

Unmanned Aircraft Systems (UAS) Traffic Management (UTM)

Key Lessons from Small UAS Operations and Performance Research and Future Work

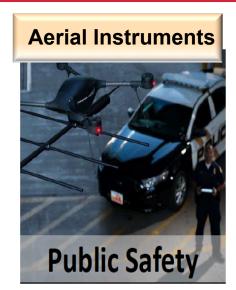
NASA

http://www.utm.arc.nasa.gov

Moffett Field, CA
Operations and UAS Performance research group

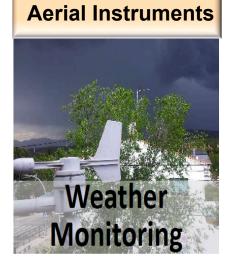
Applications of Unmanned Aerial Systems



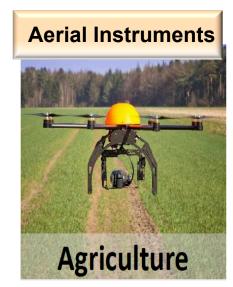


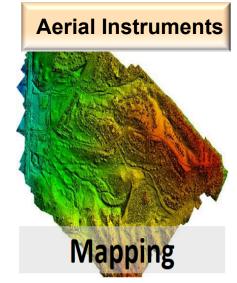


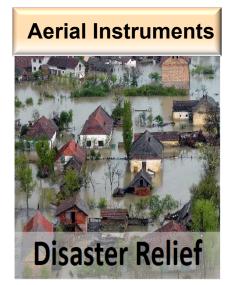


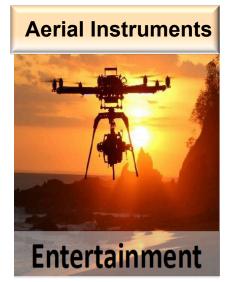














Stages of Traffic Management: Requirements are Different









http://www.kcet.org/updaily/socal_focus/history/la-as-subject/7th-and-broadway.html 1920, Photo Collection, Los Angeles Public Library

UTM Research Technical Capability Level



Each capability is targeted to type of application, geographical area and uses risk-based approach

CAPABILITY 1

- Reservation of airspace volume
- Over unpopulated land or water
- Minimal general aviation traffic in area
- Contingencies handled by UAS pilot
- Enable agriculture, firefighting, infrastructure monitoring

CAPABILITY 3

- Beyond visual line of sight
- Over moderately populated land
- Some interaction with manned aircraft
- Tracking, V2V, V2UTM and internet connected
- Public safety, limited package delivery

CAPABILITY 2

- Beyond visual line-of-sight
- Tracking and low density operations
- Sparsely populated areas
- Procedures and "rules-of-the road"
- Longer range applications

CAPABILITY 4

- Beyond visual line of sight
- Urban environments, higher density
- Autonomous V2V, internet connected
- Large-scale contingencies mitigation
- News gathering, deliveries, personal use

Current Research Areas



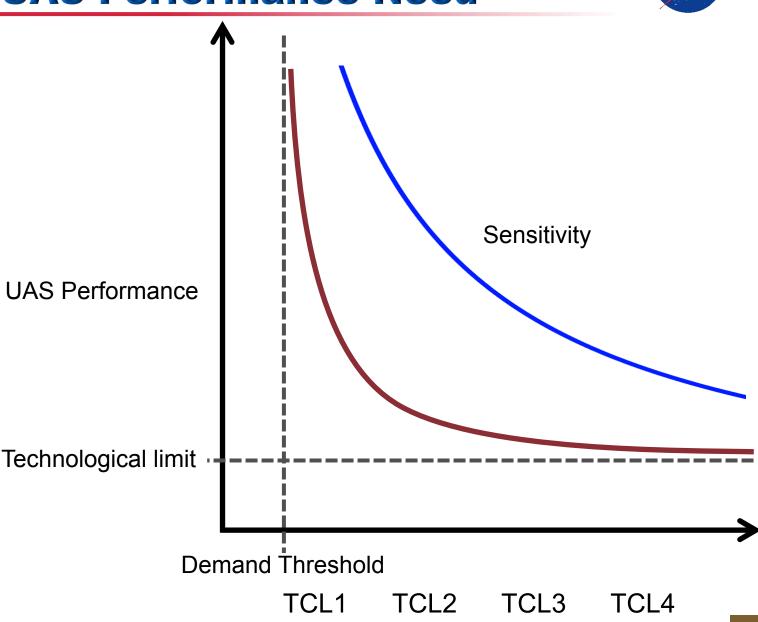
- TCL1-4 operations and UAS performance need
- Geo-fence conformance



TCL1-4 Operations and UAS Performance Need

NASA

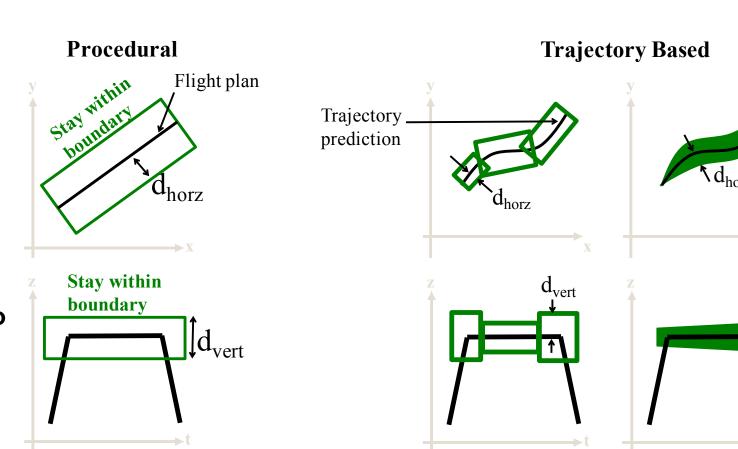
- Why is this important?
 - Demand drives traffic management
 - Type of operations and demand matter
 - Input to geo-fence setup



Conformance to Geo-fence



- Why is this important?
 - Inform requirements and standards for UAS Supplier Services
 - Identify use cases for large demand (structure where needed)
 - Understand actual challenges to operation with large variety of vehicles (wind)



Key Lessons and Future Work



- UAS Performance requirements
 - Depends on geographical need and use case
 - Understanding demand needed
- Required Navigation Performance to capture navigation performance
 - Lateral only
 - Performance validation needed
- Trajectory modeling is a key component in Geo-fence conformance
 - Feasible Geo-fence calculation
 - Conformance forecast with wind information
 - Model validation needed