VIGILANT AEROSPACE SYSTEMS™

CENTRAL ROLE OF SAFETY SYSTEMS IN DRONEPORT DEVELOPMENT

SOLVING THE AIRSPACE MANAGEMENT PROBLEM

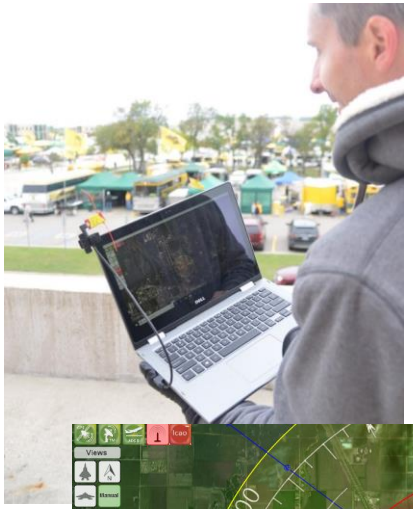
DRONEPORT Network

Agenda

- **Quick Intro to Vigilant Aerospace**
  - Who is Vigilant Aerospace and what is FlightHorizon?
- **Purpose**
  - The basic questions about safety at a droneport
  - What must a safety system accomplish
  - The sources of our recommendations
- **Droneport Step-by-Step: The Story of Wiseville**
- **FlightHorizon COMMANDER Overview**
  - Droneport Operations Development Process
  - Next Steps

Intro to Vigilant Aerospace

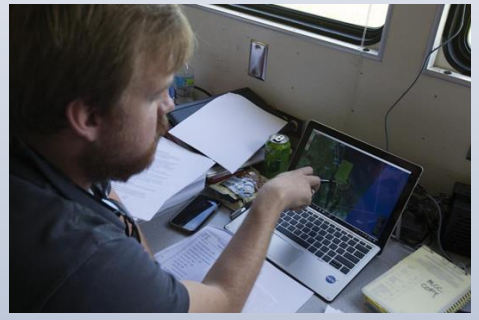
- **Safety systems for droneports and individual pilots of both unmanned and manned aircraft**
- **FlightHorizon COMMANDER software integrated to hardware**
- **Automatic avoidance system exclusively licensed from NASA**
- **Projects:**
  - NASA manned and unmanned, NASA UTM
  - FAA IPP in N. Dakota and Alaska
  - Humanitarian-Drones.org for FEMA at Hurricane Harvey
  - OSU BVLOS 13-mile COA
  - ASTM F38



Product Versions

FlightHorizon GCS™

FlightHorizon PILOT™



FlightHorizon COMMANDER™

The Basic Questions

- What do I need to think about to enable BVLOS flights from my new droneport?
- Who are the fliers? What industry are we serving? How do we enable our customers?
- What does safety mean for us? What will it mean to the FAA in our context?
- What risks do I need to mitigate and what problems do I need to solve?
- What is a good, step-by-step plan for my droneport to get this done?

What does my safety system need to accomplish?

- Risk Mitigation
- Situational Awareness
- Ownship Status
- Detect-and-Avoid – Well Clear
- Demonstrate Safe Operation
- Demonstrate Regulatory Compliance
- Demonstrate Waiver Compliance

"Vigilance shall be maintained by each person operating an aircraft so as to see and avoid other aircraft."

- 14 CFR 91.113(b)

Where do these recommendations come from?

- **Part 107, Part 135, Part 91**
- **Existing Part 107.31 waivers**
- **Operation of LAANC**
- **SC-228 MOPS Phase I and II**
- **FAA Integration Pilot Program Teams**
- **FAA Remote ID (proposed)**
- **SARP Well-Clear & JARUS Airspace Risk**
- **FAA ASSURE A18**
- **NASA UTM Working Groups – SAA&C2**
- **ASTM F38**
  - BVLOS Standard
  - UTM Standard
  - DAA Performance Standard
  - DAA Testing Standard
  - Flights Over People Standard
  - Command and Control Standard - C2
  - Certifiable Aircraft Standard

ASTM INTERNATIONAL
Standards Worldwide

NASA

FEDERAL AVIATION ADMINISTRATION

The FAA's Center of Excellence for UAS Research
ASSURE
Alliance for System Safety of UAS through Research Excellence

THE STORY OF WISEVILLE'S DRONEPORT

SOLVING THE AIRSPACE MANAGEMENT PROBLEM

Part 1: The Story of Wiseville - The Initiative

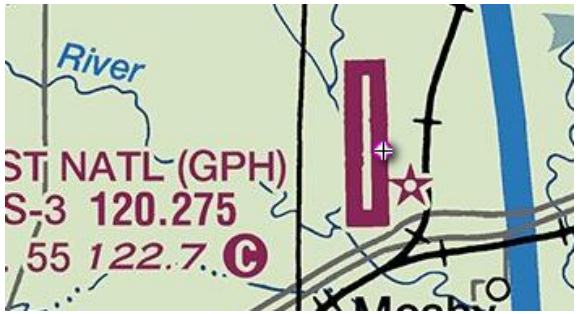
- **Decides to explore a local droneport**
- **Currently un-used county-owned runway & hanger**
  - Rural property, low population density, low aircraft density
- **Potential Industries**
  - Several ranches, major oilfield within 10 miles, 30 and 60 miles
- **Raises money to improve the facilities**
- **Shared Resources – Lower Costs, Lower Risks**

Part 2: The Story of Wiseville - The Industries

- Outreach to industry
- 2 on-site service providers and 1 corporate operator
- 2 agricultural survey specialist providers with small multi-rotors & FLIR
- 1 oil and gas production company with small fixed-wing & multi-spectral
- Needs BVLOS to reach major customers initially within 10 miles

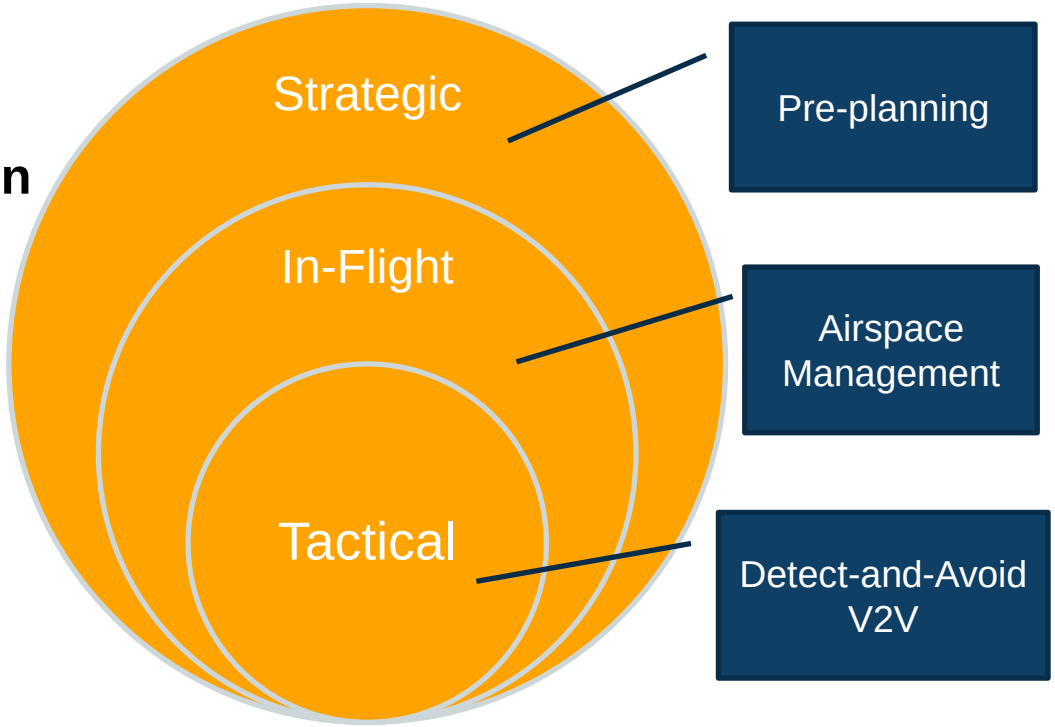
Part 3: The Story of Wiseville – The Analysis

- **Class G airspace, uncontrolled, fly under Part 107**
  - If near an airport, use LAANC or special COA
  - If at an airport, establish MOU and use LAANC, special COA, Part 135
- **JARUS Airspace Risk Classification – Air traffic**
- **DAA and Well-Clear Requirements – FAA requirements**
- **Primary and nearby airspaces – Other airports**
- **Shared droneport assets and airspace safety system**
- **Fly BVLOS up to 10 miles, then up to 30 and 60 miles**



Part 4: The Story of Wiseville – The Plan

- **Establish the "ConOp" and "SOP"**
- **Strategic Risk mitigation**
  - Where, When and How you fly
- **Procedural Risk Mitigation**
  - Aircraft maintenance plan
  - Pre-flight checks
  - Safety system checks
  - Training plan
  - Communications plan
  - Incident plan
  - Flight logging
  - Airspace logging
- **Tactical Risk Mitigation**
  - Airspace management
  - Situational awareness
  - DAA / SAA
  - Future UTM integration

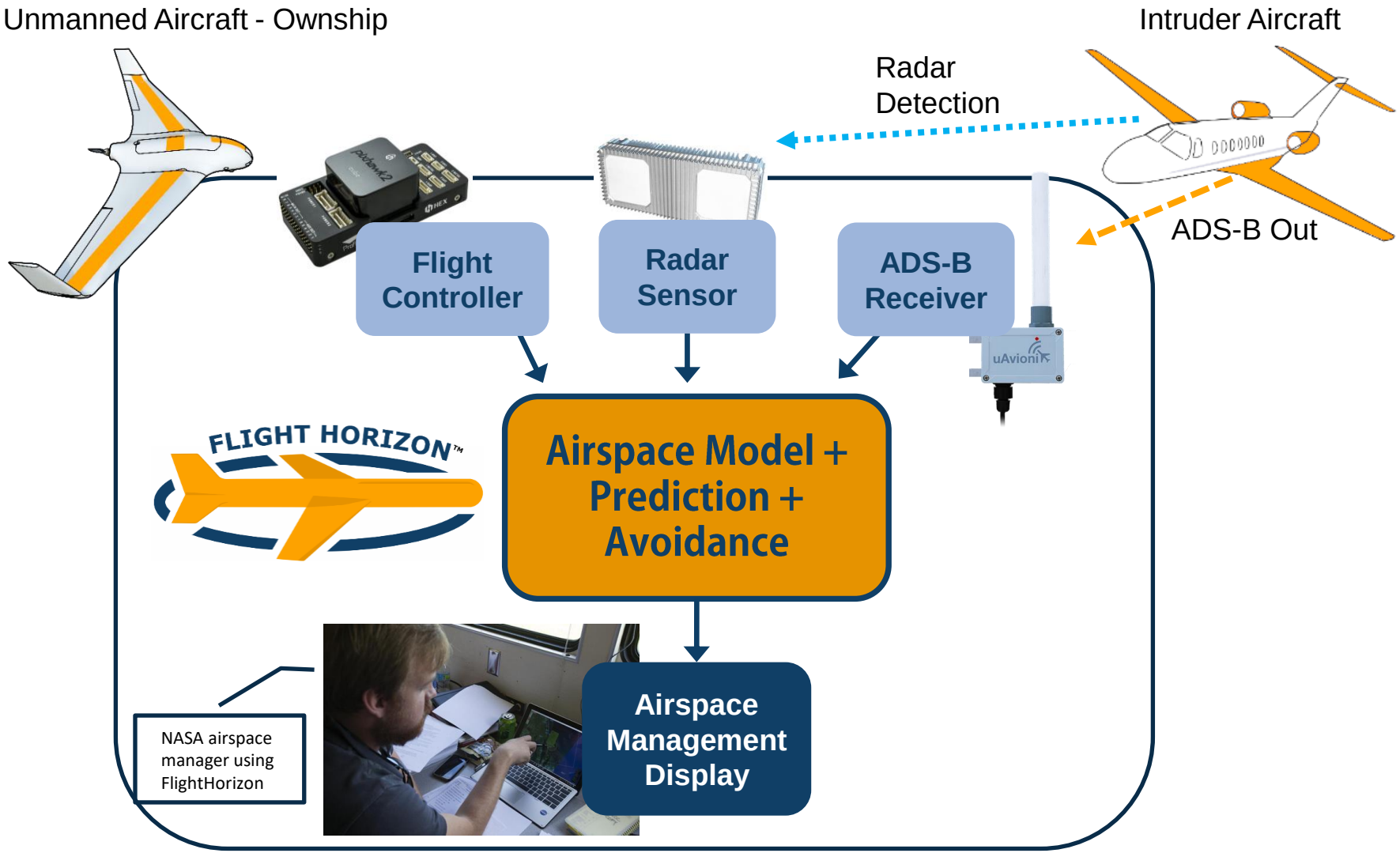


Portions of this section are derived from ICAO Doc. 9854, *Global Air Traffic Management Operational Concept*

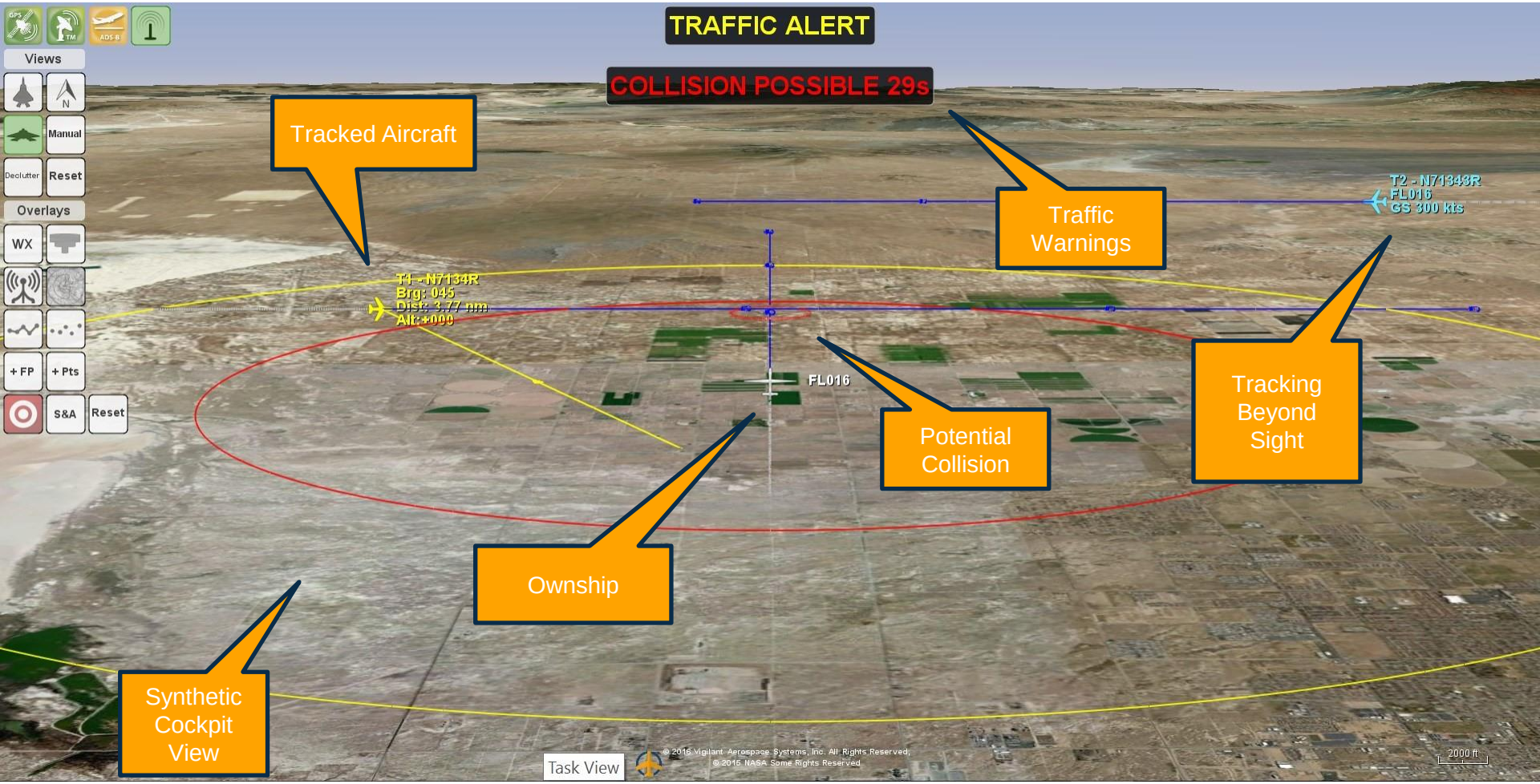
Part 5: The Story of Wiseville – The Solution

- **Install the safety system**
  - Airspace management for situational awareness
  - Self-contained unmanned traffic management (UTM)
  - Strategic De-Confliction
  - Tactical De-Confliction
  - See-and-Avoid / Detect-and-Avoid

Part 6: The Story of Wiseville – The Technology



FlightHorizon User Interface



Part 7: The Story of Wiseville - Enablement

- **Crawl / Walk / Run**
- **Fly VLOS under the SOP and document it**
- **Apply for Waiver**
  - Select the most likely candidate – public, private
  - 14 CFR § 107.31 - Visual line of sight aircraft operation
  - Apply and respond to questions

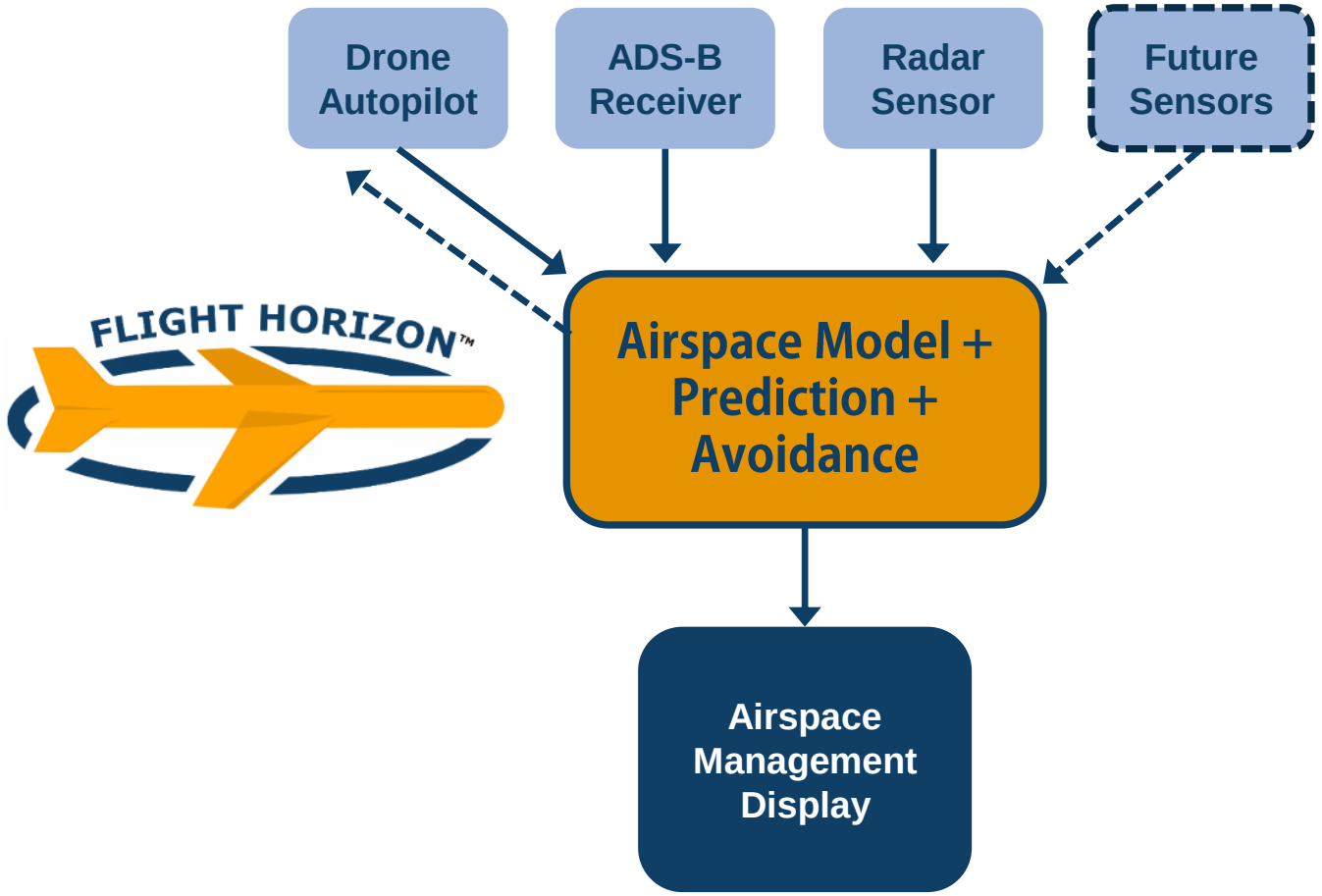
- **Receive the Waiver – BVLOS with VO**
- **Fly with VO and document it**
  - Operate with a VO along route and at point of operation
  - Utilize system to track the UAS and all other aircraft
  - Document flights with airspace log and journal

- **Re-apply for non-VO waiver**
  - Graduate to radar-based BVLOS
- **Attract New Operators**
  - Specialist service providers

QUICK INTRODUCTION TO FLIGHTHORIZON

SOLVING THE AIRSPACE MANAGEMENT PROBLEM

FlightHorizon COMMANDER System



What is FlightHorizon COMMANDER?

NASA airspace managers using FlightHorizon

- Airspace management system
- Turn-key, Single subscription
- Single point of contact
- Both cooperative and non-cooperative aircraft tracking
- Tracking, alerts, warnings
- Active “Detect-and-Avoid”
- Built-in “ConOp”
- Avoid complexity, integration costs and risks
- Upgrade to future sensors and data
- FAA requirements for BVLOS COA & waiver

Consulting Services

- **Systems Integration**
  - HW & SW integration
  - Sensors integration
- **System Installation**
  - Software install and configuration
  - Hardware install and configuration
- **Testing & Test Flights**
  - Test plan
  - Equipment & aircraft
  - Full logging and documentation
- **Regulatory Consulting**
  - FAA Compliance
  - Beyond Line-of-Sight Waivers & COAs
  - Risk mitigation advisory

Droneport Operations Development

1. **Execute operating agreement with the airport to accommodate unmanned aircraft**
2. **Install safety systems including FlightHorizon COMMANDER and related equipment**
3. **Conduct visual line-of-sight flight testing and document the safety systems**
4. **Draft standard operating procedures manual for submission with waiver or Certificate of Authorization (COA) applications**
5. **Apply to FAA for waivers or COAs for beyond visual line-of-sight flight, as needed**
6. **Write up final standard operating procedures manual based on waiver or COA compliance**
7. **Conduct training using the standard operating procedures in the use of the safety systems and in compliance with any waiver or COA**
8. **Commence droneport operations**

Next Steps

FLIGHT HORIZON™

VIGILANT AEROSPACE SYSTEMS™

- **Contact:**
  - sales@VigilantAerospace.com
    - Tel: (405) 445-7224
    - Tel: 1 (844) SafeSky (844.723.3759)
  - www.VigilantAerospace.com

- **Available upon request:**
  - Subscription Quotes
  - Integration Plans
  - Project Proposals