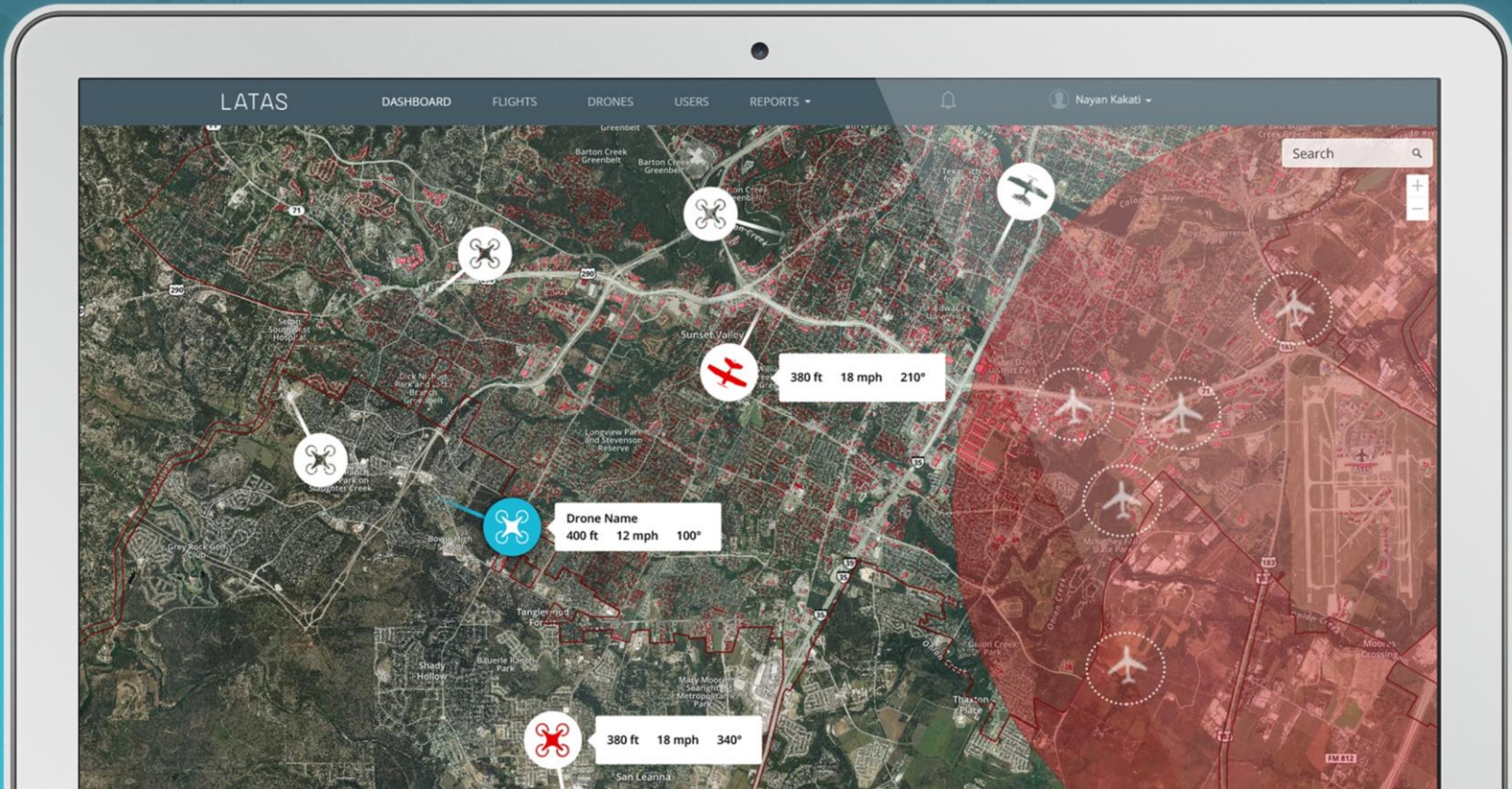


# LATAS

By:  **PRECISION HAWK**

Enabling Beyond Visual Line of Sight



# Our Goals



- 1 Reduce risk of drone operations
- 2 Enable advanced operations such as BVLOS and package delivery through technology
- 3 Build “backbone” datasets and technologies that will enable UTM in the future

# Mitigating Risk - LATAS

## Data

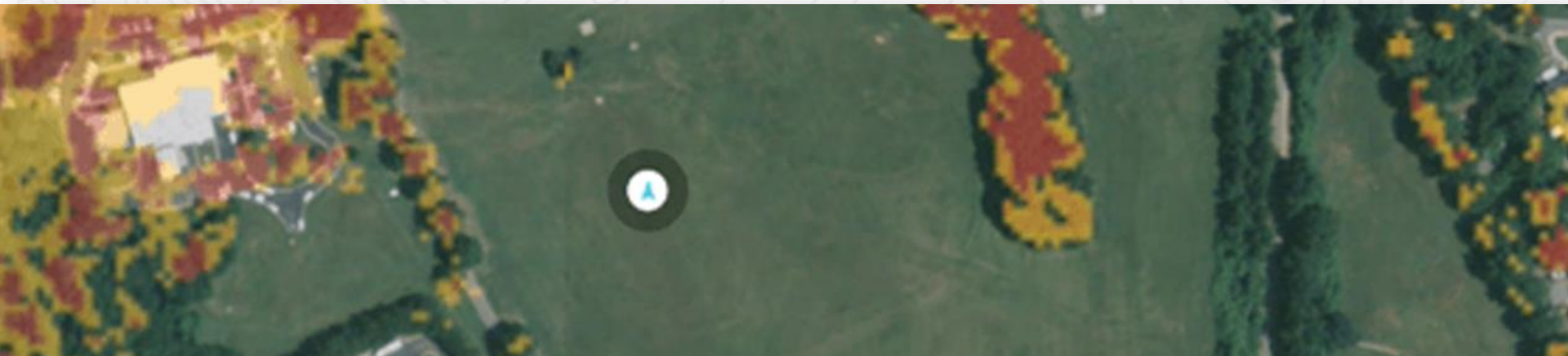
- 3D Obstacle Maps
  - Buildings
  - Trees
  - Terrain
- Manned Aircraft
  - Radar / ADS-b
  - UAS
- Surveillance
- Airspace
- Cellular Coverage

## Infrastructure

- Cloud services
- Cellular
- Security
- Bandwidth considerations

## Services

- Registration
- Tracking
- Reporting
- Flight planning
- Flight authorization
- Operator validation



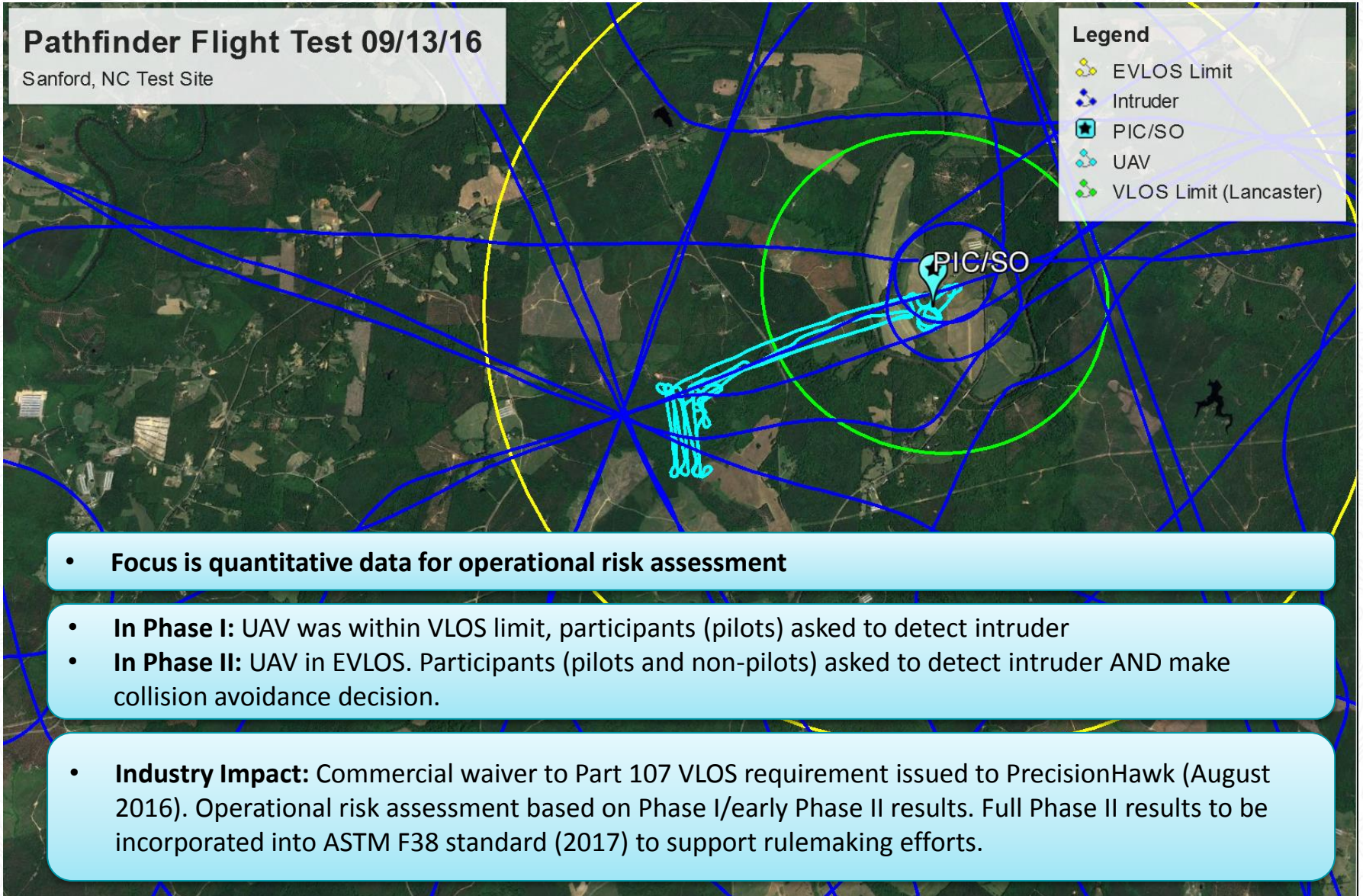
# 2015-2016: Phase I and II

## Pathfinder Flight Test 09/13/16

Sanford, NC Test Site

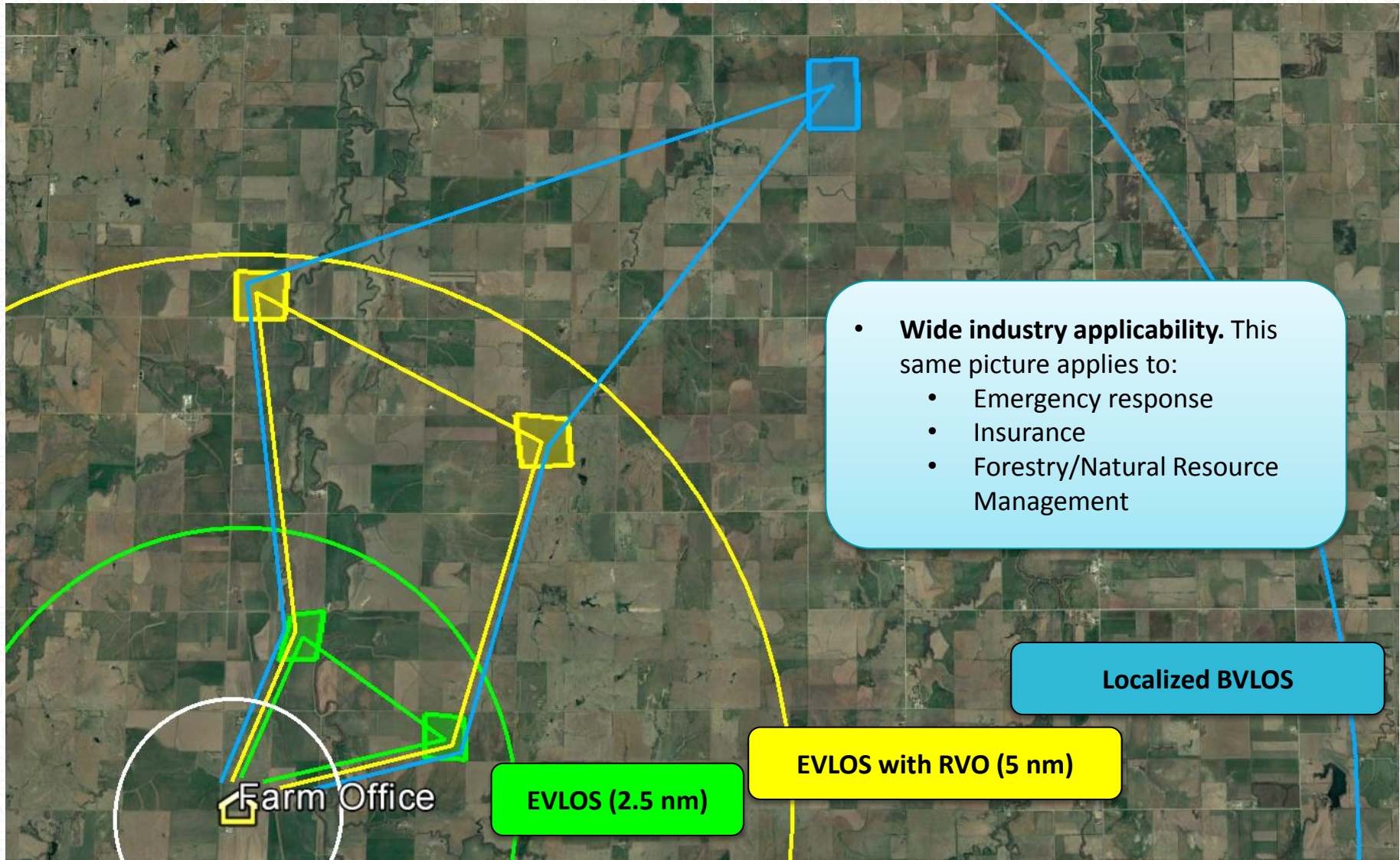
### Legend

- EVLOS Limit
- Intruder
- PIC/SO
- UAV
- VLOS Limit (Lancaster)



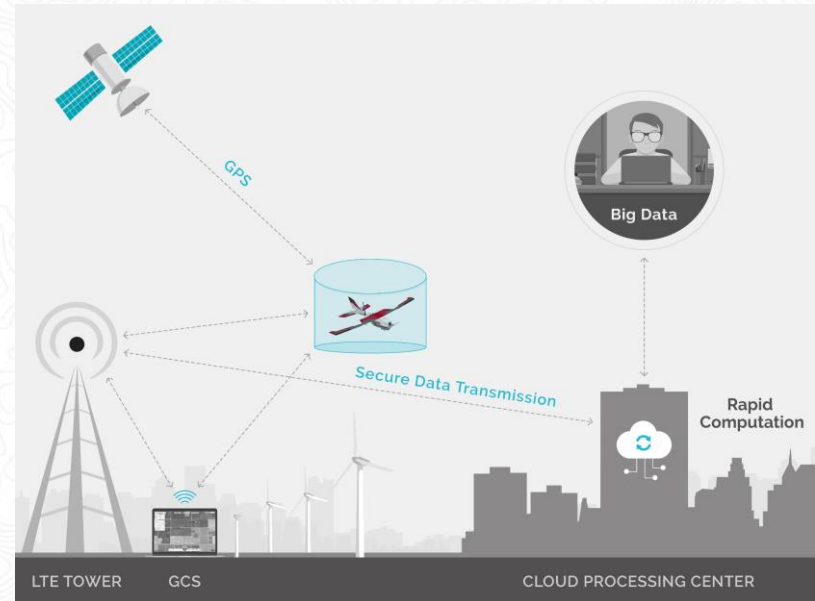
- **Focus is quantitative data for operational risk assessment**
- **In Phase I:** UAV was within VLOS limit, participants (pilots) asked to detect intruder
- **In Phase II:** UAV in EVLOS. Participants (pilots and non-pilots) asked to detect intruder AND make collision avoidance decision.
- **Industry Impact:** Commercial waiver to Part 107 VLOS requirement issued to PrecisionHawk (August 2016). Operational risk assessment based on Phase I/early Phase II results. Full Phase II results to be incorporated into ASTM F38 standard (2017) to support rulemaking efforts.

# 2017: Phase III



# 2017: Phase III

Drive creation of localized beyond visual line of sight concept of operations in Class G



## Current operations to understand risk:

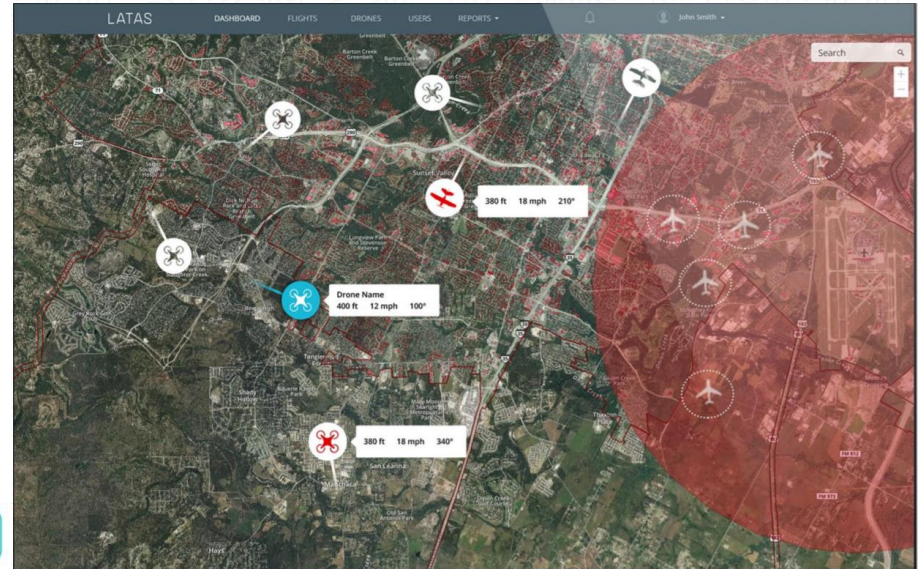
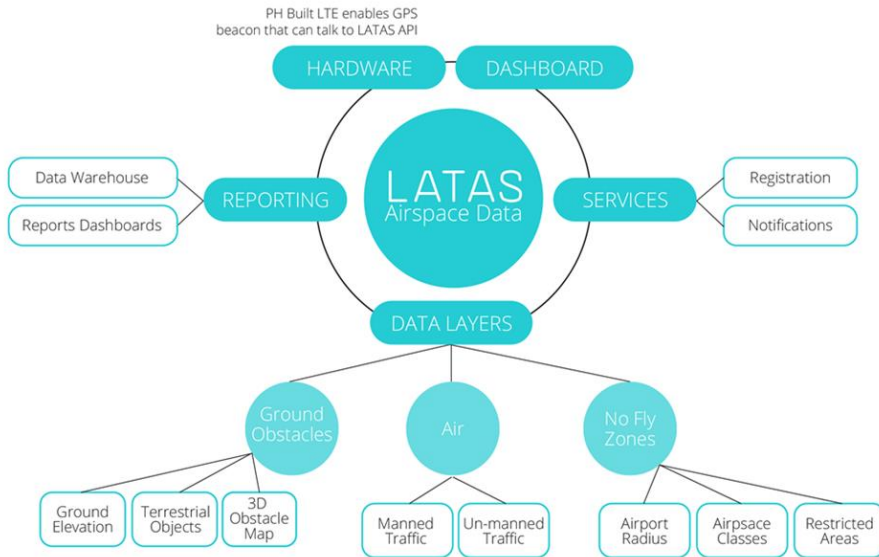
- Pathfinder, UAS test sites, ASSURE

## Towards operating on a National Level

- Shift focus from visual base case to technology assisted case

BUILD ON RESULTS TO DEFINE RISK PROFILE ON NATIONAL SCALE

# 2017: Phase III



- + PrecisionHawk has developed the LATAS platform, a combined set of geospatial, software, and hardware tools to facilitate safe UAS operation.
- + **Key Features:**
  - + Combines static & dynamic information into one system for display via the LATAS dashboard or third-party application
  - + Operates over cellular networks, transmitting telemetry either via LTE module or LATAS-enabled GCS
  - + Provides alerting/notification functionality

# Phase III Mission Statement

---

Evaluate the impact of assistive technology (i.e. LATAS) on operational risk associated with flight of sUAS in BVLOS applications in the NAS.

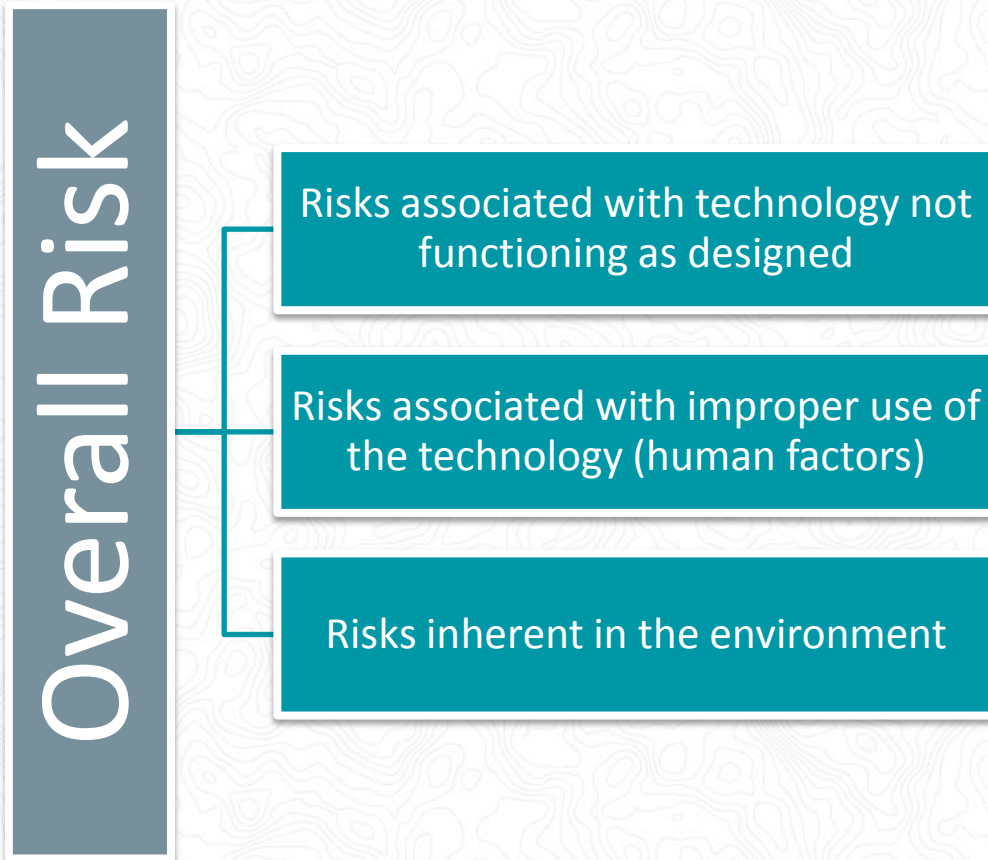
What does the technology need to do to achieve an acceptable level of safety?  
In what ways can it fail?  
How do we mitigate the risk of failure?

Quantitative answers to these questions provide regulators with the information they require to define an operational standard for rulemaking.



# Phase III Operational Risk Assessment

- Risks in the technology-assisted case can be loosely grouped into three categories:



- + Similarly to the ORA for the EVLOS case, we will ideally define a series of performance-based requirements ANY assistive technology would have to meet.
- + “Environmental” risk is related to conditions that feed into the risk model. For example:
  - + Low altitude traffic patterns
  - + Population density

# Phase III Operational Risk Assessment

- Risks associated with the technology not functioning as designed (software & hardware):

## Technology Risk

- + From a map of the process we can begin to itemize the potential hazards at each process step.
- + One specific set of hazards is related to GPS & cellular service at altitude:

Process Step	Hazard
<b>Transmit telemetry until operation complete</b>	<ul style="list-style-type: none"><li>i. Device experiences mechanical or electrical failure</li><li>ii. <u>GPS issues:</u> GPS service becomes unavailable or intermittently available during operation, invalid GPS string (improperly formed), incorrect GPS data (properly formed string)</li><li>iii. <u>Cellular issues:</u> No cellular service, poor cellular reception due to local conditions, intermittent connectivity due to LTE handover issues</li></ul>

- + Cellular service (and LTE in particular) is one of the bigger open questions:
  - + Lag?
  - + Intermittency?
  - + How much of either of these is acceptable?

# Phase III Operational Risk Assessment

The screenshot displays the LATAS web application interface. At the top, the navigation bar includes 'LATAS', 'DASHBOARD', 'FLIGHTS', 'DRONES', 'USERS', and 'REPORTS'. A user profile for 'KState Pathfinder' is visible on the right. The main map area shows a satellite view of a rural landscape with a river. A red drone icon is positioned at the top center of the map, with a white circle below it. Text next to the drone icon indicates a height of '+501'' and a distance of '1.6nm'. A search bar at the top right contains the text 'Type a location or zip code'. On the right side of the map, there is a vertical scale legend with markings for 400', 300', 200', 100', and 0'. At the bottom of the map, there are filter options: 'Recreational Airspace' (unchecked), 'Obstacles' (checked), 'Drone Tail' (checked), and 'Manned Aircraft' (unchecked). The bottom of the interface shows a Windows taskbar with open applications 'ChromeSetup.exe' and 'ntpcheck.py', and a 'Show all' button.

# Assessing the Workflow

May need to iterate on requirements!

- + A word of encouragement.....
  - + Lots of variables to assess means a wealth of industrial opportunity!
- + ...and of caution:
  - + We need to be mindful of making too many assumptions BEFORE assessing the risk



Cellular Infrastructure



Cellular Service



Telemetry



Display



Operator

# Thank You

---

Ally Ferguson – [a.ferguson@precisionhawk.com](mailto:a.ferguson@precisionhawk.com)

Tyler Collins – [t.collins@precisionhawk.com](mailto:t.collins@precisionhawk.com)

Juan Jimenez – [j.jimenez@precisionhawk.com](mailto:j.jimenez@precisionhawk.com)

