LAUNCHING YOUR UNMANNED AIRCRAFT PROGRAM

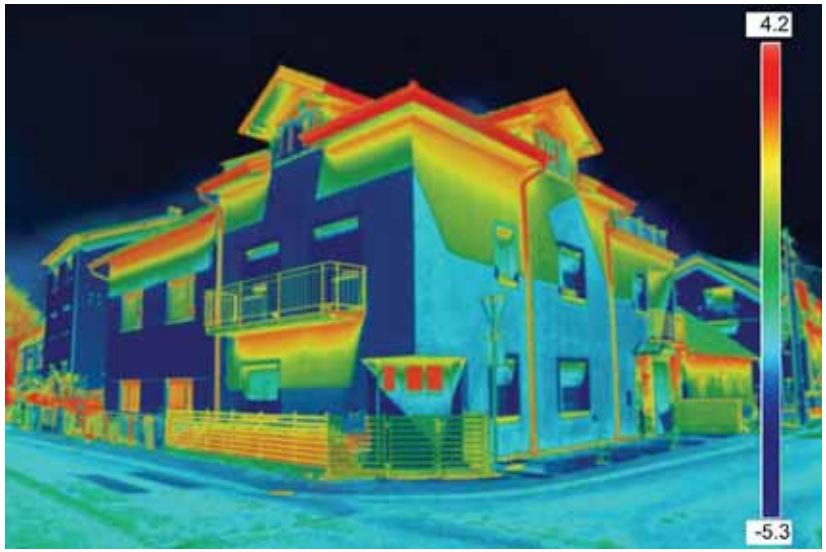
THE DARTDRONES TEAM

UNMANNED AIRCRAFT APPLICATIONS

AERIAL INSPECTIONS

AERIAL INSPECTIONS

- Safer and faster alternative to visual inspection by an individual
- Damage assessment
- Buildings, towers, utilities infrastructure, etc.
- Rotorcraft UAS are typically preferred
- Visual, thermal, multispectral, or other cameras/sensors utilized



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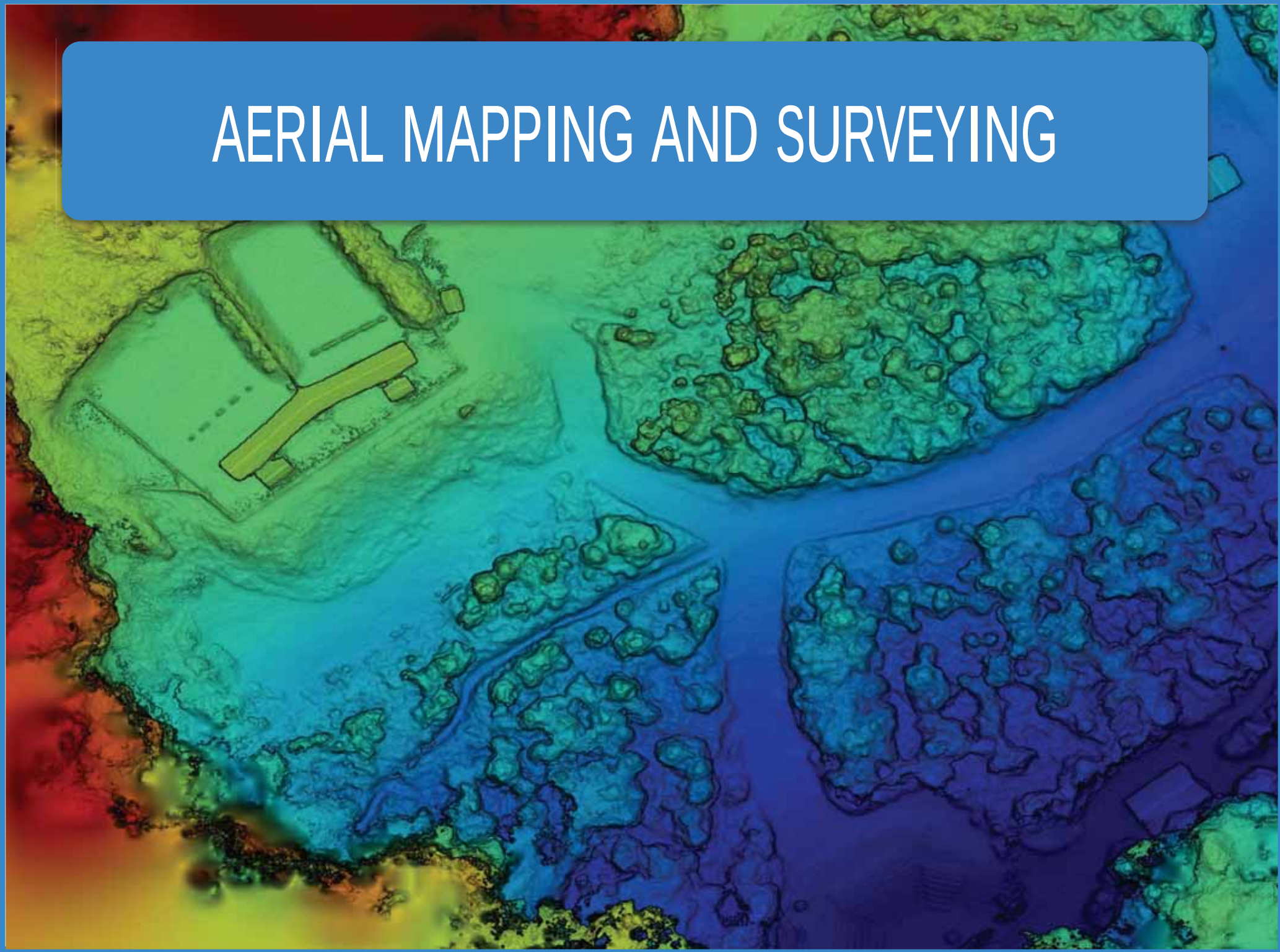
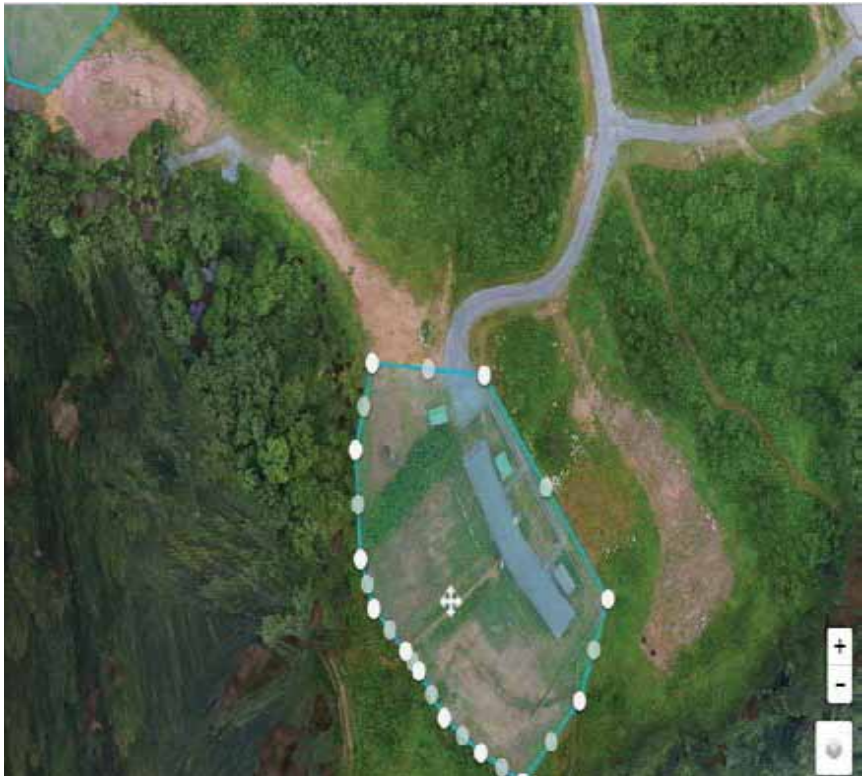
AERIAL MAPPING AND SURVEYING



AERIAL MAPPING AND SURVEYING

- Photos captured by sUAS are processed using orthomosaic, photogrammetry software
- 3D modeling of structures and terrain also possible
- Have the potential to generate GIS Survey quality maps with 1cm accuracy
- Visual, IR, LiDAR and other imaging solutions



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THE FEDERAL AVIATION ADMINISTRATION

- Responsible for all aircraft in the National Airspace System (NAS)
- Tasked with creating laws for drones

PART 107 REGULATIONS

- The FAA's first UAS rule
- Covers:
  - Operational Limitations
  - Operator Certificate
  - Operator Responsibilities
  - Aircraft Requirements

OPERATOR CERTIFICATION AND RESPONSIBILITIES

- Obtain an Pilot Certificate with a sUAS rating
- Pass Aeronautical Knowledge Test: Every 24 months
- Vetted by the TSA
- Aircraft must be registered

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OPERATIONAL LIMITS

- Maximum Altitude: 400 feet
- Aircraft Under 55 lbs
- Maintain Visual Line of Sight
- Daylight Operations Only
- No flying over the public
- Class B, C, D, and E Airspace requires specific authorization
- Visual Observer may not be required

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WHERE DO WE START?

TRAINING AND PILOT CERTIFICATION

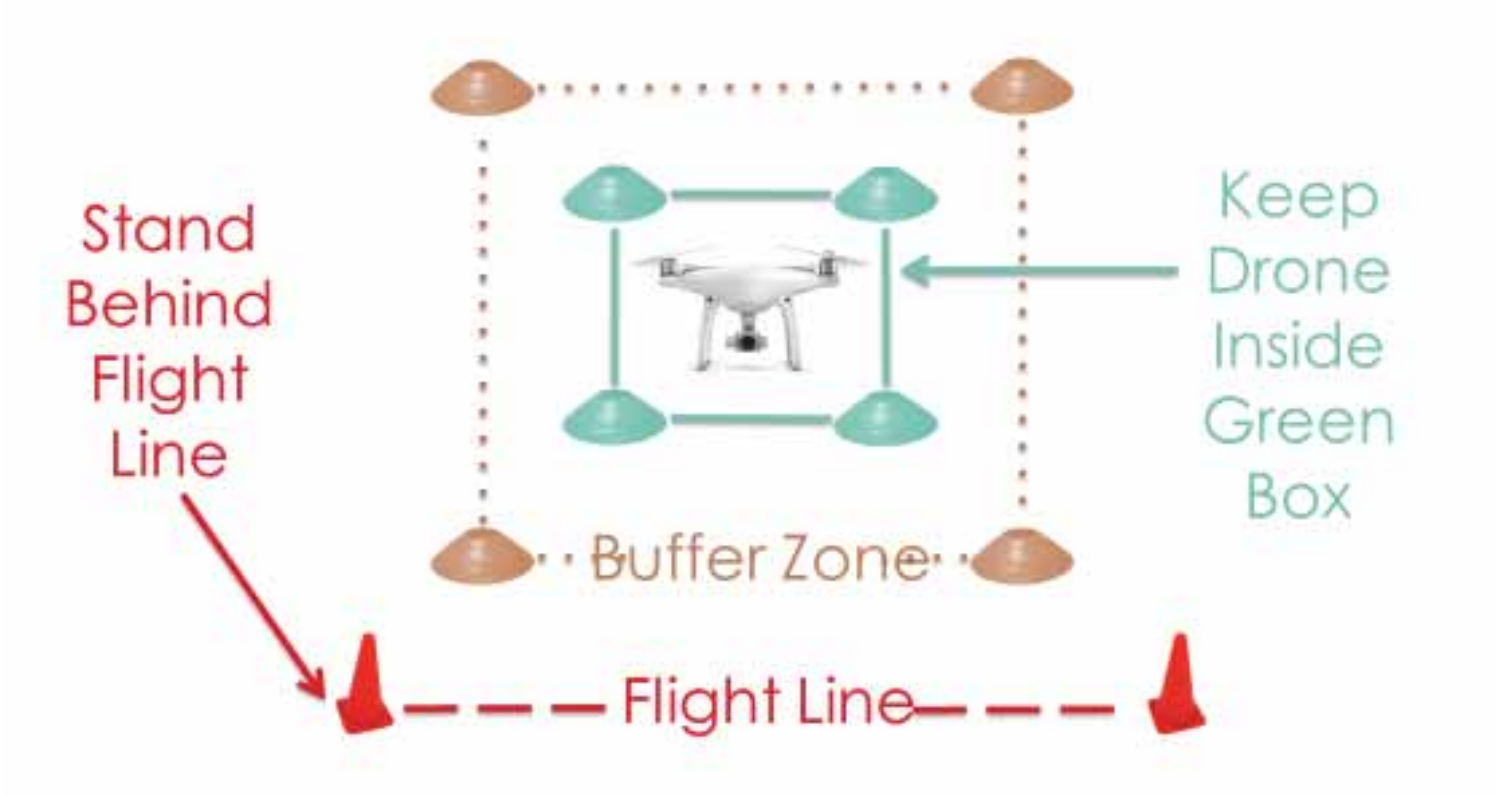
FAA CERTIFICATION

AERONAUTICAL KNOWLEDGE REQUIREMENTS

- sUAS Regulations
- Airspace
- Flight Restriction
- Chart Study
- Airport Operations
- Radio Communications
- Aviation Weather
- Maintenance and Procedures
- Crew Resource Management
- sUAS Loading and Performance
- Hazards and Emergencies
- Aviation Physiology

BASIC sUAS FLIGHT TRAINING

FUNDAMENTAL sUAS PILOT SKILLS



FPV FLIGHT/COMMAND AND CONTROL SOFTWARE

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AUTONOMOUS FLIGHT MODES AND EMERGENCY PROCEDURES

- Allows for semi and fully autonomous control of the aircraft
- Data from the aircraft's positioning and navigation sensors used to calculate autonomous control
- Can reduce workload, simplify complex maneuvers and increase accuracy and efficiency in data collection

sUAS PLATFORMS AND PAYLOADS

MULTIROTOR sUAS AIRFRAMES

- Similar to helicopter in function
- “Quad” = 4 Props, “Octo” = 8 Props, Etc.
- Ideal for Aerial Inspection Operations

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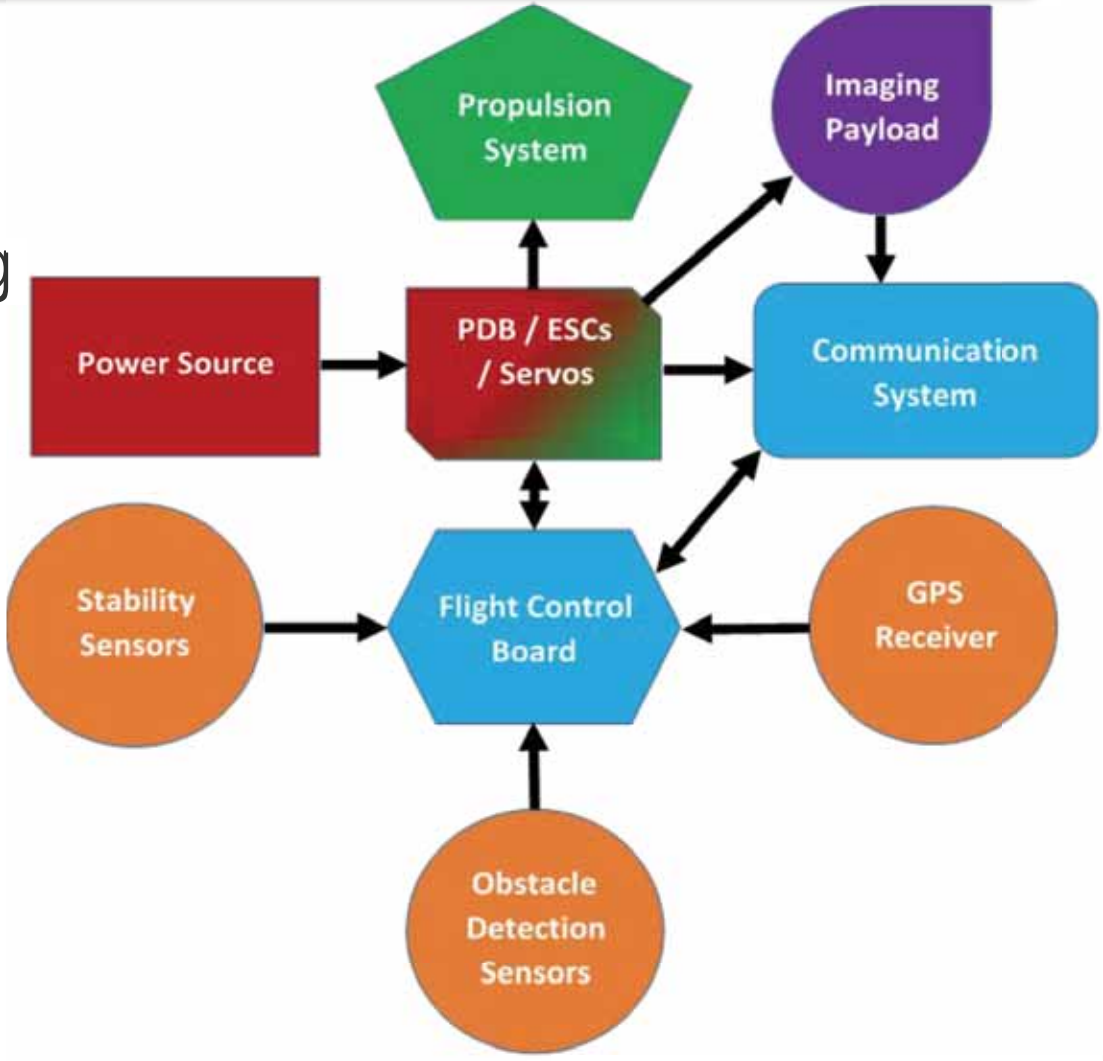
COMMON UAS ARCHITECTURE

- Power System
- Propulsion and Maneuvering System
- Data Gathering Payload
- Positioning and Navigation System
- Command and Control System



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DATA CAPTURE TOOLS

Cameras:

- Visual Imaging: 4K – 5.2K Cinema Quality Video, 10MP - 20MP Photos
- Thermal / IR Imaging: Various Capabilities

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POWER SYSTEM

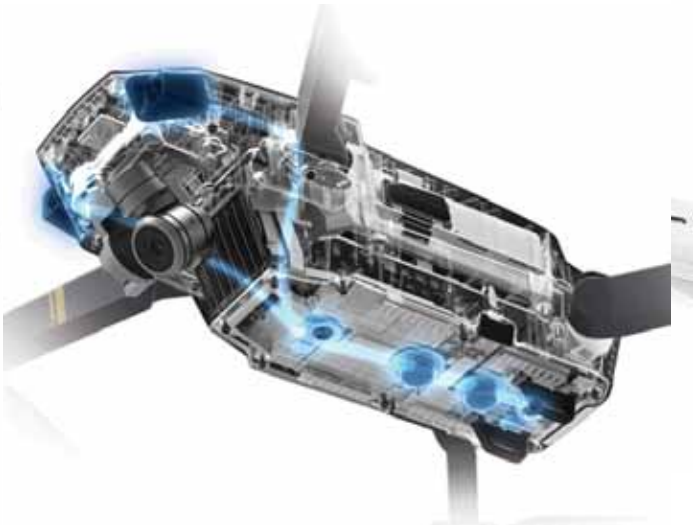
Batteries:

- Multicopter: 20 – 45 minutes is typical
- Fixed-Wing: 30 – 90 minutes is typical
- Multiple Batteries/Multi-Charger is recommended for commercial use

POSITIONING AND NAVIGATION SYSTEM

Vision Positioning:

- Keeps aircraft steady indoors or when GPS satellites can't be acquired.
- Accuracy may be degraded over solid color surfaces, soft ground, or water.



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POSITIONING AND NAVIGATION SYSTEM

Obstacle Detection:

- Monocular cameras & image recognition software detect objects, distance, and movement
- Infrared Sensors map the immediate vicinity to enhance flight accuracy (P4 Pro)


USE CASE OVERVIEW: AERIAL INSPECTIONS

STRUCTURAL INSPECTIONS

- Access hard to reach or hazardous areas
- Identify items of concern quickly and easily
- Respond quickly to assess damage after severe weather
- Save thousands by conducted preventative, as opposed to reactive repairs

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STRUCTURAL INSPECTIONS

- Utilize sUAS fitted with optical cameras and/or thermal imaging equipment
- New FAA regulations allow for the use of sUAS to survey and inspect structures of any size/height without special approval

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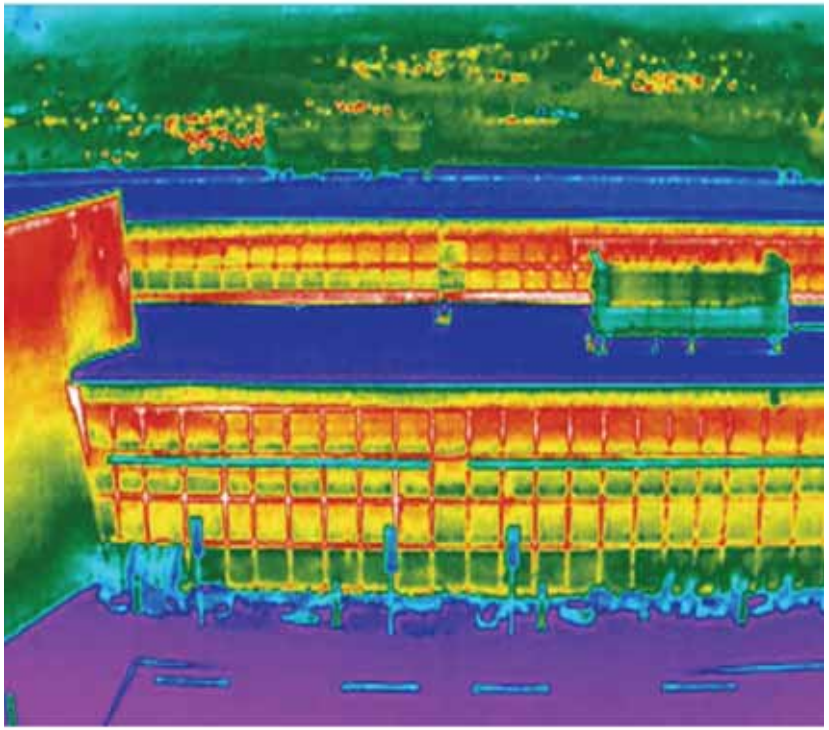
MULTISPECTRAL IMAGING

- Identify areas of energy loss
- Analyze material composition
- Locate hidden areas of water damage
- Gather environmental data



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CHECKLIST

- Check Legality and Safety of Flight Location
- Understand Your Goal
- Plan the Flight
- Review Site and Edit List of “Focus Areas/Points”
- Choose Camera Settings
- Capture the Shots
- Follow Your Formula
- Review Your Work

REVIEW SITE AND EDIT SHOT LIST

Hospital Heliport

Trees

Power Lines and Highway

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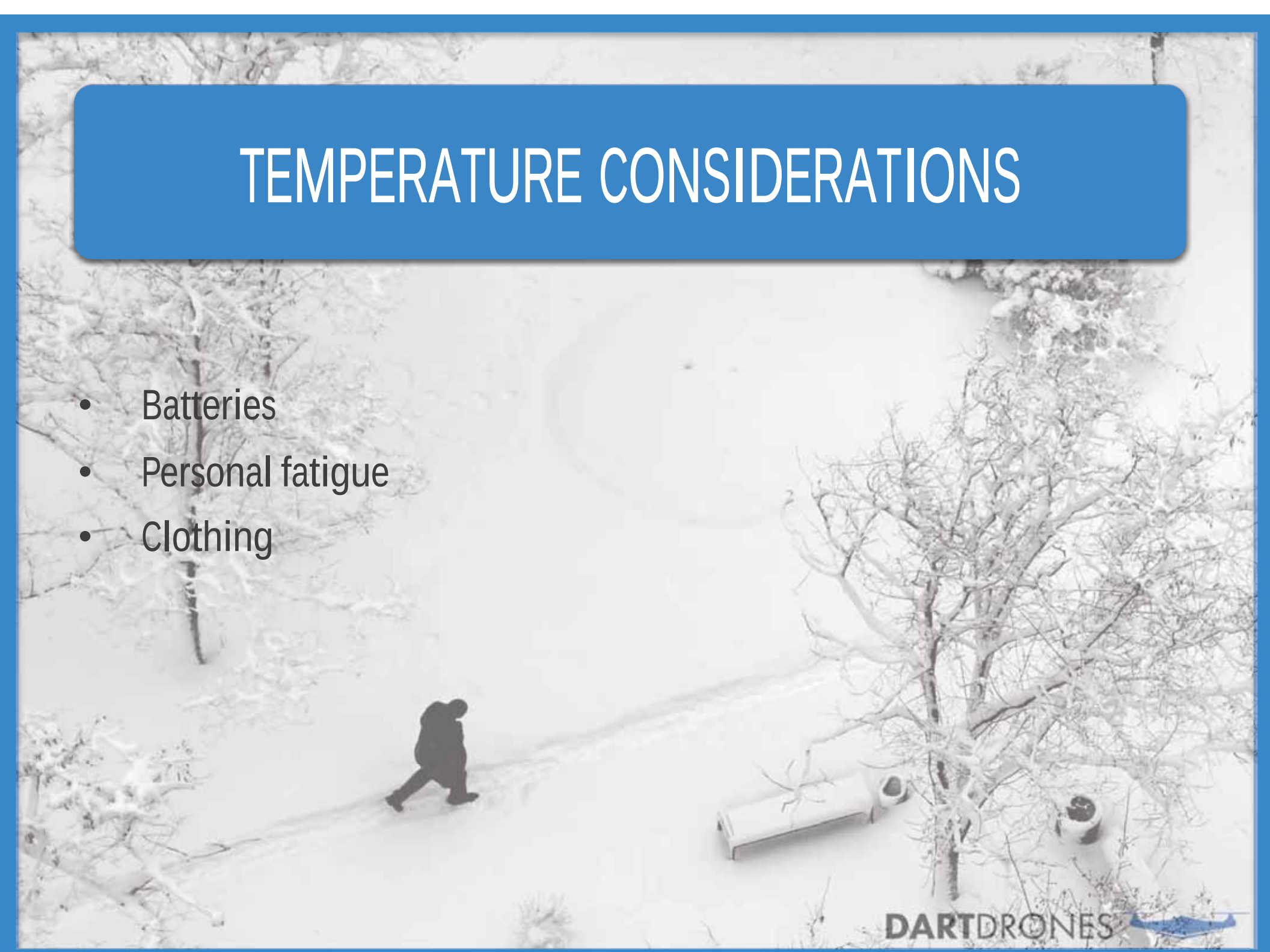
WINDY DAYS

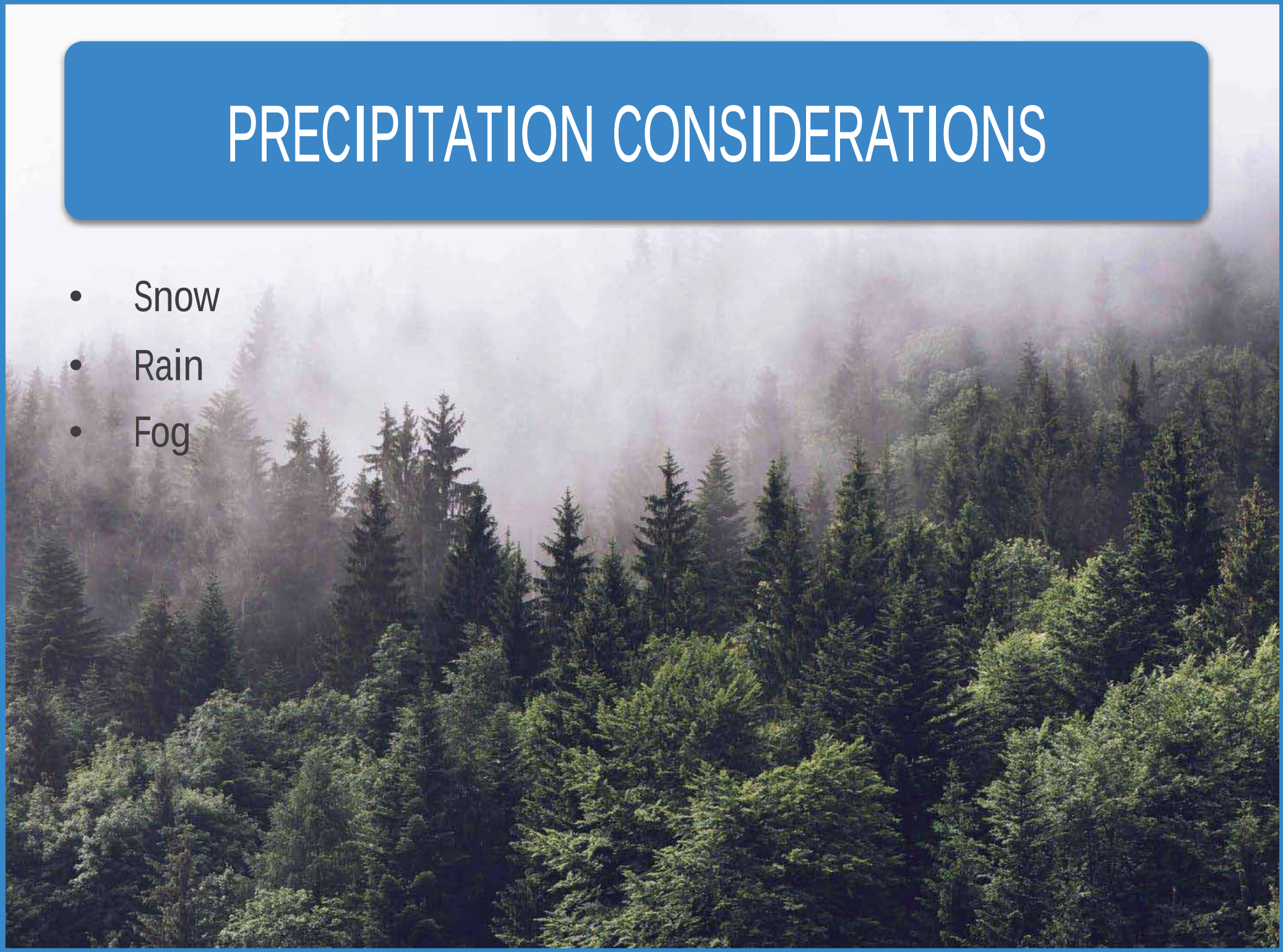
- Communicate weather limitations with your customer
- Gimbals
- Obstacle avoidance
- Battery life

TEMPERATURE CONSIDERATIONS

- Batteries
- Personal fatigue
- Clothing



PRECIPITATION CONSIDERATIONS



- Snow
- Rain
- Fog

SUNNY DAYS

- Shoot with the sun behind you
- Mid-day timing to reduce shadows is idea
- Adjust exposure values or utilize exposure bracketing to adequately capture areas of interest

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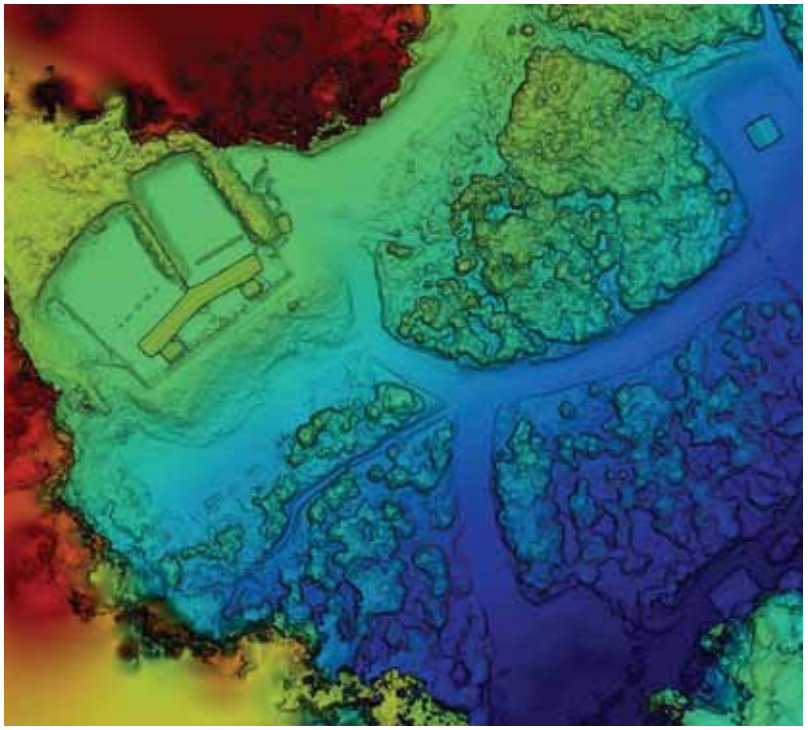
USE CASE OVERVIEW: sUAS MAPPING AND MODELING

PHOTOGRAMMETRY AND ORTHOMOSAICS

- Cost effective solution for a variety specific applications
- 2D or 3D site maps/models
- Orthomosaics can be further analyzed with software solutions to assess damage, generate measurements, and calculate project costs



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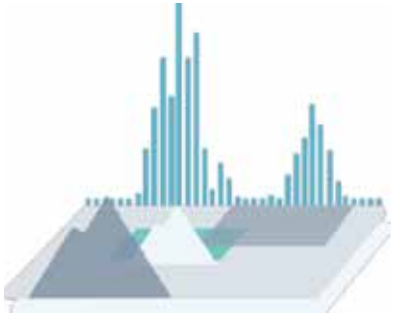
HOW IT WORKS

Fly

Process



Analyze

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AREA, DISTANCE, AND VOLUME CALCULATIONS

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STOCKPILE MANAGEMENT

STOCKPILE MANAGEMENT

- Monitoring sections that are too dangerous to have an employee inspect
- Monitoring the growth/use
- Checking areas that have a risk of hazardous materials
- Mapping changes in overall inventory

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3D MODEL GENERATION AND EXPORT

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EXPORTABLE FILES – CAD SOFTWARE COMPATIBLE

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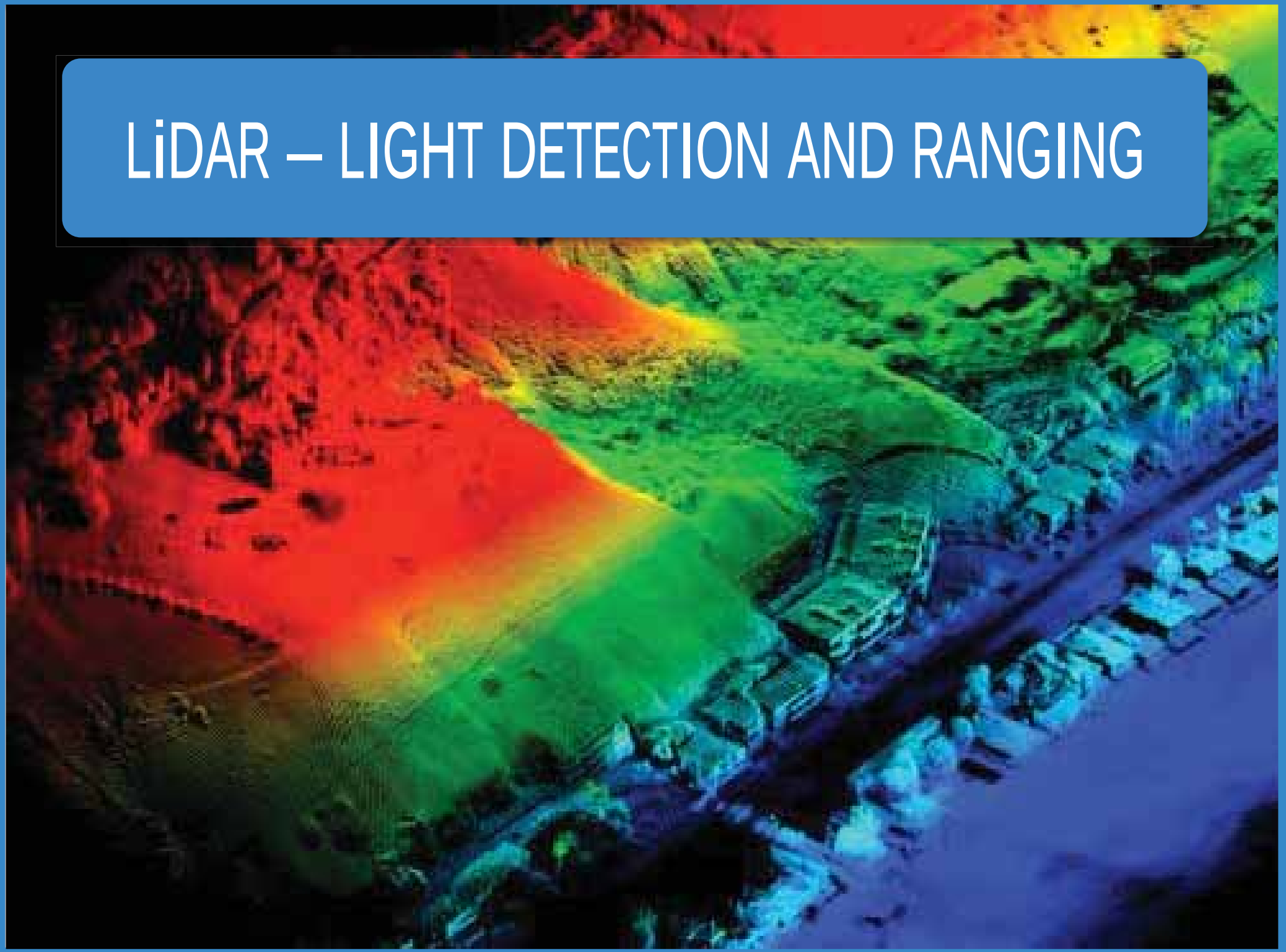
LiDAR – LIGHT DETECTION AND RANGING



LiDAR FOR MAPPING AND MODELING

- Utilize laser array to range distance to terrain/objects and “map” the results
- Extremely accurate elevation and shape profiles (mm accuracy)
- Highly effective for detailed inspections of utilities/communication infrastructure when used for 3D modeling

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ADVANCED SCENARIO-BASED FLIGHT TRAINING

sUAS SYSTEM SPECIFIC TRAINING

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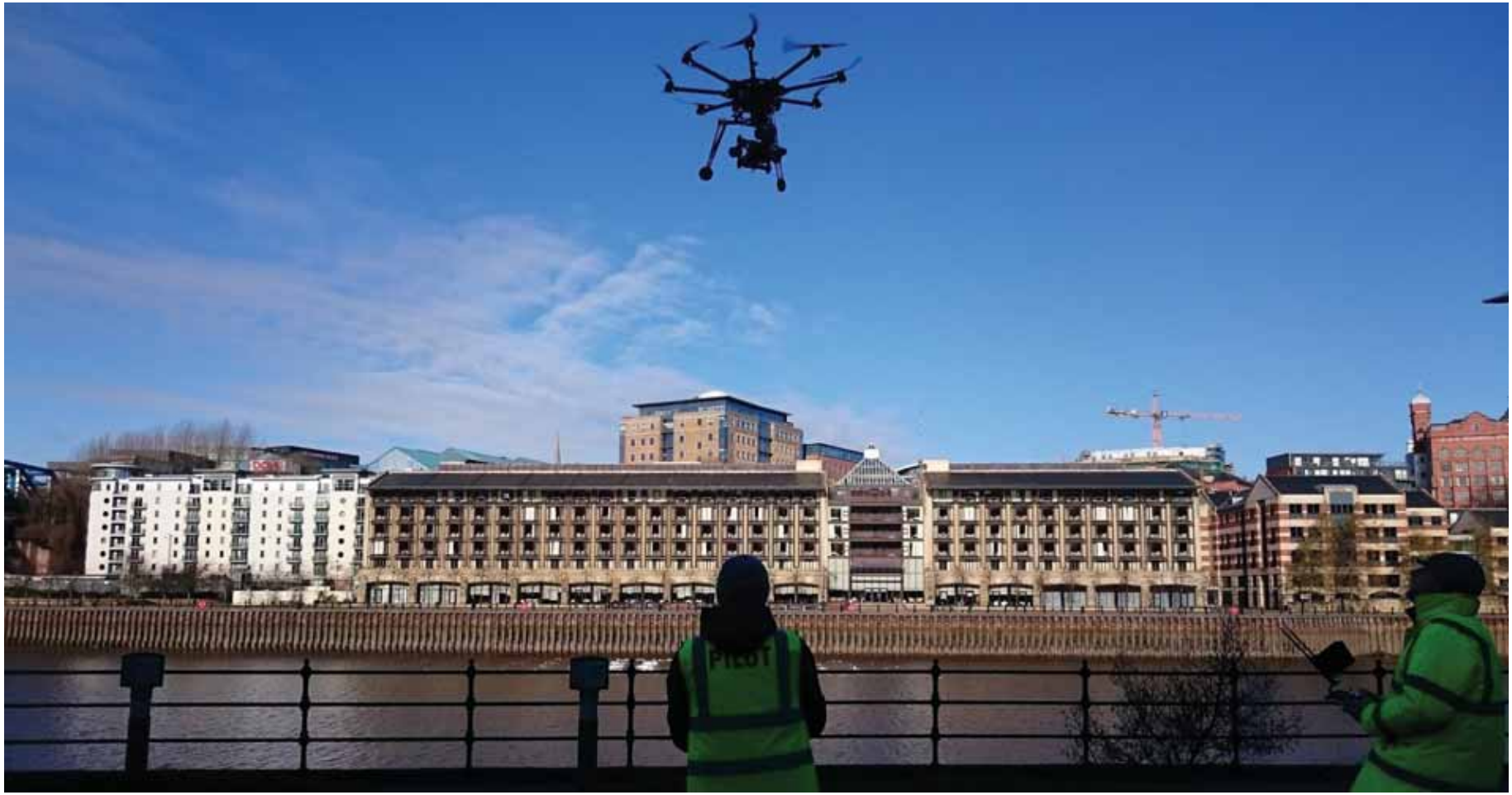
ALL TRAINING FLIGHTS CONDUCTED
“ON LOCATION”

TRAINING CENTERED ON YOUR S.O.P.



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CONTINUED SUPPORT: SCALING YOUR sUAS OPERATIONS

OUR CURRENT COURSES

Open Enrollment

Basic Flight Training

Part 107 Test Prep

Online

Drones for Beginners

Starting a Drone Business

Aerial Photography

Workshops

Aerial Mapping & Modeling

Aerial Roof Inspections

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OTHER OFFERED SERVICES

Custom Team Training

Flight Training

Part 107 Prep

Mission Specific Training

Consulting

Drone Program Launch Guide

SOP Development

Program Manager Guide

Equipment Procurement

After Course Support

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DARTDRONES DIRECTOR OF TRAINING

Amelia Owre is a former Navy helicopter pilot who flew the SH-60F, HH-60H and MH-60S prior to transitioning to unmanned systems. She spent 5 years developing curriculum and implementing training for the Navy's MQ-8 Fire Scout UAS, and continues to instruct UAS operators as a current Naval reservist. She is a graduate of the U.S. Naval Academy and holds an M.S. in Environmental Science, a Commercial Pilot Certificate with fixed wing, helicopter and instrument ratings, and a Remote Pilot Certificate. Amelia focuses on developing new curriculum for DARTdrones and coordinating our subject matter experts.

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Michael Bush

CFI & Lifelong Educator

Michael Martin

Avid drone photographer

Michael Uleski

Sergeant Daytona Beach Police

Paul Matheson

Commercial Helicopter Pilot

Joel Martin

Commercial Certification

Rick Mills

U.S. Military Academy Professor

Eduardo Voloch

Army National Guard Signal Officer

Jason Miller

Instrument Rated Pilot

Bob Wess

Commercial Pilot and CFI

Keith Phillips

Blackhawk Helicopter Pilot and FAA CFII

Tod Strickland

Navy Nuclear Weapons Technician

Kent Chivers

Navy Veteran

Robert Patterson

CFI and Mission Pilot for Civil Air Patrol

Robert Beck

Experimental Aircraft Pilot and Engineer

Craig Trammell

CFI / CFII & ATP Rated Aviator

Becky Hagner

Former Military Pilot

Ryan Walker

Marine Combat Instructor and Pilot

Sergio Gemoets

Private Pilot and Photographer

Jimmy Burkhart

Helicopter Pilot and CFI

Colin Romberger

Embry Riddle Masters in UAS

Bob Warfel

Commercial and ATP Rated Pilot

Josh Haddad

Helicopter Pilot and CFI

Chris Grazioso

FEMA Search and Rescue Team

Christina Martinez

CFII and Commercial Pilot

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