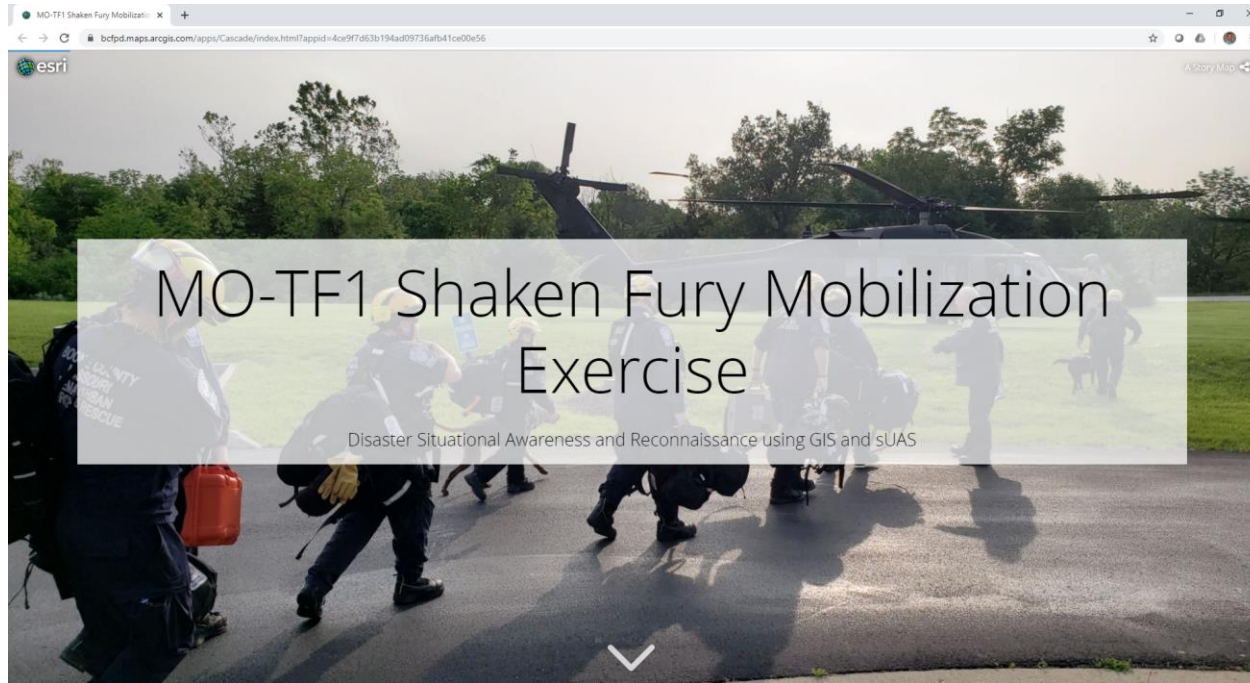


sUAS/GIS Responses

Public Safety Common
Operating Map
400 acre 6 inch imagery
from 1,980 (9.2Gb)
individual sUAS photos

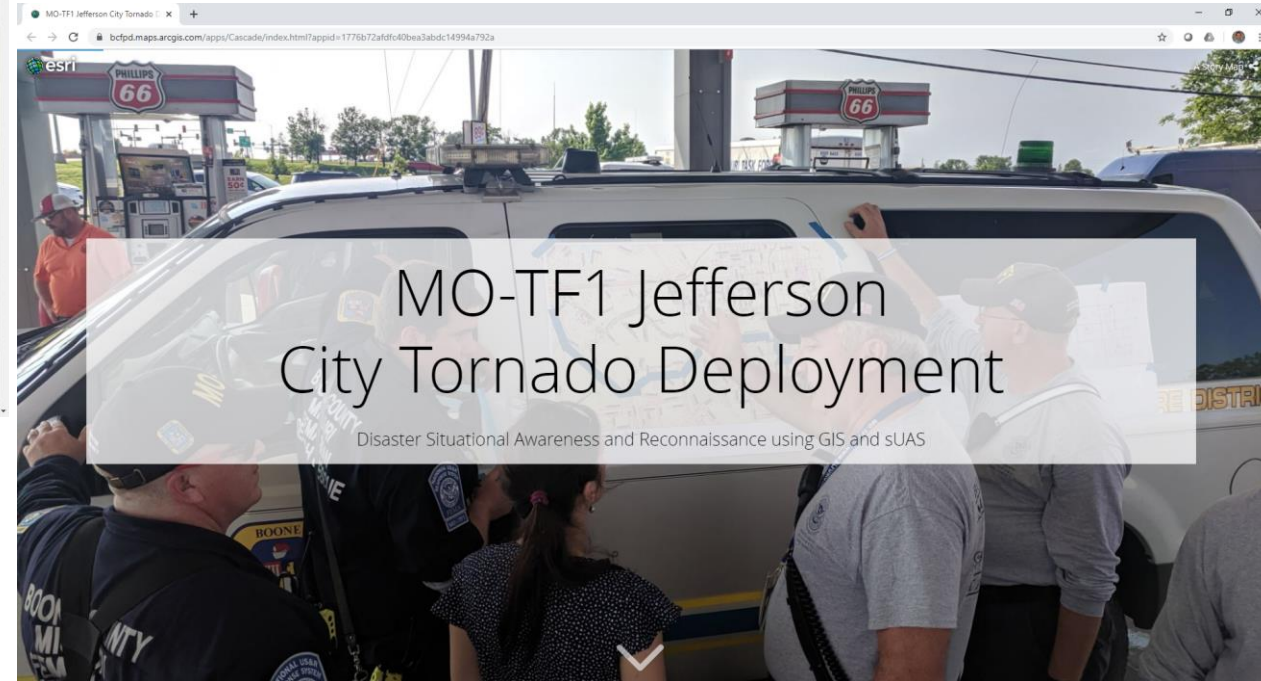


sUAS/GIS Responses



<https://arcg.is/15HiLy1>

<https://arcg.is/1bKmKn>



Drone/UAS Imagery and Platform for your Mission Needs

Austin Worcester, Civil Air Patrol

Which One Should I Use????? ...so many choices, not enough time...



What type of imagery (for what application) are you looking for???

Oblique Still (Geo-referenced or not?)

Thermographic

LiDAR

NADIR Still (Geo-referenced or not?)

Video (EO / IR)

Magnetic Survey

Orthomosaic (Geo-rectified or not?)

Ground Penetrating Radar

Multispectral

What purpose are you obtaining imaging for?

WHAT??????

Incident Awareness and Assessment (IAA)

Critical Infrastructure Assessment

Search and Rescue (Crowd Sourcing?)

Recovery / Construction Progress

Debris Volumetric Imagery

Terrain evaluation

Vegetation Assessment

Etc., Etc., ETC!!!!!!!!!!!!!!

FOR WHAT PHASE OF THE EFFORT??????

Preparedness / Pre-event Mitigation

Response

Recovery

Post Event Mitigation

BLUF!!!! (Bottom Line Up Front)

- There isn't a single solution – take the time to make a good decision and do some research. Do actual testing under non-emergency or time dependent conditions to develop the product you need!
- Never fall for the company's sales tactics and pitch – they all look COOL!!!!!!

Facilitated Discussion

- If your agency has used UAS, what mission types were they used for?
- How did you select imagery collected and platform used?

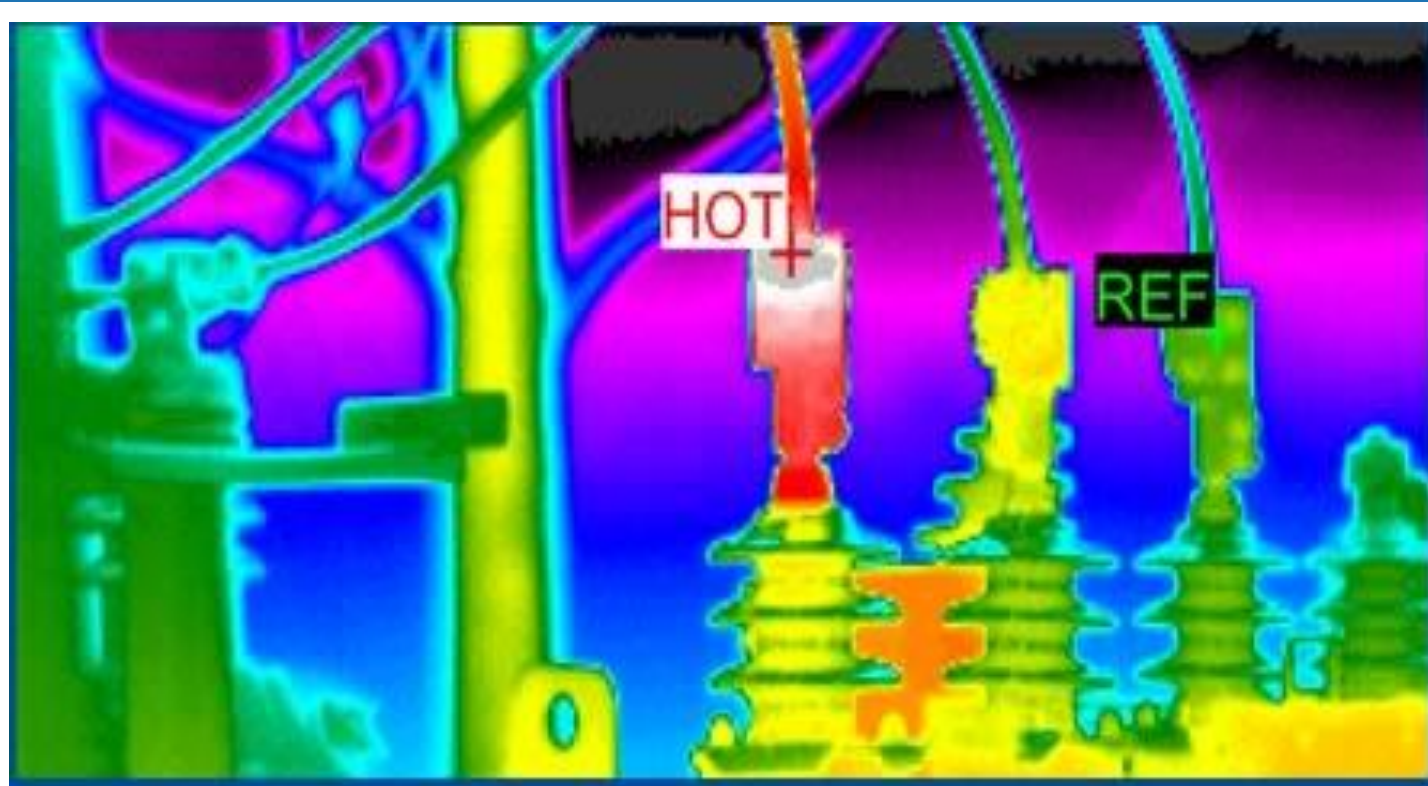
Drone/UAS Imagery End Products

Austin Worcester, Civil Air Patrol
Catherine Bohn, Dewberry
Katie Picchione, FEMA

The Georeferenced Orthomosaic



Thermography



Crowd Sourcing Search and Rescue



Facilitated Discussion

- Communicating your program – Best Practices
- Discovering other Drone/UAS efforts.
 - How have you learned about programs in your region?
 - What organizations are you aware of that support UAS or have UAS capabilities?

UAS for Recovery: Tracking Housing Recovery after California Wildfires

Catherine Bohn, Dewberry

Wrap-up

Upcoming Sessions:

Remote Sensing, Imagery, and Drones for Response and Recovery Workshop

Day 3: Thursday, November 14, 2019

Time: 9:00am-12:30pm

Remote Sensing Innovation Working Group Meeting (Open)

Day3: Thursday, November 14, 2019

Time: 1:00-4:00pm

Thank you!

