Unmanned Aircraft System (UAS) Overview

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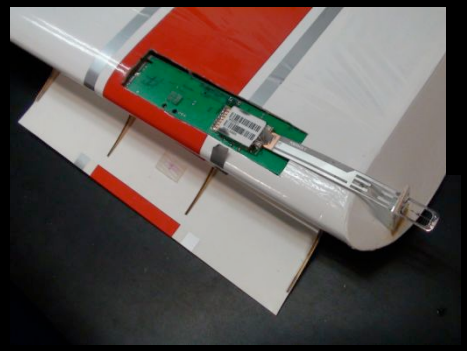
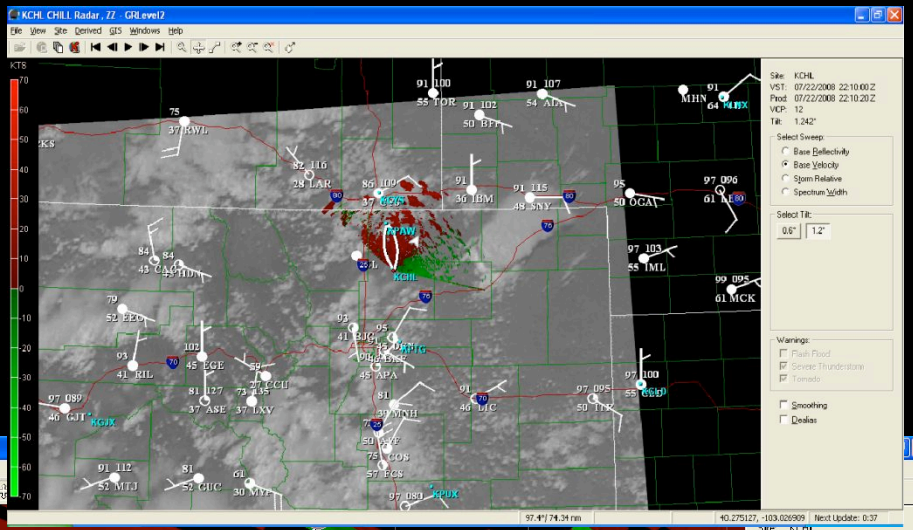
Instrument Description

NCAR MIST Sonde

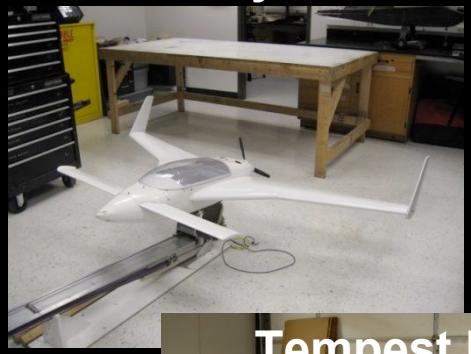


NexStar UA

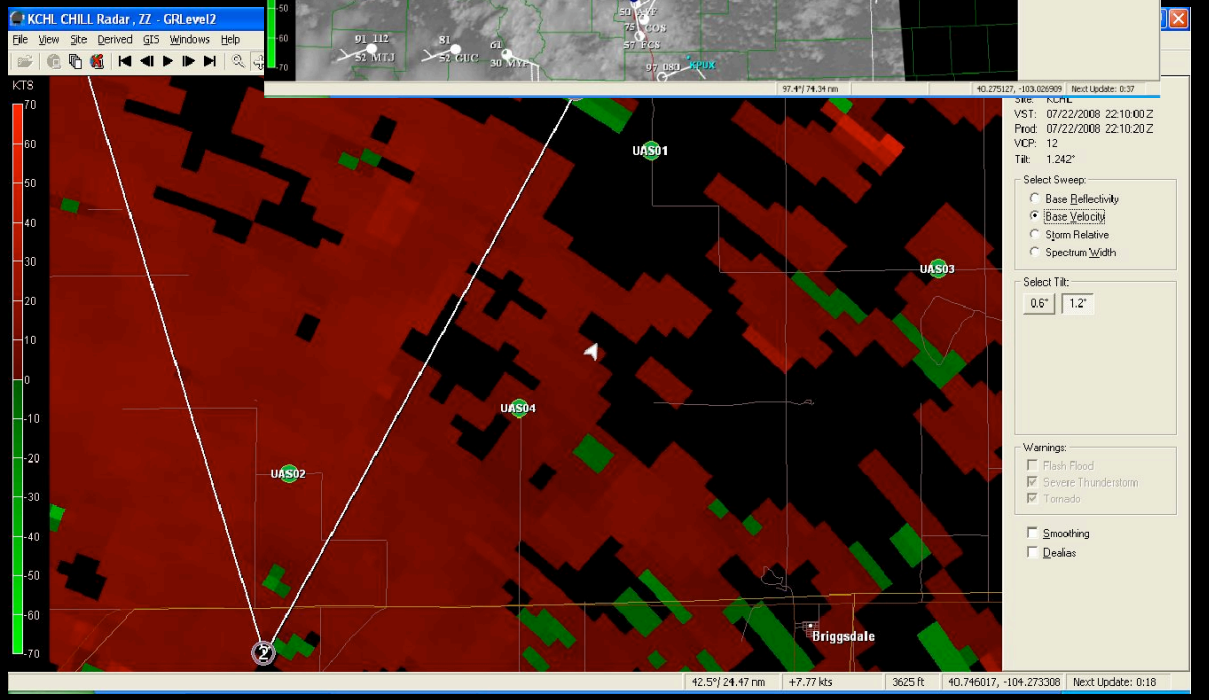
GRRUVI Radar and Tracking Interface



Velocity UA

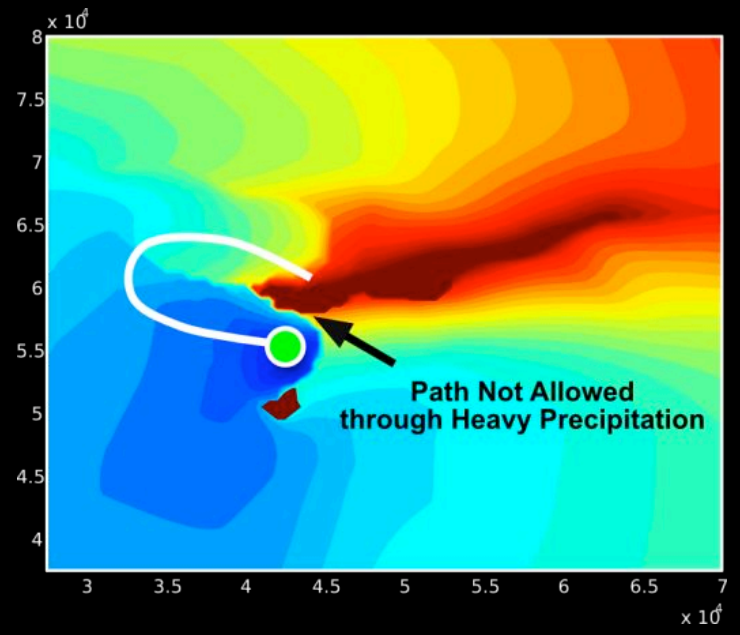


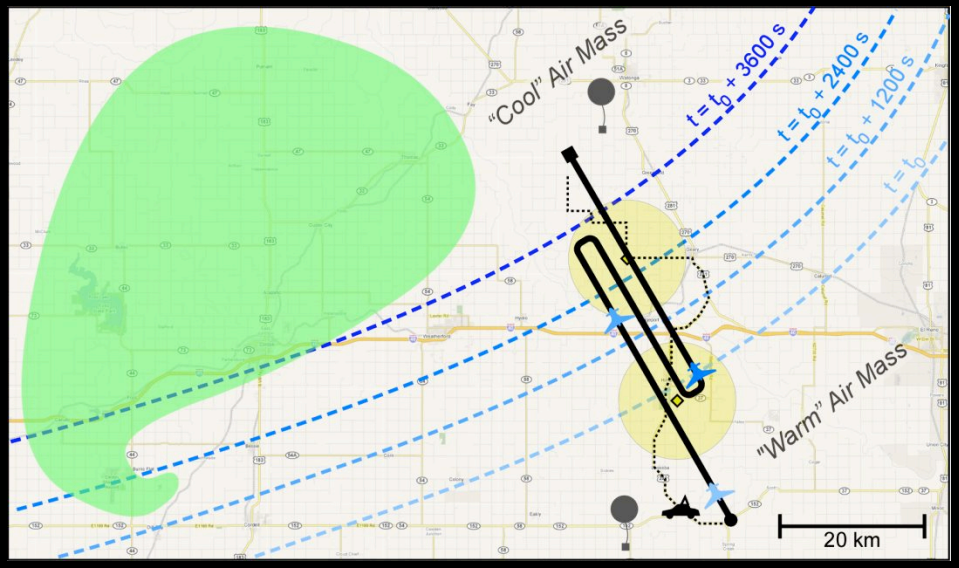
Tempest UA

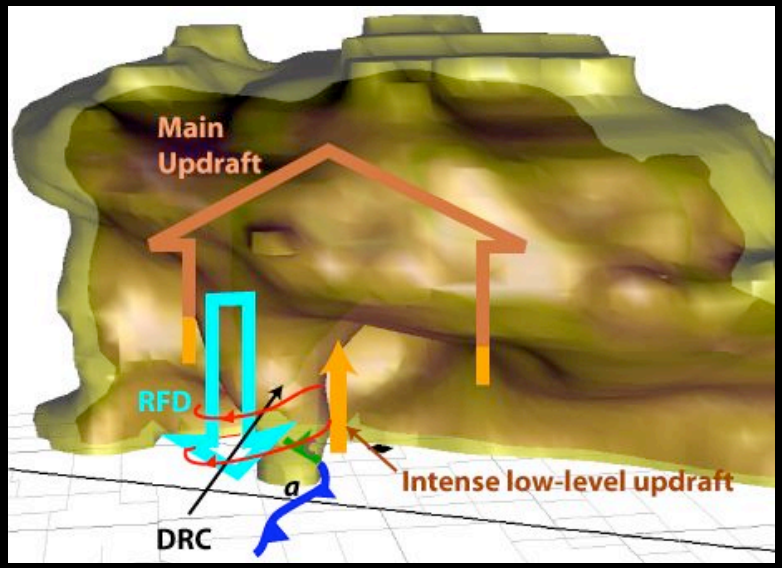


Science and Engineering Objectives

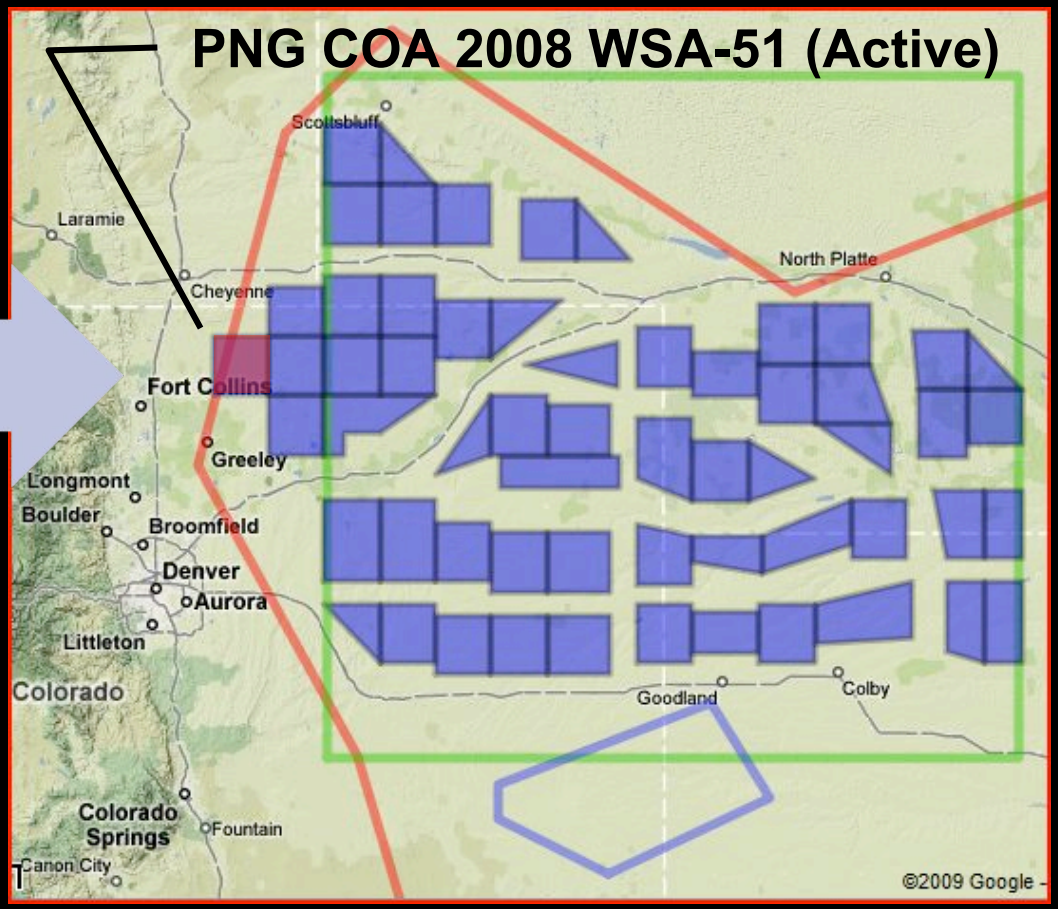
- **High-fidelity storm simulations**
  - UAS design requirements
  - Deployment strategies
  - Autopilot tuning and path planning
- **UAS operations**
  - (P, T, RH) and wind velocity across outflow boundaries, and beneath the supercell rear-flank





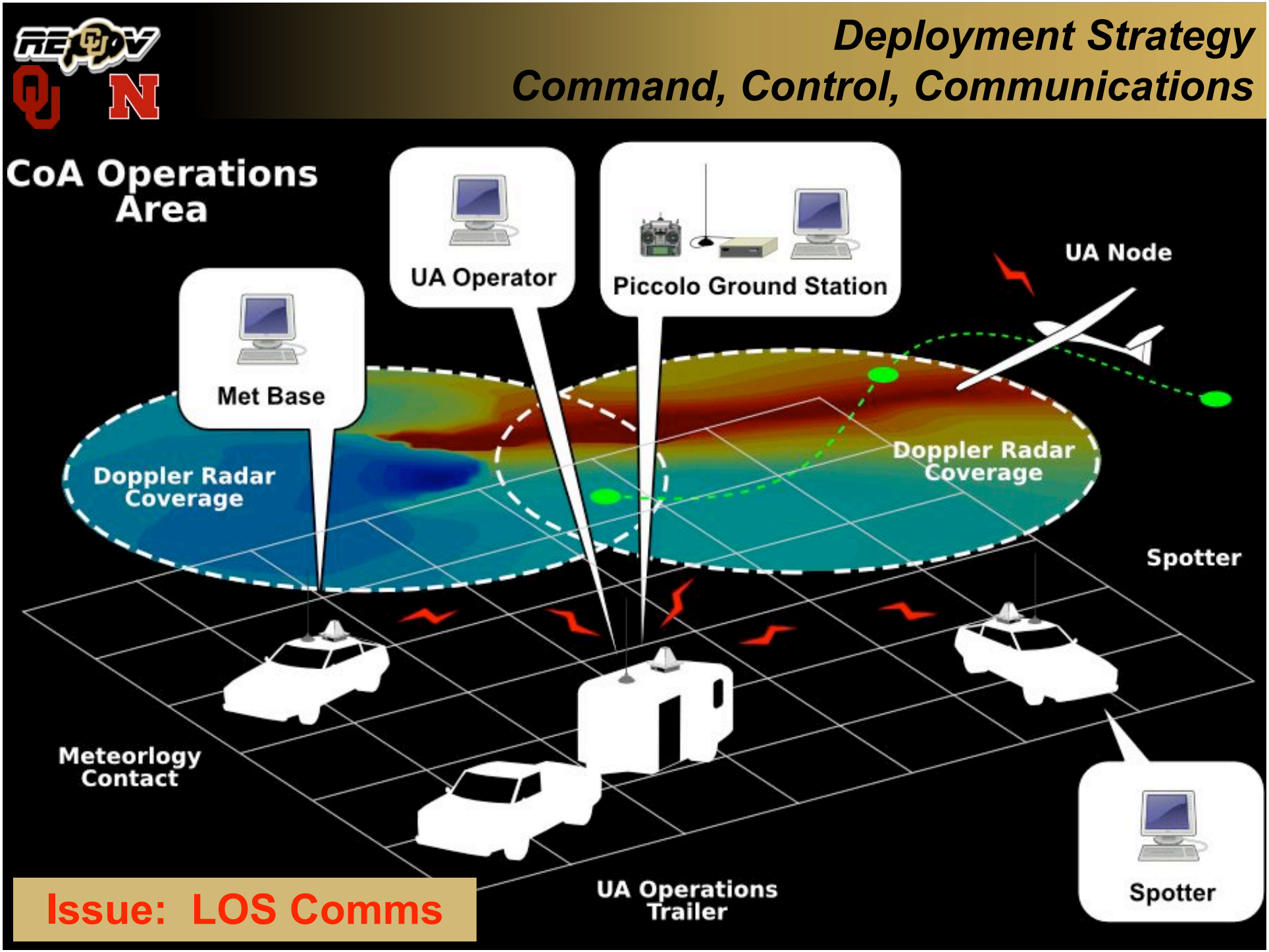


FAA Certificate of Authorization or Waiver (COA)



Issues: (1) Timeliness, (2) Max Altitude, (3) Multiple UA

Deployment Strategy
Command, Control, Communications



Issue: LOS Comms

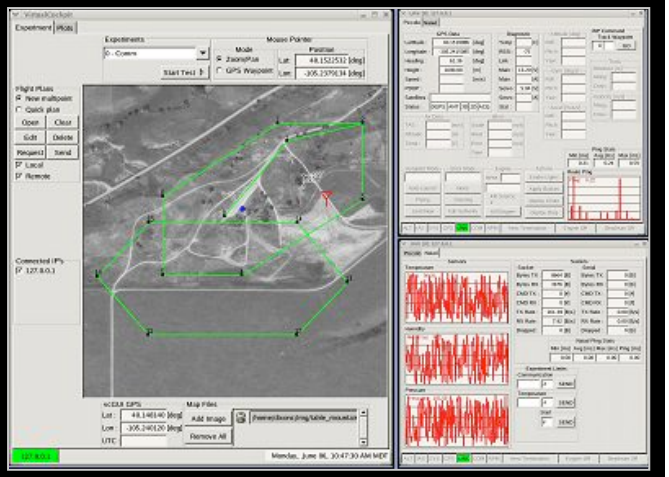
Concept of Operations: Team

- Science Contact (Rasmussen/Houston)
- UAS Flight Commander (Argrow/Frew)
- Pilot in Command (Aune/Stachura) – UAS final authority
- Pilot at Controls (Elston/Stachura) – UAS operator
- Manual Backup Pilot / Observer (Aune/Dixon)
- Safety Observer / Driver

Year 1	Year 2
1 base station 1 tracker 2 spotters 11 total people 4 total vehicles	2 base stations 1 tracker 2 spotters 13 total people 5 total vehicles

Concept of Operations: Flight Profile

- T–72 to 48 hr: NOTAM issued
- T–24 hr: Notification of NOTAM to contacts
- T–1 min: Preflight: Science Contact specify initial waypoint path of UA
- T–0: LAUNCH; based on signal from Science Contact and approval of UAS Pilot in Command
- T+5 to 10 min: Ingress; 1km range and 1000ft altitude of at least one mobile observer
- T+10 to 20 min: In Situ; follow pattern at altitude set by Science Contact and Pilot in Command
- T+ 50 min: Start egress at Science Contact signal and/or Pilot in Command decision
- T+1 hr: UA RECOVERY
- T+1hr 10 min: Batteries replaced, UA inspected, RELAUNCH



Concept of Operations: Safety

- UA is NOT disposable
- Pilot in Command is UA final authority
- Safety Procedures
  - UA comm loss—return to pre-specified waypoint
  - UA lost from view—return home
  - UA is lost from view AND another aircraft enters area, aerodynamic termination (quick spiral to ground)