Registration and Identification

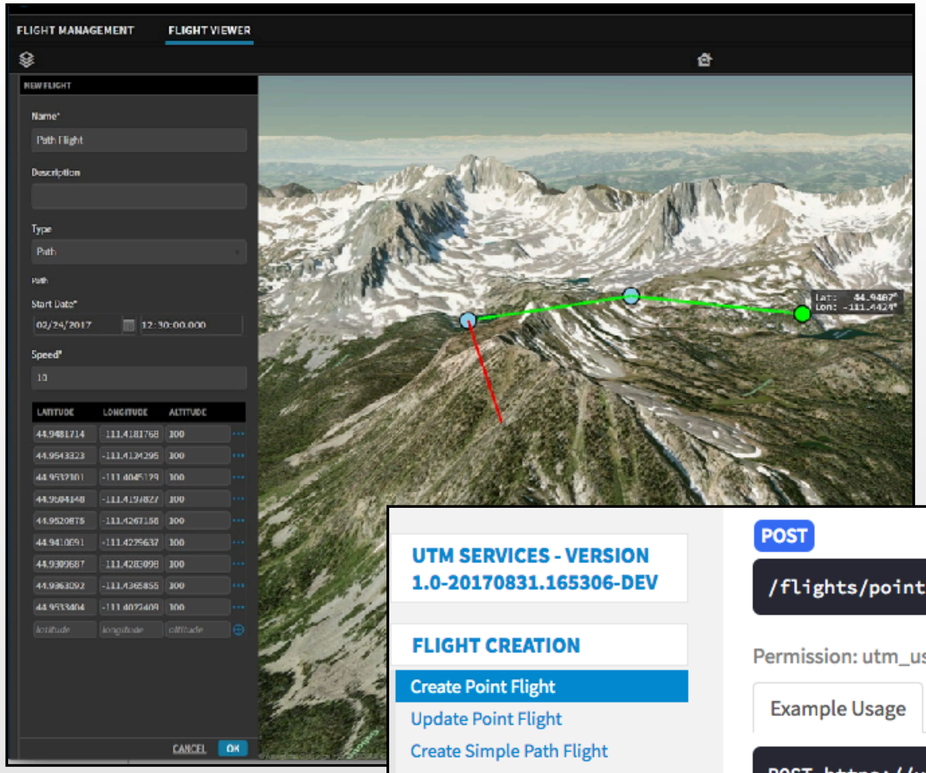
Motivation, Concepts and Issues

Christopher Kucera
Director of Air Operations
Analytical Graphics, Inc.

AGI

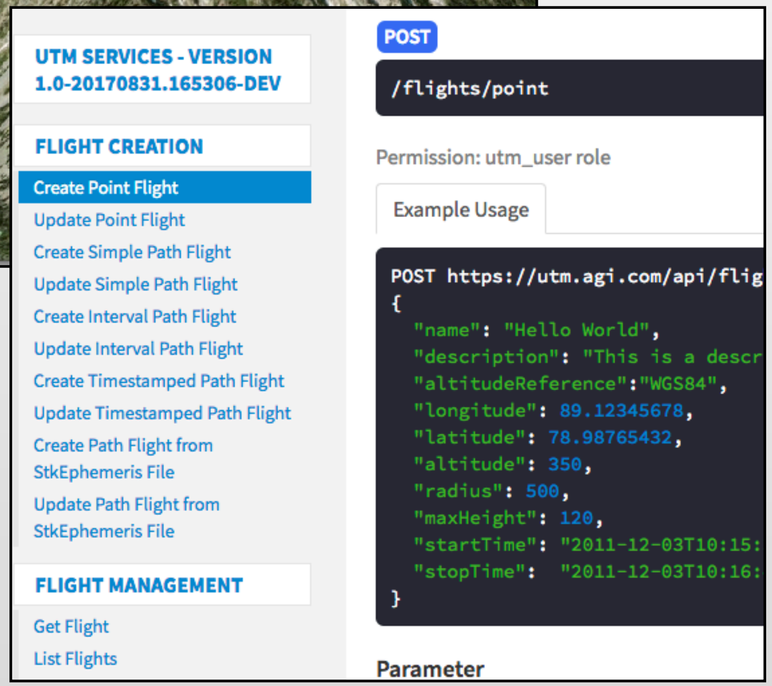
Analytical Graphics

- Since 1989, software for land, sea, air and space
- 50,000 customers worldwide
- Framework to…
  - understand vehicle dynamics and payload performance
  - understand infrastructure coverage (CNS)



UTM

Analytical Services



AGI

Why register and track?

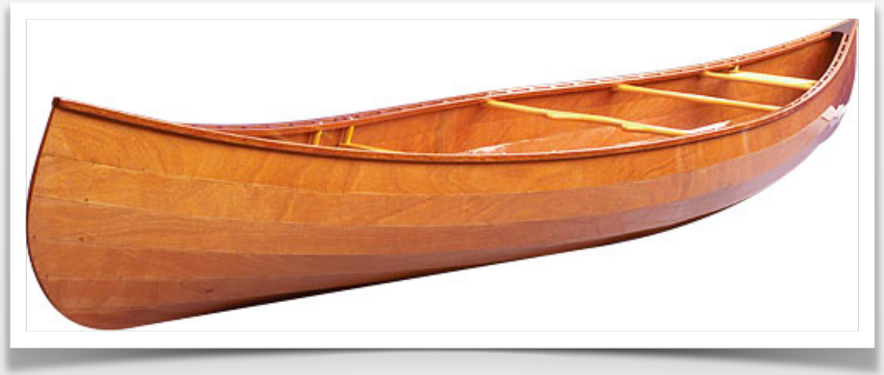
	Safety	Security	Privacy	Financial
Stakeholder	**Air Traffic Control**	**Law Enforcement**	**Public**	**Comptroller**
Issue	Separation Assurance	Discriminate Threat	Spying	Fund ATM or UTM
Goal	Determine Position	Find Operator	Understand Operation	Collect Money
Registration Benefit	**Reduce Collisions**	**Provide Protection**	**Give Awareness**	**Generate Revenue**

AGI

We already register things…

AGI

But not everything…



AGI

What thresholds should be used?

	Safety	Security	Privacy	Financial
Regional Threshold	Airspace	None	Private Property Rights	None
Altitude Threshold	Airspace	Visualize Observer	Under 100ft Or Treeline	None
Distance Threshold	Airspace	Visualize Observer	BVLOS	None
Weight Threshold	None	Threat?	None	Value Based
Capability Threshold	None	Autopilot / FPV	Autopilot, FPV	Value Based

AGI

Using carrots, not rules, for compliance

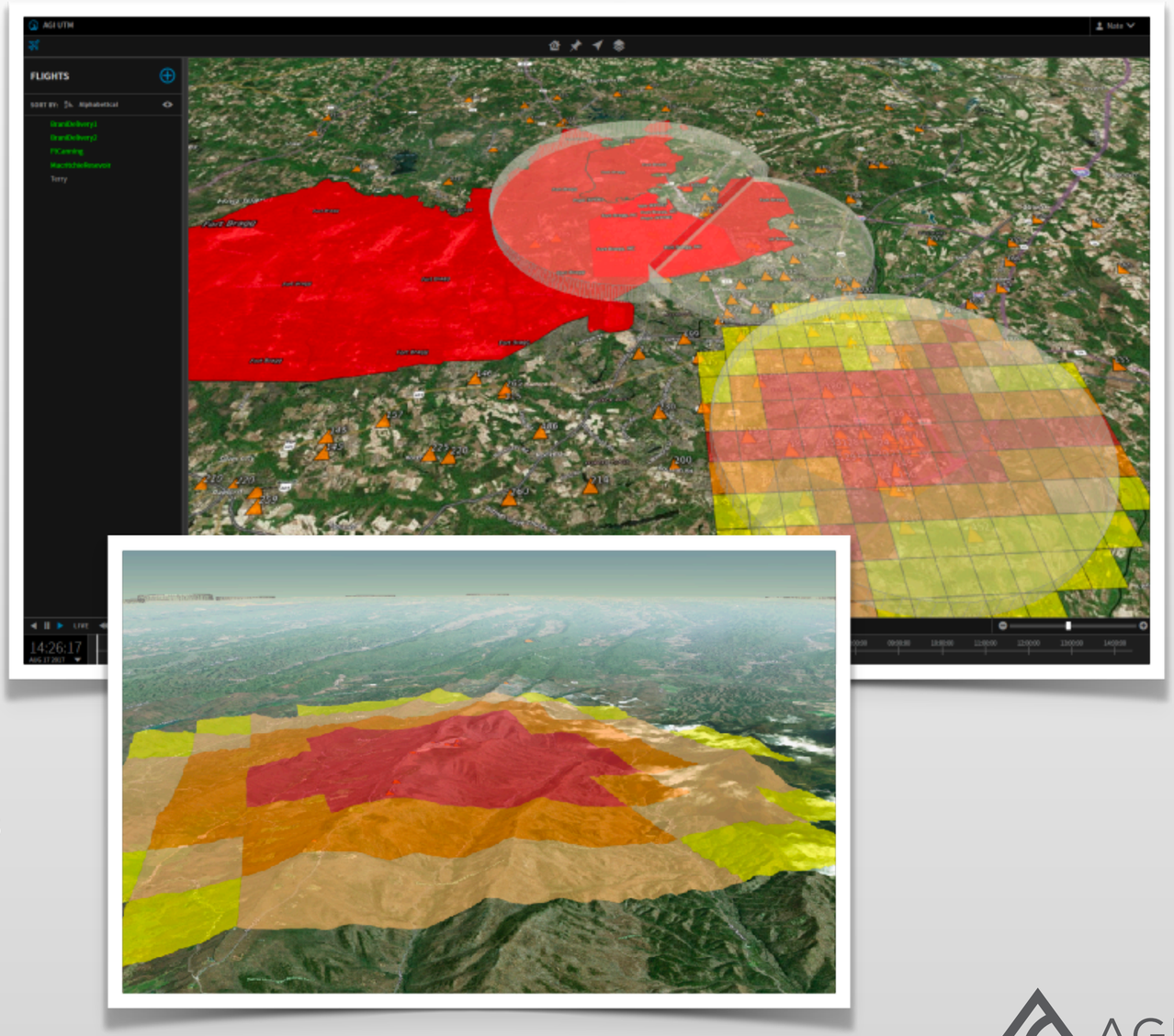
Regulators can grant approvals and waivers if people comply

Rule-making is a much lengthier process

ATC permissions, for example…

- LAANC enables accessibility to 107.41 (ATC waiver) more rapidly (minutes vs. months)
- Benefits of registering and tracking far outweigh the cost of compliance

Other examples include national parks, sports venues and densely populated areas

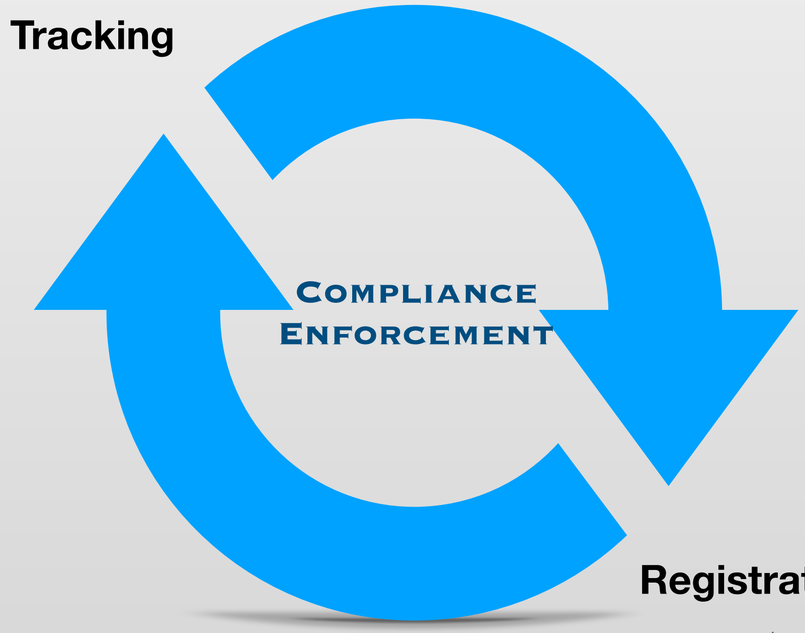


Tracking enforces registration

When operators don’t comply…

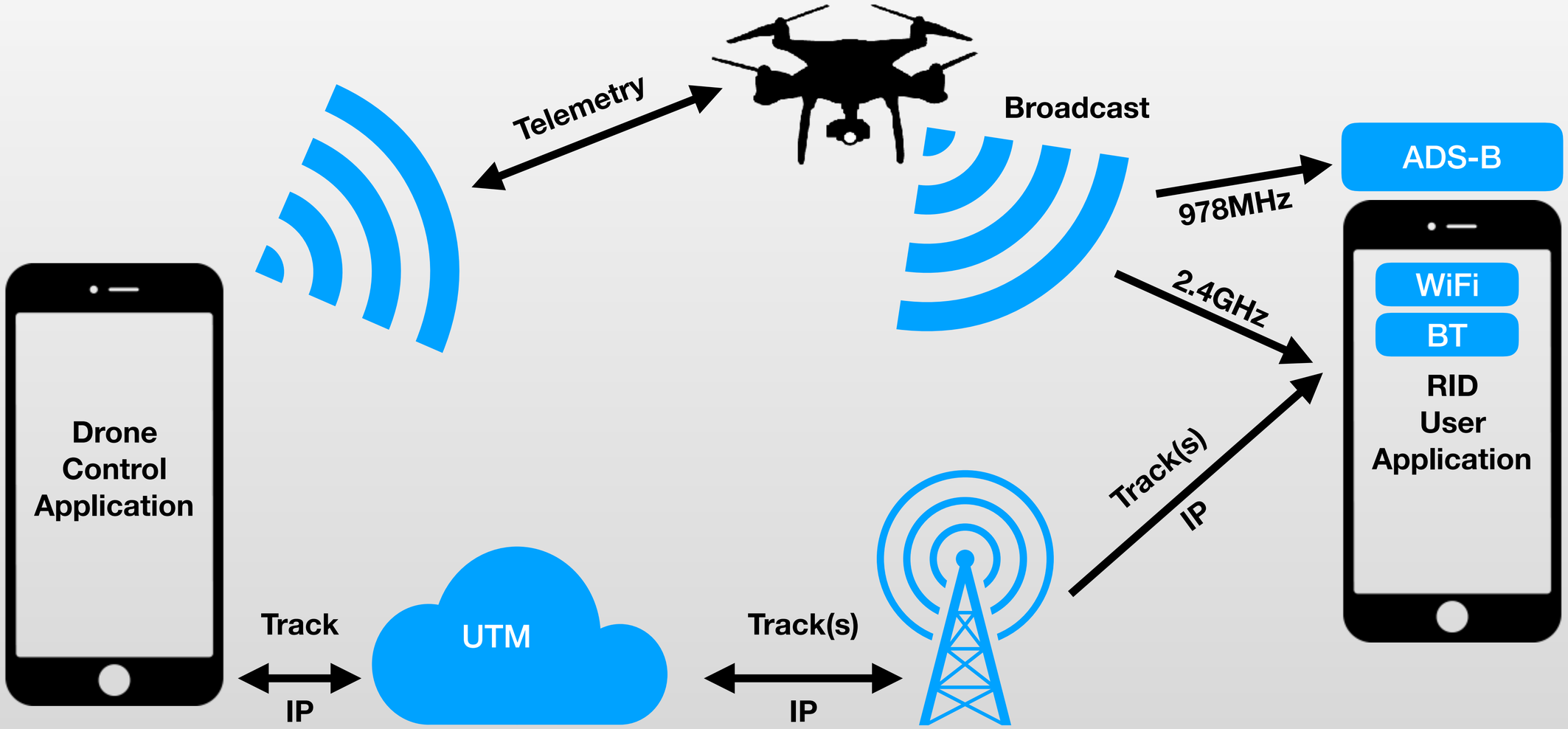
- They won’t broadcast an ID
- They won’t end up in a UTM - like system
- They won’t show up in ATC systems

Tracking allows law enforcement to target the non compliance…



AGI

Methods for tracking

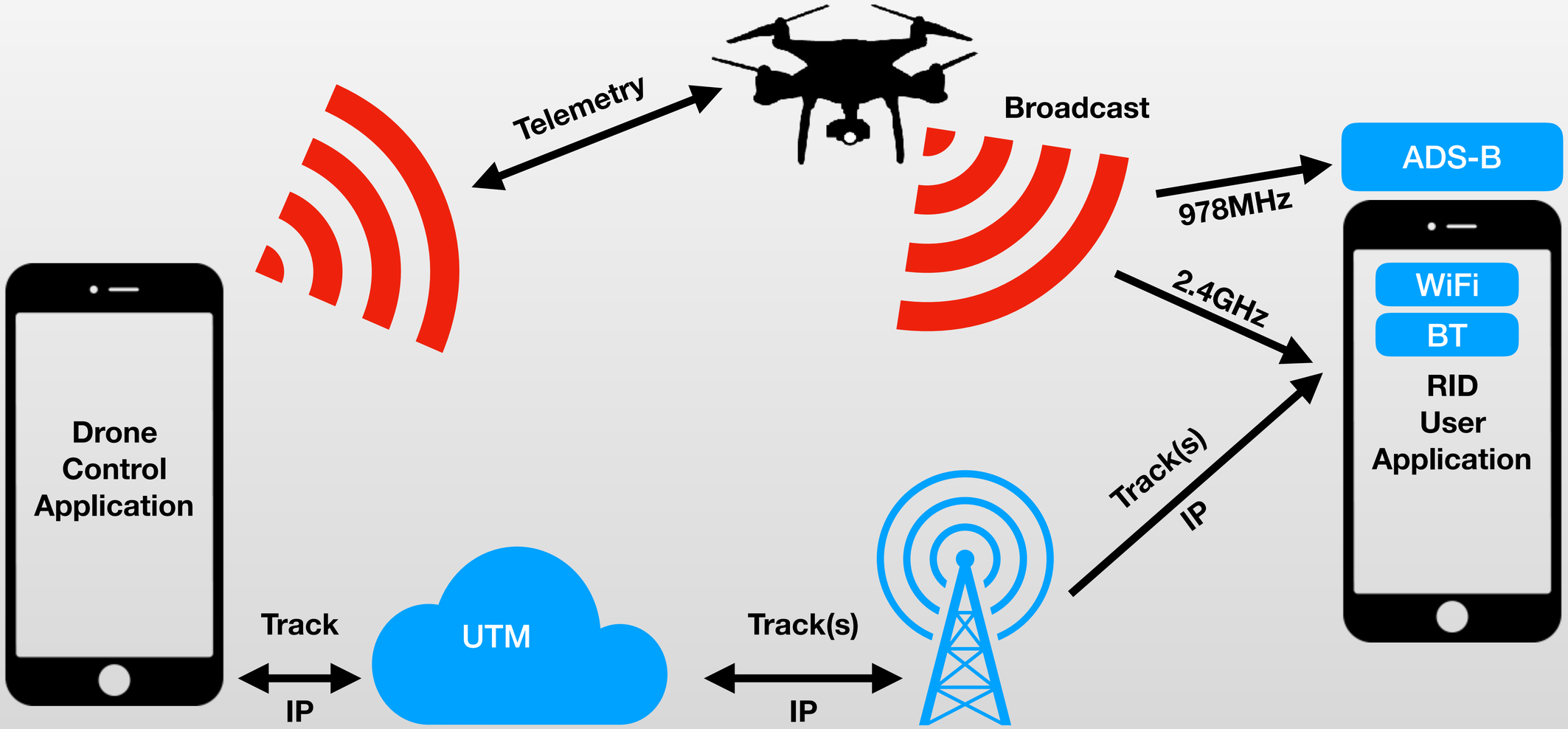


Tracking options

	Self Declare	Broadcast	LTE	Satellite
Latency	10 min	1 sec	1 sec	> 15 secs
Coverage	Regional	Local	Regional	Global
Hardware	No	$	$	$
Connectivity	$	No	$	$

AGI

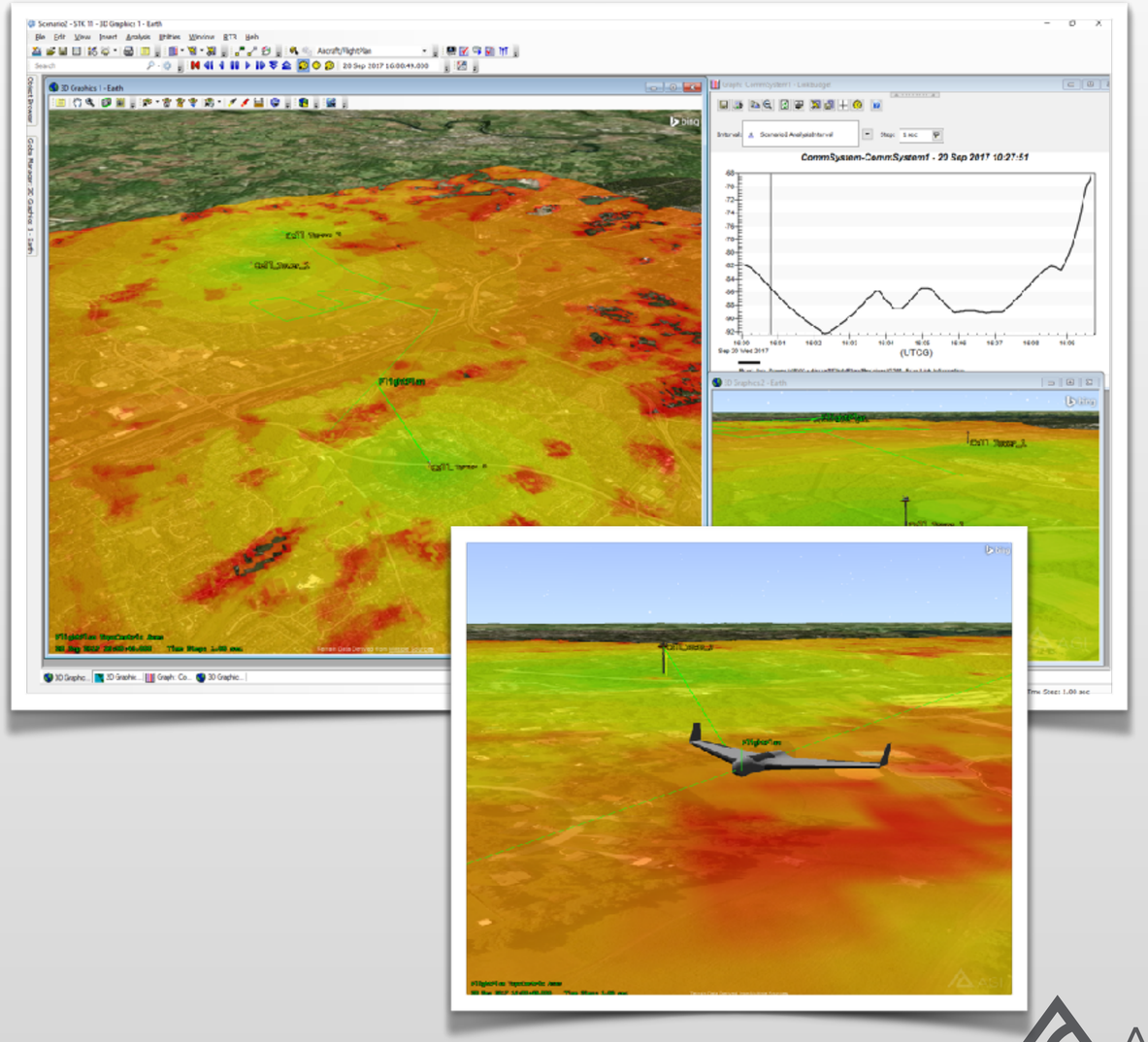
Tracking relies on RF



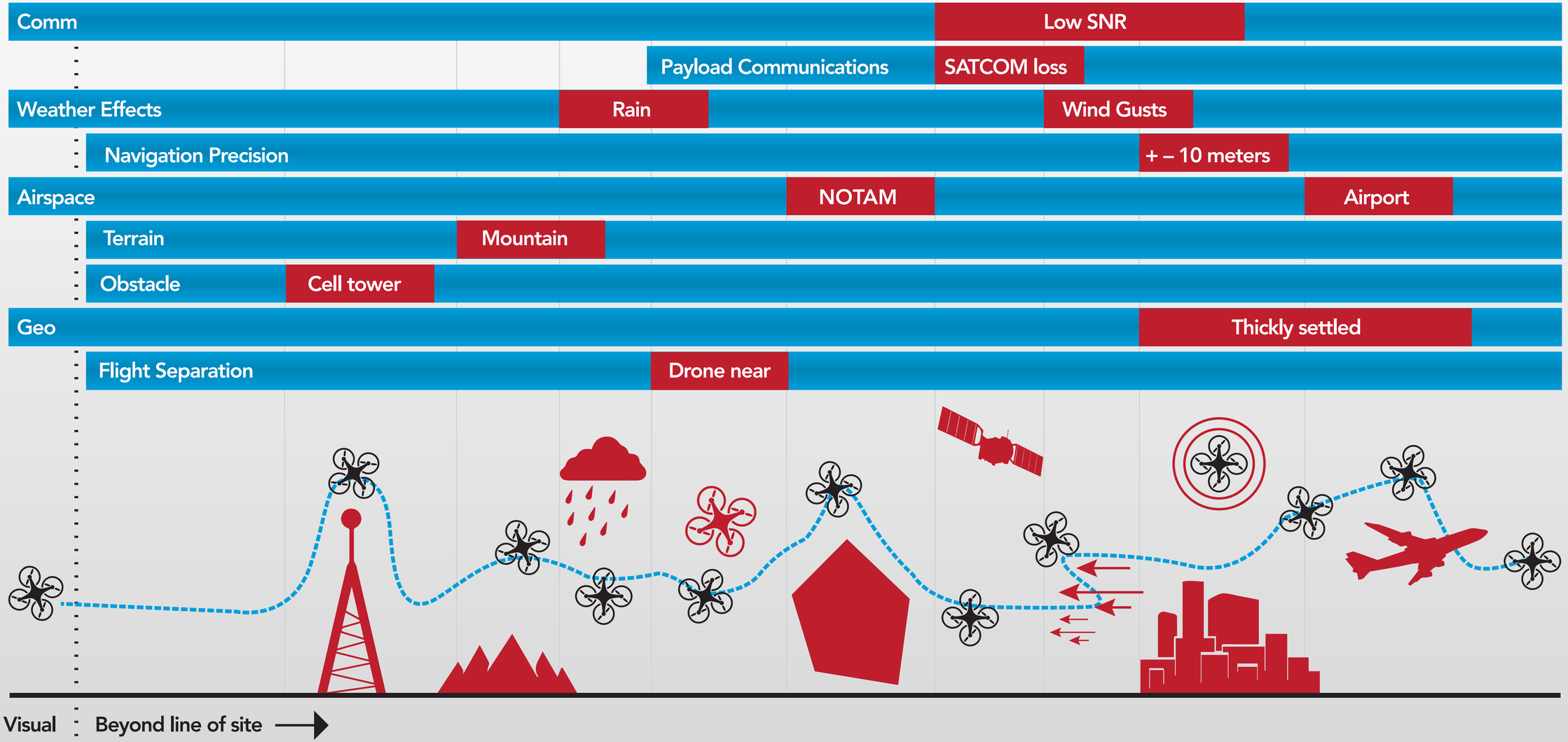
Understanding RF coverage

Without RF Coverage Metrics…

- Can’t understand flight risk
  - blindspots in DAA
- Can’t route effectively for C2 and payload
- Can’t plan effectively for contingency
- Can’t prove safety case to regulator

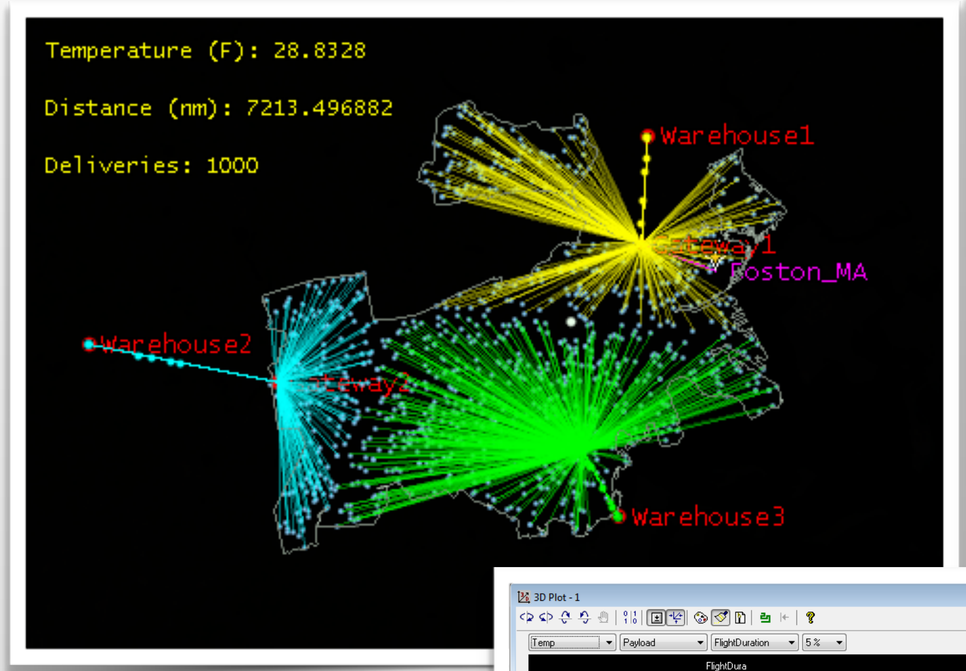


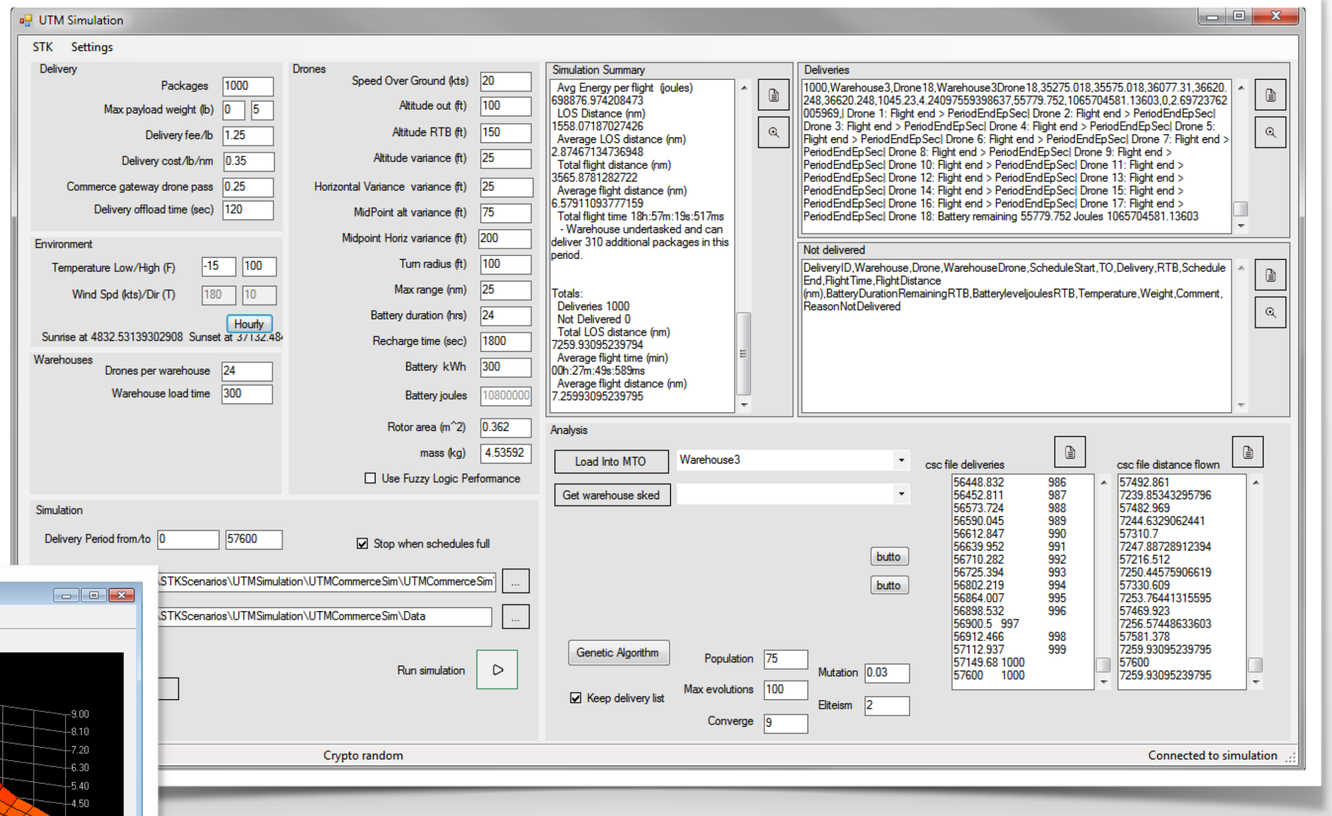
AGI's analytical web services

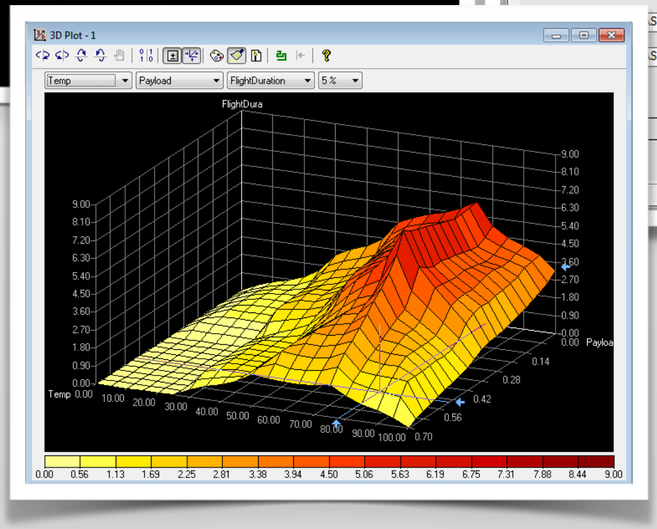


AGI

AGI's UTM simulation







Summary

- What are registration and identification ***thresholds*** the global community can accept?
- How can the regulators encourage compliance now by offering ***automated*** authorizations which are currently difficult to obtain?
- Analyze the ***tracking system blind spots*** to verify system risk
- Use ***simulation*** to help understand the trade space of UAS operations and performance of UTM, ATM and commercial tracking systems

AGI