



UTM – Enabling the Drone Ecosystem

Chris Kucera, OneSky Head of Strategy; ACJA Technical Lead



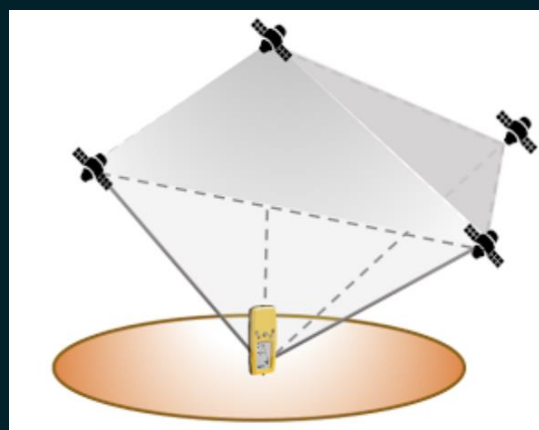
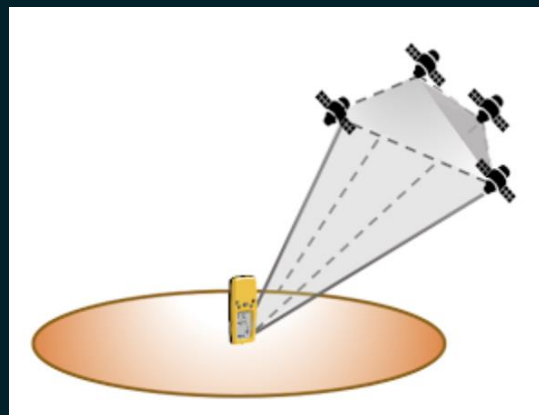
Our Evolution



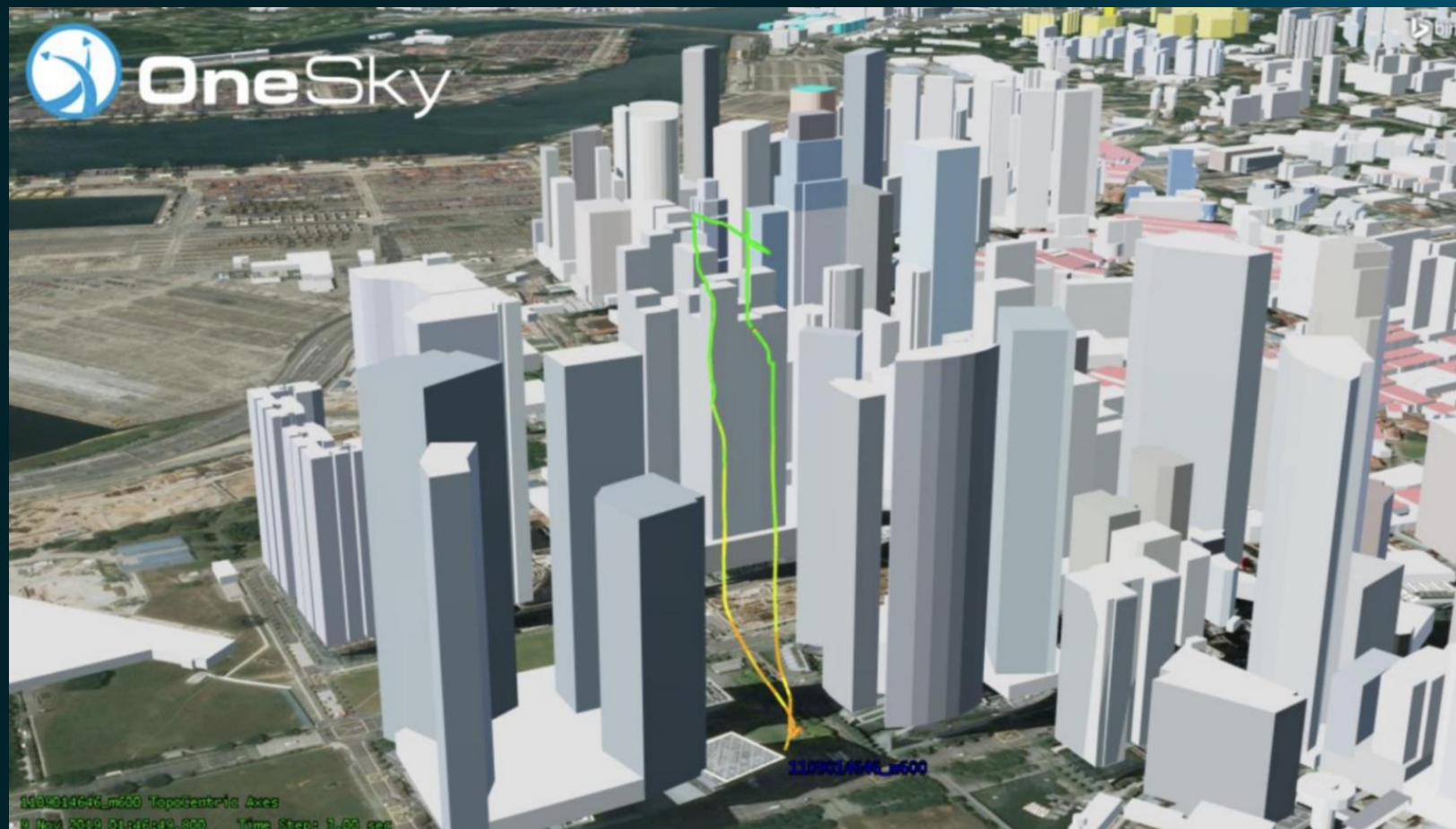
7,000,000 lines of code
31 Years supporting aero & defense
700 aero & defense companies



BVLOS - An infrastructure problem...



DOP Images from PSU



Singapore GPS Testing

What is UTM?

UTM is...

a digital system that can integrate drones safely and efficiently into air traffic that is already flying in low-altitude airspace

a **collaborative effort** – regulators, OEMs, SPs and consumers must work together

must be built with **tomorrow's needs in mind**

a **system of systems** – not a single product or service

will expand to incorporate **all airspace users and operations**



Global UTM Deployments - Singapore



Global UTM Deployments – NASA TCL4

Browser: <https://tcl4.onesky.xyz/portal/#> Incognito

LIBRARY

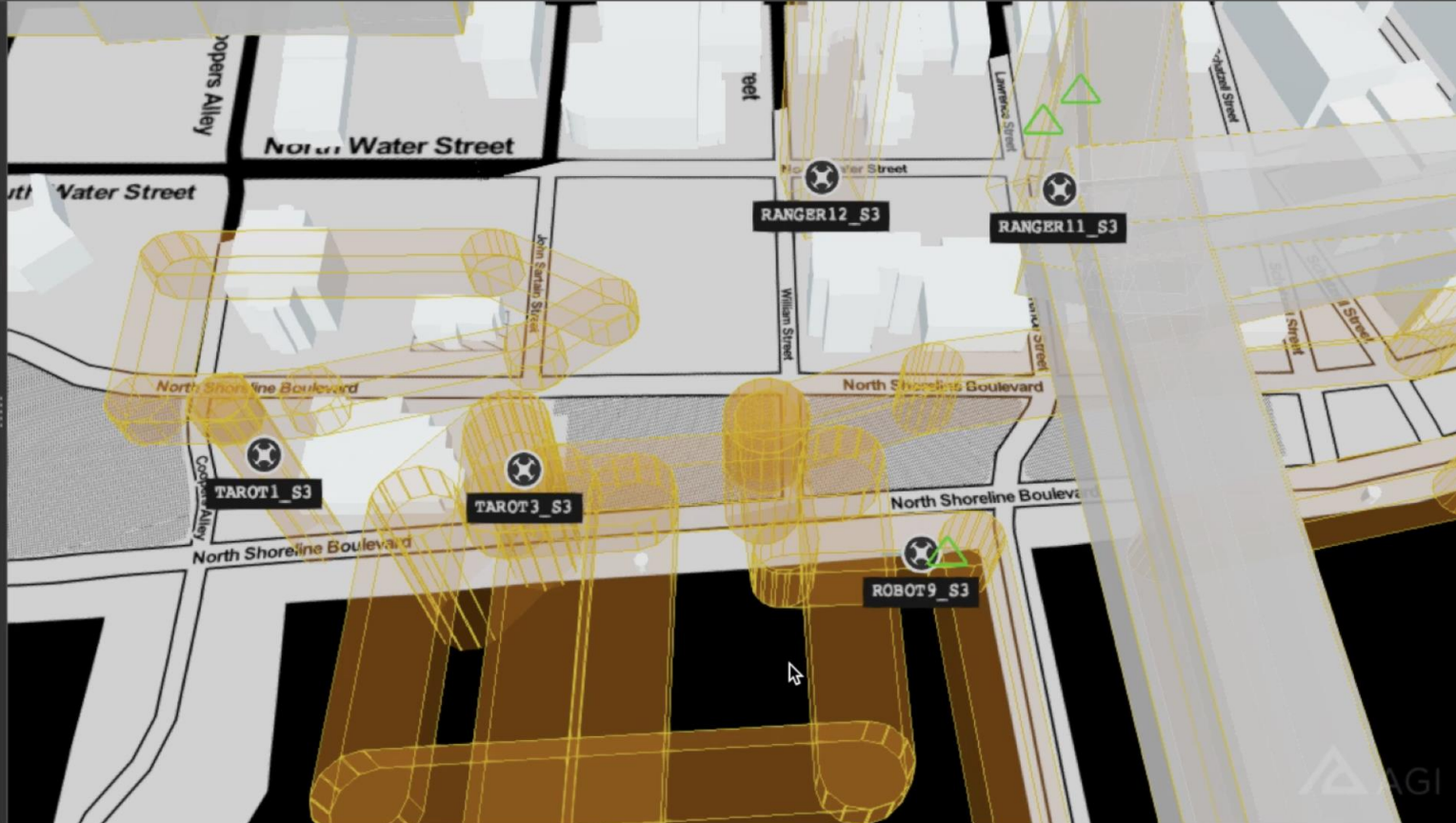
SORTED BY: Alphabetical

No items to display

OPERATION RESTRICTION DETAILS

Name:	ROBOT9_S3-0
Description:	TCL ShakeDown Flights
Gufi:	dd288623-3211-4a54-8ad6-8cf394242a78
Source:	uss.flyanra.net
State:	NONCONFORMING
Start Time:	08/22/2019 15:03:00
Stop Time:	08/22/2019 17:02:00
Max Altitude (m):	51.51
Min Altitude (m):	-24.99
Altitude Reference:	WGS84
Ordinal:	0

Properties



Global UTM Deployments - Australia

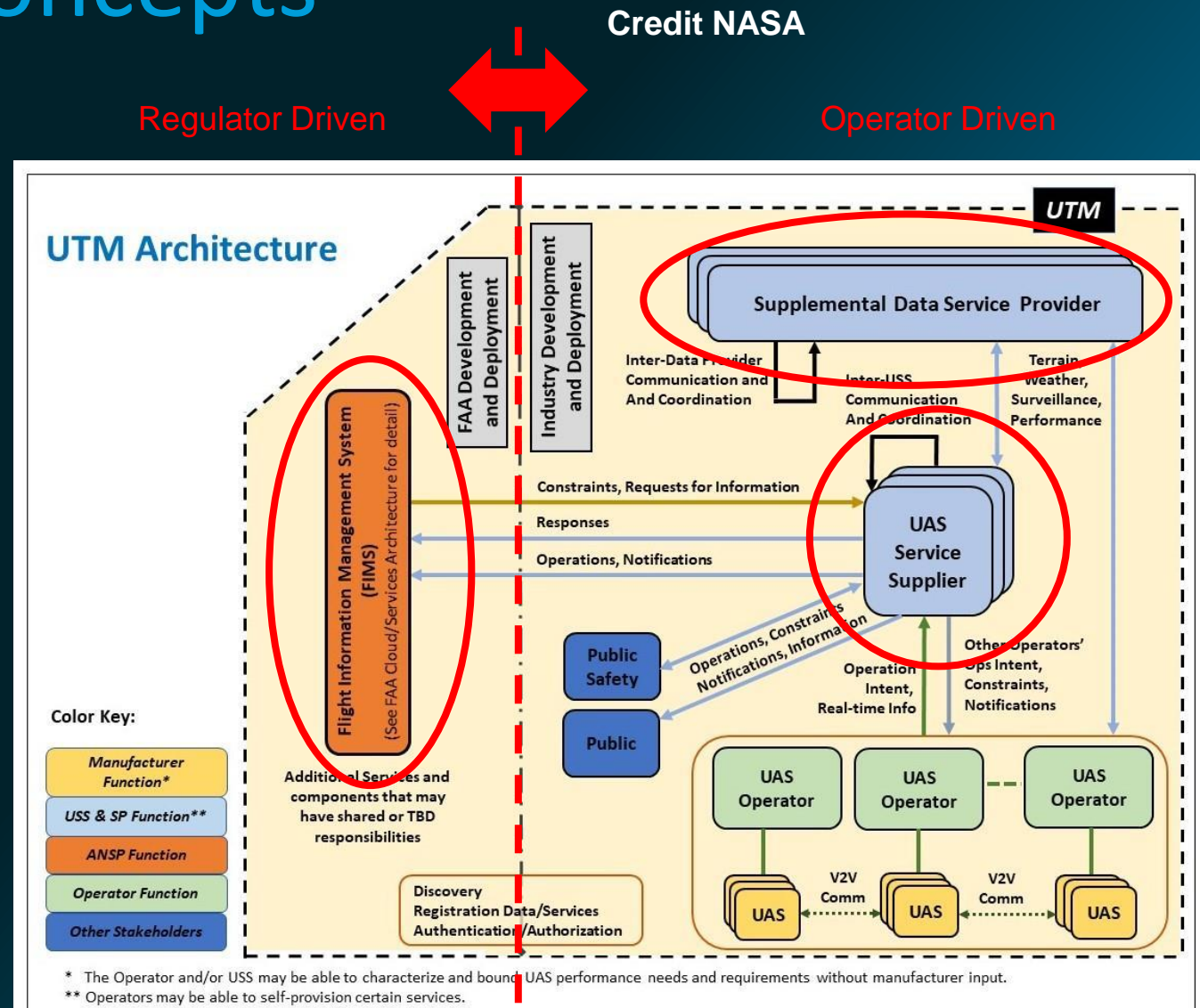
The screenshot displays the OneSky UTM interface with the following components:

- Navigation:** Home, Search (Enter an address or landmark...), and User (USS) icons.
- FLIGHTS Panel:**
 - Flight 1:** Reg ID: US.256C.SK, GUF: e8de60b3-f788-4d5e-9e3e-71319aa1b674. Status: Completed. Pilot: Demo TestSession, +14843523801. Aircraft: Skydio X2+.
 - Flight 2:** Reg ID: US.256C.SK, GUF: ebf478fb-a34c-42f3-b0c1-088272488feb. Status: Completed. Pilot: Demo TestSession, +14843523801. Aircraft: Skydio X2+.
 - Flight 3:** Reg ID: US.256C.SK, GUF: 9005067f-f5f5-430b-b98f-8055fab70fd2. Status: Completed. Pilot: Demo TestSession, +14843523801. Aircraft: Skydio X2+.
 - Course_Inspection_1:** Reg ID: US.256B.SK, GUF: aa866a5e-2213-4a8f-8647-e09aeb4d924b. Status: Active. Pilot: Dan Honaker, +19707610067. Aircraft: Skydio X2. Violations (1): MELBOURNE CONTROL ZONE (C).
 - Flight 4:** Reg ID: US.256B.SK, GUF: 9005067f-f5f5-430b-b98f-8055fab70fd2. Status: Active.
- Map:** Aerial view of Melbourne, Australia, with flight paths overlaid in cyan and blue. A search bar is at the top of the map.
- ALERTS Panel:**
 - Flight State: Confirmed** (6-Apr-2022 22:00): _Generated_Point_Flight_0 is Confirmed. GUF: 9005067f-f5f5-430b-b98f-8055fab70fd2.
 - Flight State: Active** (6-Apr-2022 22:00): _Generated_Point_Flight_0 is Active. GUF: 9005067f-f5f5-430b-b98f-8055fab70fd2.
 - Flight State: Completed** (6-Apr-2022 22:00): _Generated_Point_Flight_0 is Completed. GUF: ebf478fb-a34c-42f3-b0c1-088272488feb.
 - Flight State: Nonconforming** (6-Apr-2022 22:01): _Generated_Point_Flight_0 is Nonconforming. GUF: 9005067f-f5f5-430b-b98f-8055fab70fd2.
 - Flight State: Active** (6-Apr-2022 22:01): _Generated_Point_Flight_0 is Active. GUF: 9005067f-f5f5-430b-b98f-8055fab70fd2.
 - Flight State: Nonconforming** (6-Apr-2022 22:02): _Generated_Point_Flight_0 is Nonconforming. GUF: 9005067f-f5f5-430b-b98f-8055fab70fd2.
 - Flight State: Active** (6-Apr-2022 22:03): _Generated_Point_Flight_0 is Active. GUF: 9005067f-f5f5-430b-b98f-8055fab70fd2.

UTM Architecture Concepts

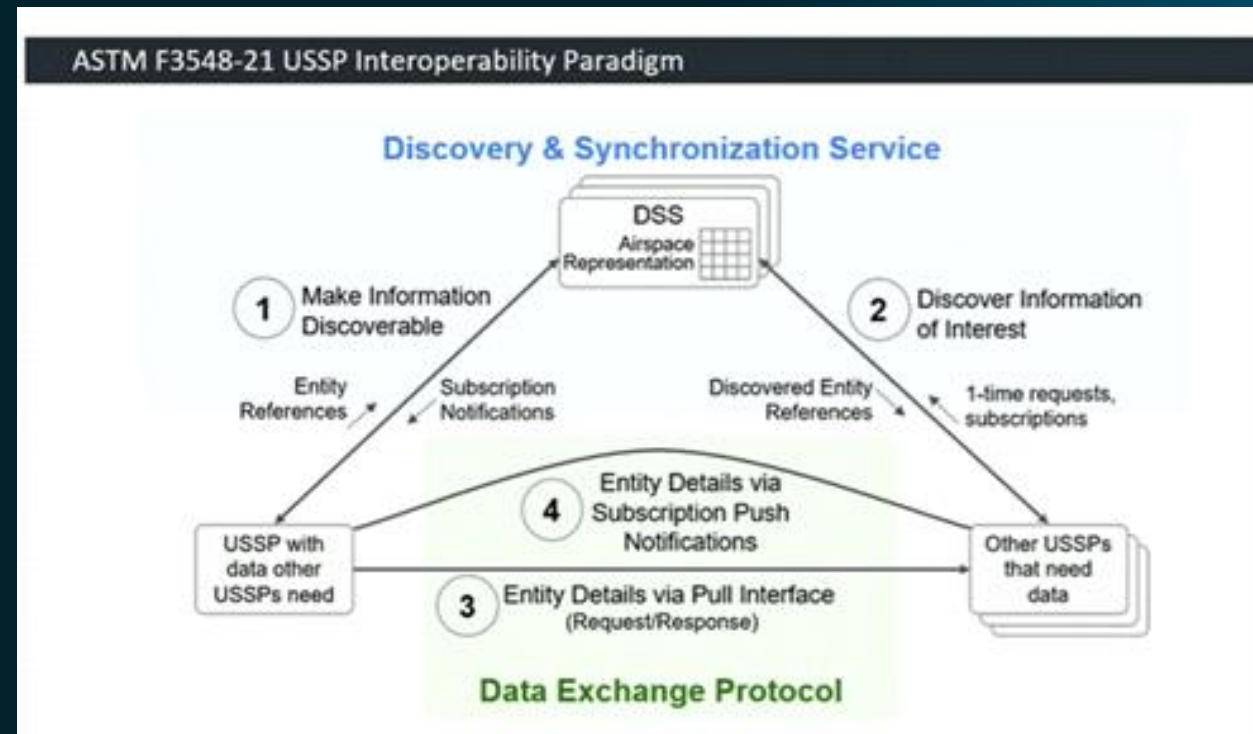
3 Main Parts

- FIMS/CIS – authoritative back-end services to share data and obtain flight approvals
- USS/USSP – operator representation in the UTM architecture to perform strategic deconfliction, tracking and alerting
- SDSP – 3rd party data and service integration to obtain a better situational awareness picture



USS Standardized Communications

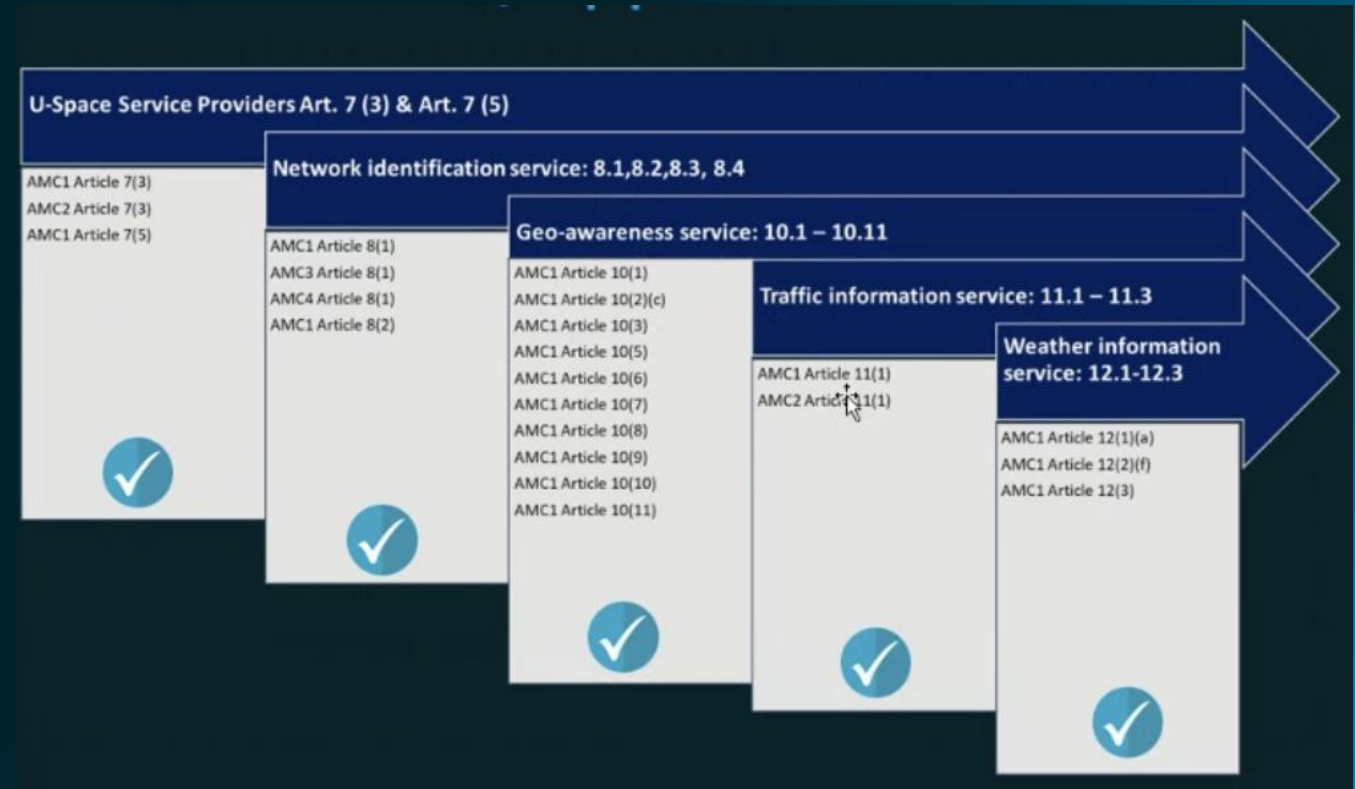
1. Operator sends flight plan to USS
2. USS uses flight plan region to query DSS
3. DSS sends notification of other operators using that airspace and method to contact them
4. USS queries other USS for flight plan and/or flight track depending on UTM or RID service
5. Subscribe for changes that will be pushed by USS



Core Services (EASA Approach)

U1... the current focus for most ANSPs

- Drone Registration
 - Registers the drone and the operator
- Network Identification
 - Tracks the drone and gives information about registration identification number
- Geo Awareness
 - Understanding where drones can and cannot fly
- Traffic Information
 - Ensuring drone deconfliction
- Weather Information

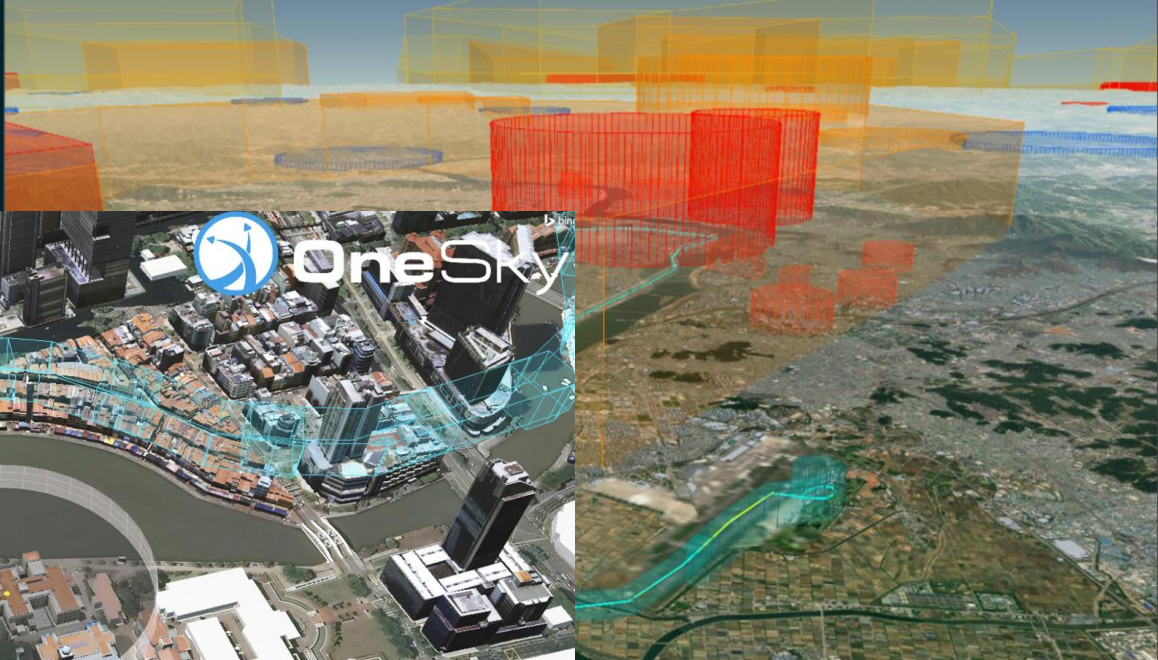


Non-Core Services Deployed

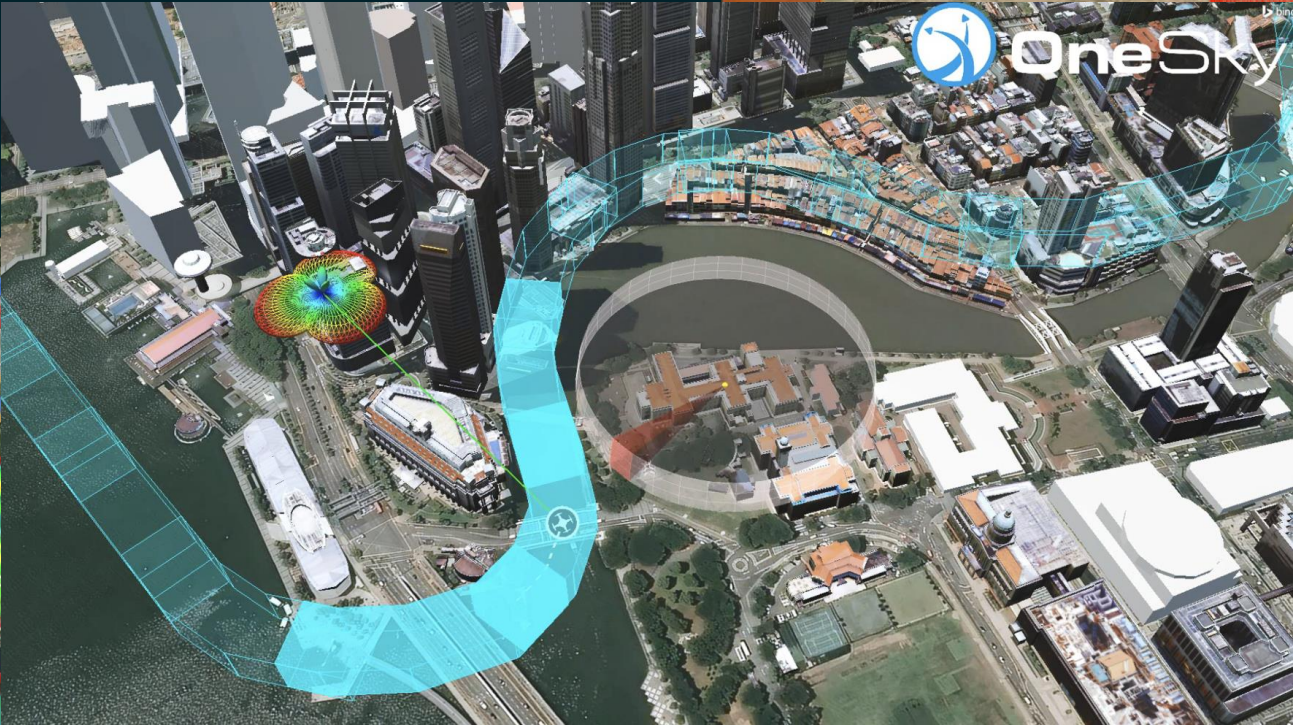
- Data Communications
- ATC Handover Service

UTM Service Examples

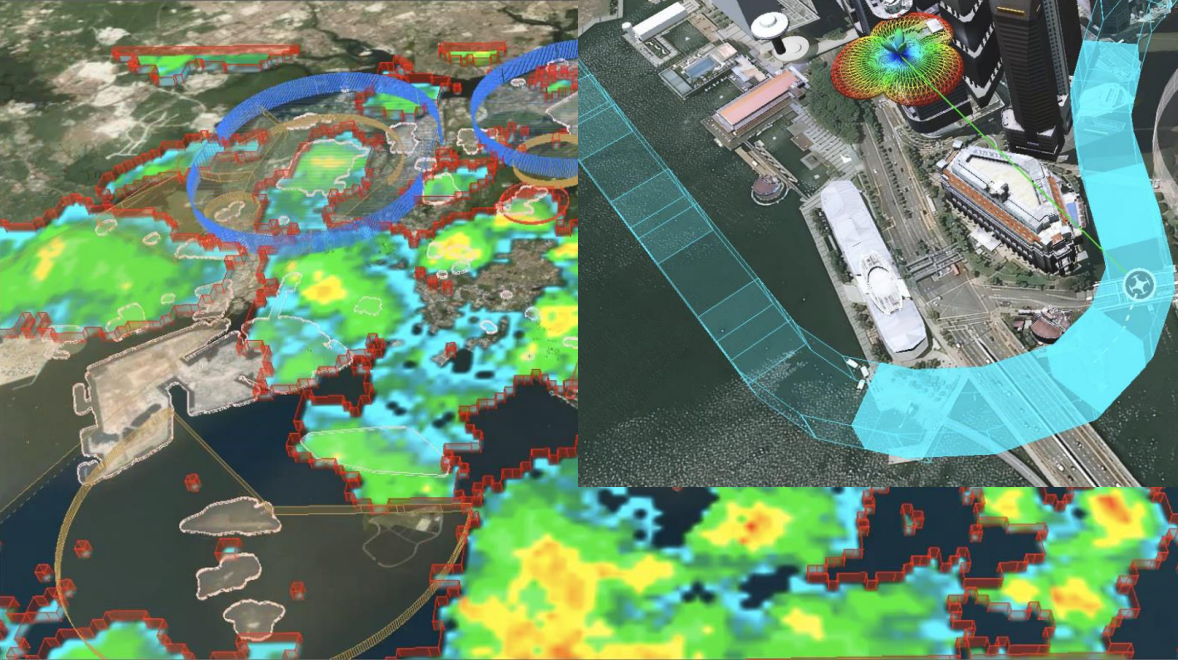
Airspace Awareness



Separation Management



Weather



Operation Risk Assessment

Communications

- Radio Performance
- Population Density

Navigation

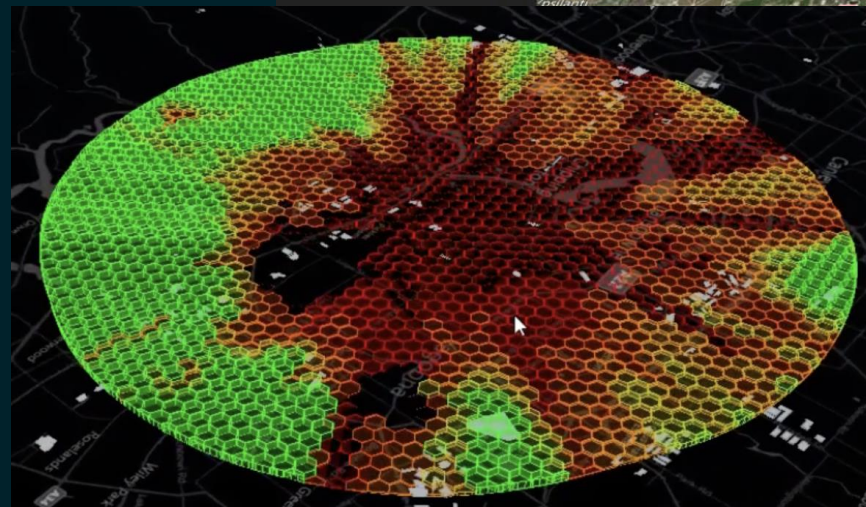
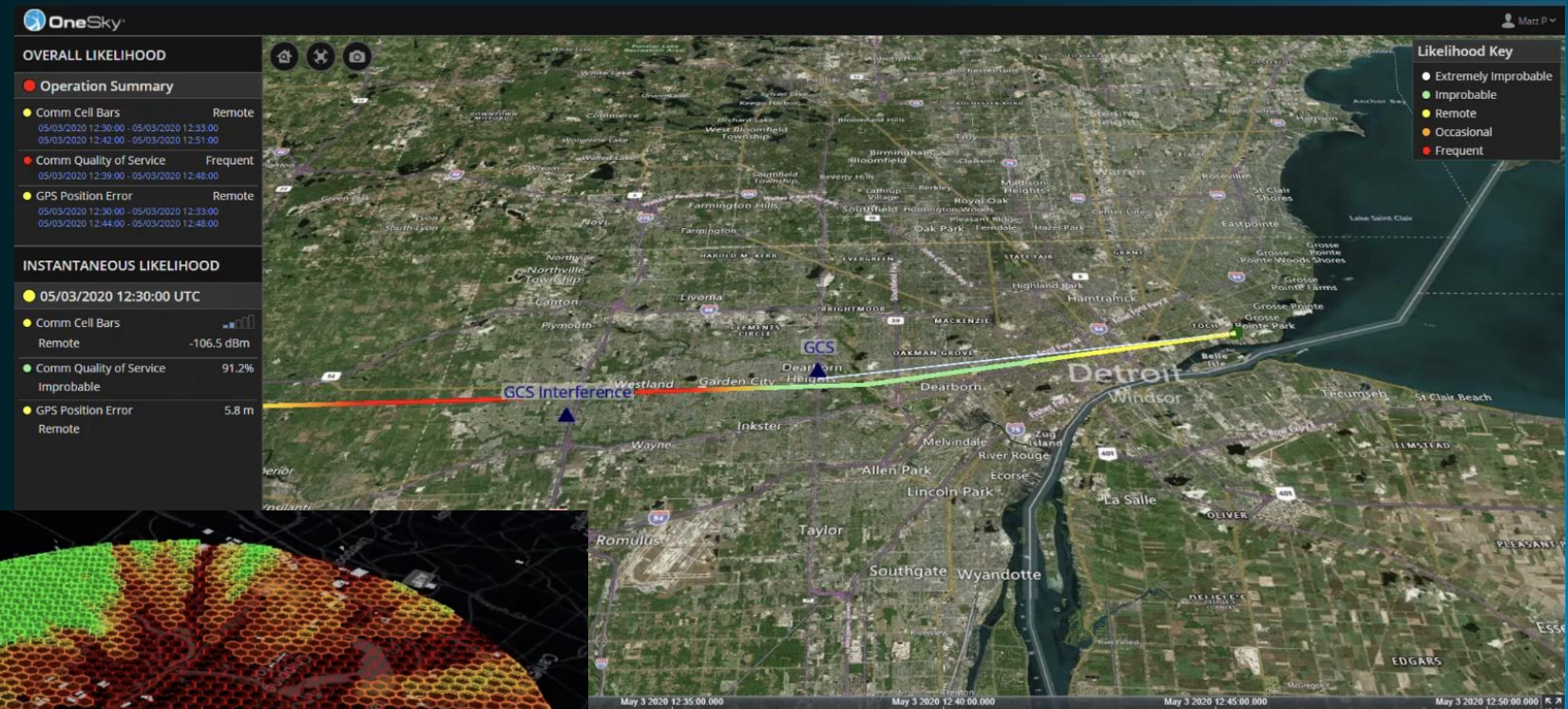
- Position Accuracy
- Augmentation Performance

Surveillance

- Encounter Risk

Obstructions

- Terrain
- Buildings



Quantifiable Risk to Support SORA Process

Key Takeaways

- ATM systems have problems performing at low altitude and needs to be understood for safe operations
- Cooperative data sharing enables a more safe and efficient solution without relying on expansive non-cooperative surveillance networks
- FIMS/USS is based on common services, but the line can move based on the customer. The software solution should be modular and able to be configured
- ASTM provides the glue to hold architecture pieces together, and data can be used easily within an ASTM construct to share flight plans, tracks and constraints

Thank You

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