UTM Service Suppliers

Organizational Construct and Approval Processes

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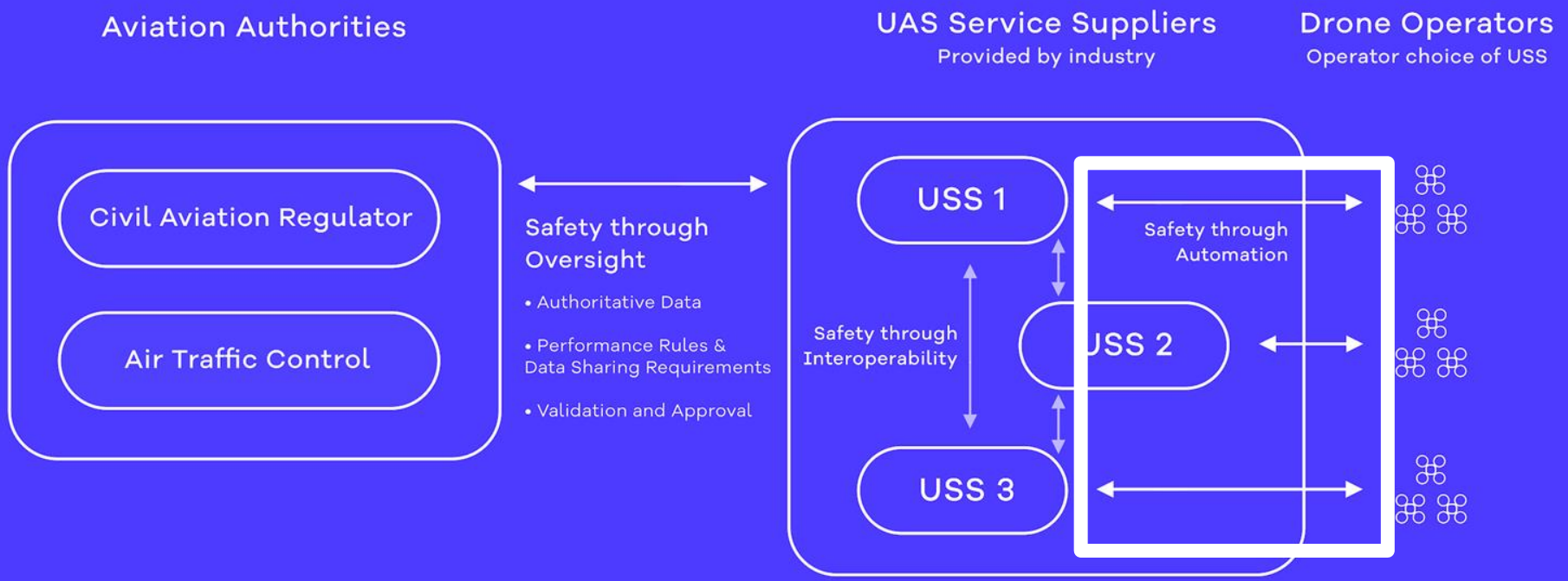
Diversity

Emergency Response, Humanitarian Aid & Disaster Relief, Conservation, Bird Mitigation Disease Control, Defense, Healthcare, Agriculture, Weather Forecasting, Maritime, Waste Management, Energy, Mining, Construction Planning, Infrastructure Development & Inspection, Insurance, Realty, Urban Planning, Personal Transportation, Airline Inspection, Telecommunications, Internet Access, Outdoor Industry, Tourism & Hospitality, Live Entertainment, Sports, Film Industry, Advertising, Retail Delivery, Manufacturing & Inventory Management, Law Enforcement, Fitness, Food Services Industry, Journalisms & News Coverage, Gaming, Space, Education, Security, Search & Rescue

Given the number and type of UAS operations envisioned, it is clear that the existing Air Traffic Management System cannot cost-effectively scale to deliver services for UAS.

Federal Aviation Administration
UTM Concept of Operations, v1.0

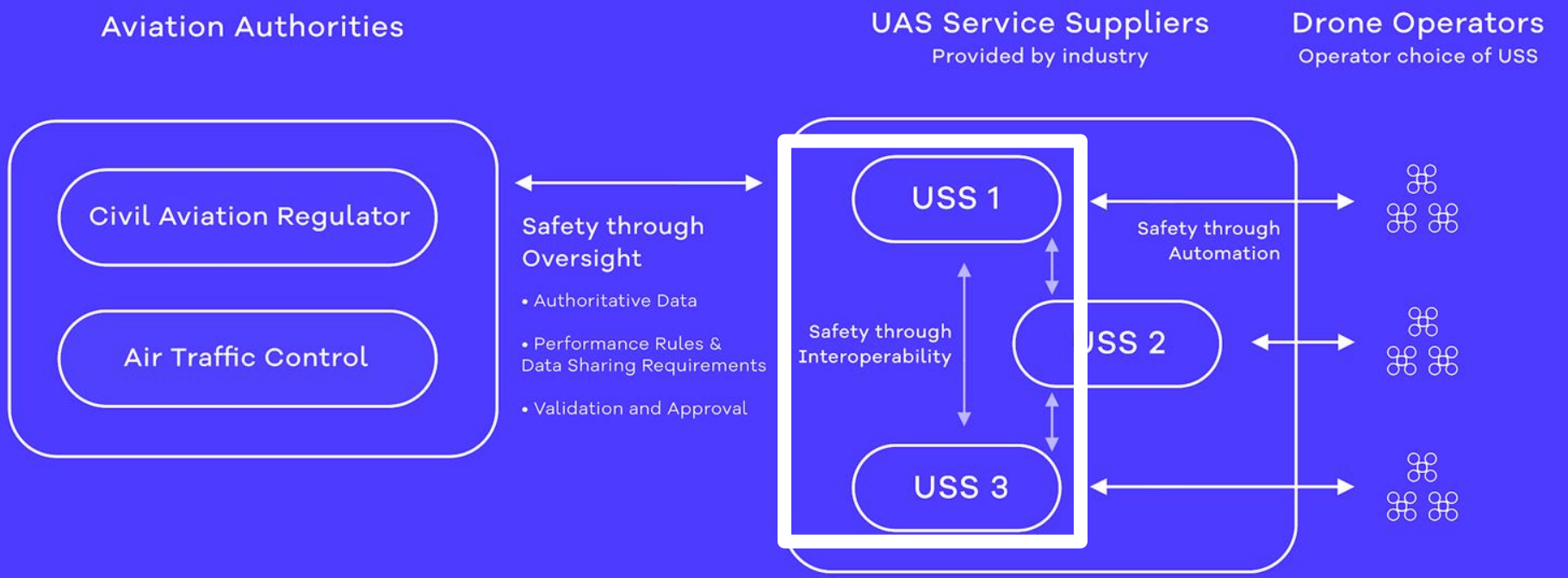
UTM Ecosystem



Safety Through Automation

- Increased automation leads to reduced potential for human error; examples:
  - Geo-awareness
  - Conflict detection
  - Conformance monitoring
  - Ground-risk buffer determinations
- Automation is tailored to the operation (not one-size-fits-all)
  - Different vehicles have different performance and levels of automation
  - Each operation has different risks and needs
  - Match the range of SORA Specific Assurance and Integrity Levels
- Approved providers help operators achieve their safety case through Service Level Agreements based on operation
- USS Capabilities should be defined using performance-based requirements, not prescriptive to support diversity
  - Includes security and privacy
  - Integrated with safety management systems

UTM Ecosystem



Safety Through Interoperability

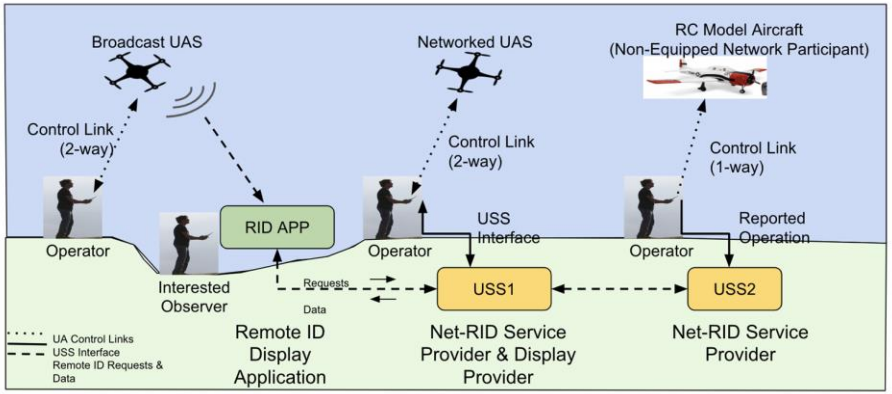
- Interoperability is necessary for distributed USSs to exchange data when necessary, e.g.:
  - Deconfliction, negotiation, remote identification

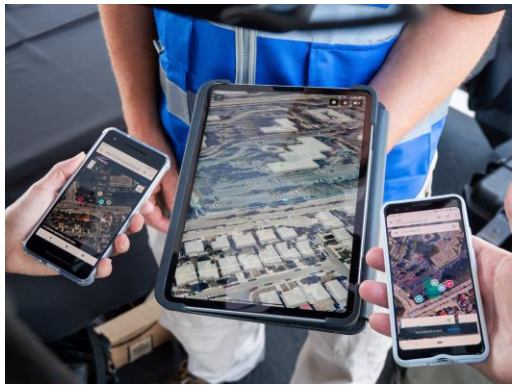
- Standards-based interoperability
  - Promotes global harmonization and can be used by CAAs for oversight
  - Minimally sufficient interoperability via APIs (e.g. ASTM Remote ID standard)
    - Path for innovation and evolution by allowing implementations to exceed standards
  - Data consistency is critical in a distributed ecosystem and best assured through standards

- Standards allow security and privacy to be built-in and handled in a consistent manner

Examples of Interoperability

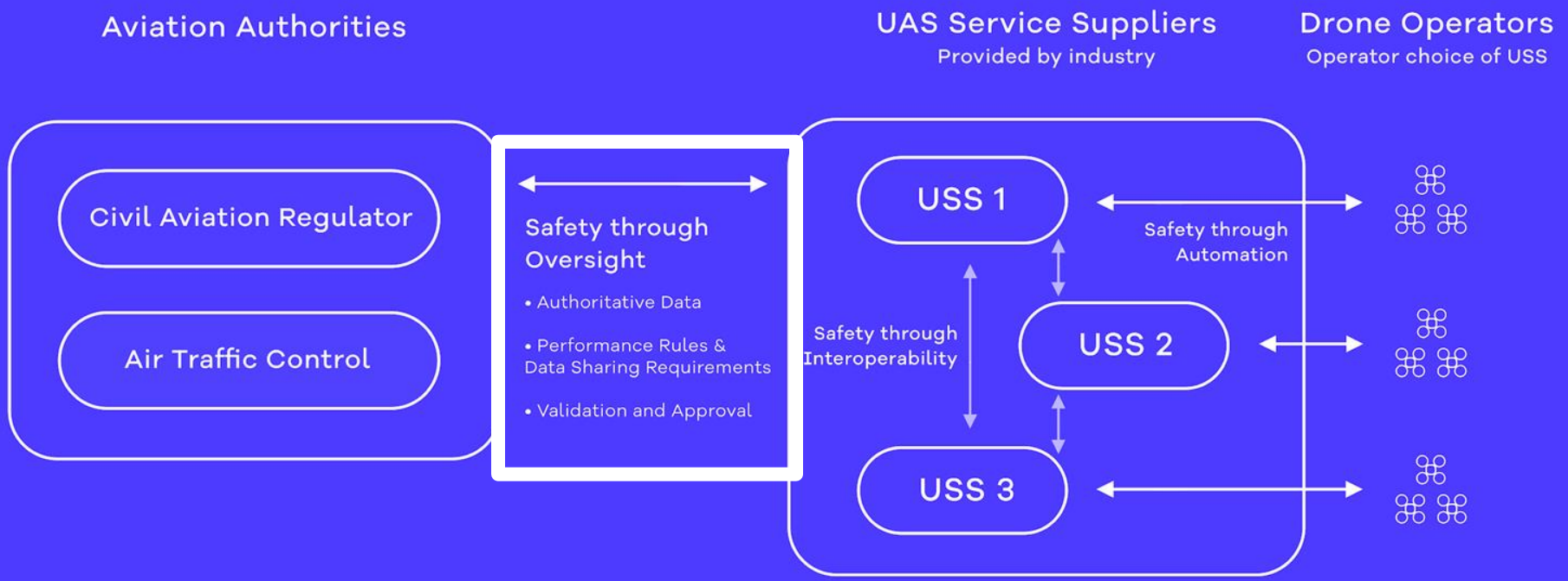
ASTM Remote ID





FAA UTM Pilot Program

UTM Ecosystem



FAA LAANC: Case Study in Partnership + Oversight

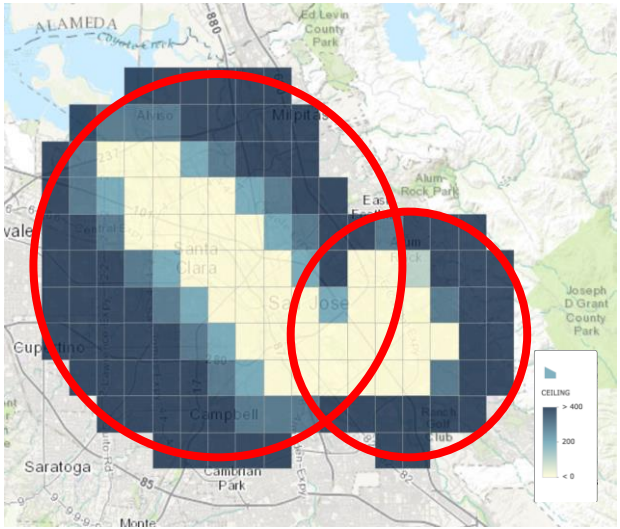
CAA/ANSP

- Rules & Data
- APIs

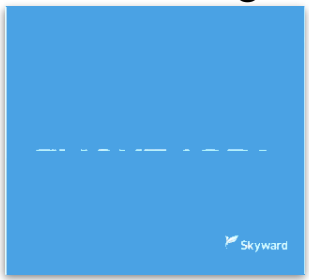
Partnership
~ 1 yr Investment
No RFP

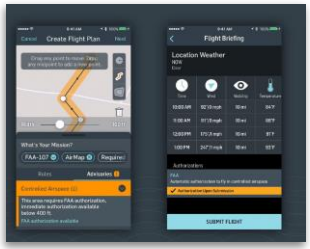
Industry

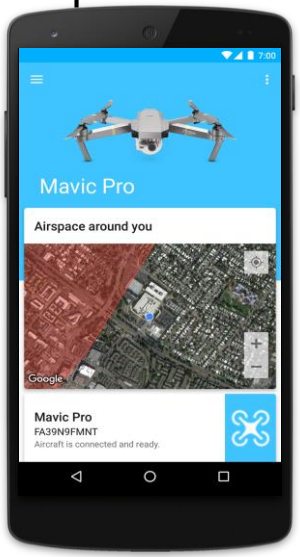
- User Interface
- Range of operators



Improved
Automated Airspace Access
User Compliance
Workload







LAANC Ecosystem with Approved Providers

Data

Table 1: Required Sources for Certain LAANC Information Types

Rule	Information Type	Authoritative Source	Category / Dataset
[3.2.2a]	UAS Facility Maps (UASFMs)	http://udds-faa.opendata.arcgis.com	UAS Facility Map Data / FAA UAS Facility Map Data V2
[3.2.2b]	National Security UAS Flight Restrictions (NSUFRs)	http://udds-faa.opendata.arcgis.com	National Security UAS Flight Restrictions / National Security UAS Flight Restrictions
[3.2.2c]	Class Airspace	http://adds-faa.opendata.arcgis.com	Airspace / Class Airspace
[3.2.2d]	Airports	http://adds-faa.opendata.arcgis.com	Airports / Airports
[3.2.2e]	Stadiums	http://adds-faa.opendata.arcgis.com	Miscellaneous / Stadiums
[3.2.2f]	Washington D.C. FRZ	http://adds-faa.opendata.arcgis.com	Airspace / Airspace Boundary

Scenario Based Testing

3.6 Scenario #6: Part 107 Auto Crossing Airspace Boundaries

The area of the test operation is downtown Sunnyvale in CA. The test operation falls under both SJC and NUQ UASFMs. The airspace boundary between the two intersects the operational area. Prior to the start of this test, your application should be configured to communicate with the FAA LAANC "Staging" environment.

Rules

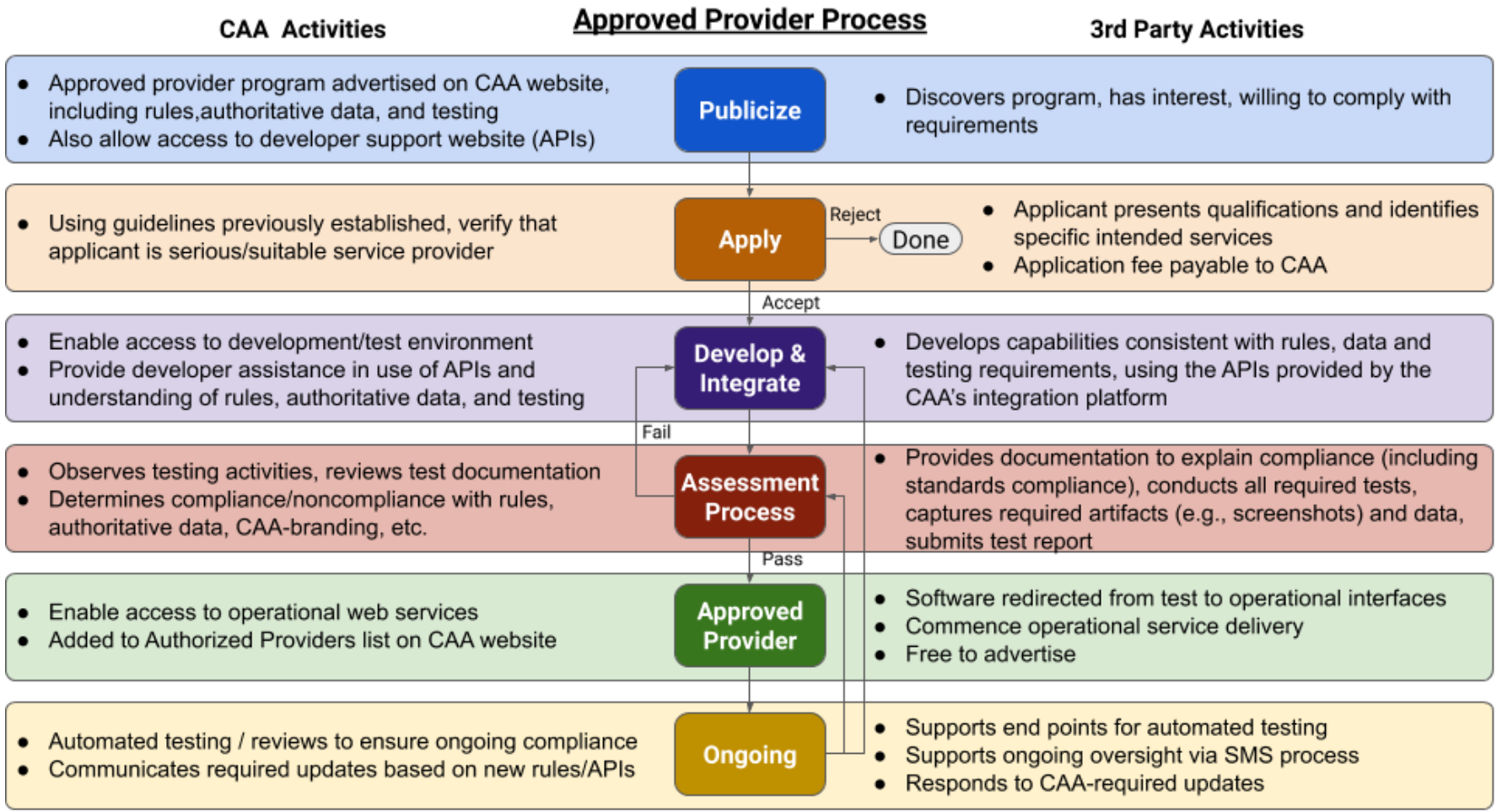
Rule	Operation Type	USS Responsibility	Notes
[3.4.4d]	Operations exceeding 400 feet (§107.51b)	Block	This request type is not supported by LAANC.
[3.4.4e]	Operations at night (§107.29)	Block	USS must employ a reasonable algorithm for civil twilight and block accordingly.
[3.4.4f]	Operations in an NSUFR or the DC FRZ (§107.47)	Block	This request type is not supported by LAANC.
[3.4.4g]	Operations in a Prohibited or active Restricted SUA (§107.45)	Block	This request type is not supported by LAANC. USS is only responsible for start/end times published on sua.faa.gov.
[3.4.4h]	Operations in a TFR (§107.47)	Advise	Providing FAA link(s) per [3.4.4c] minimally satisfies this rule. USS may read digital TFR's and display them. Blocking is permissible but not required.
[3.4.4i]	Operations in another type of SUA (MOA, CFA, Warning, Alert, etc.) (§107.49)	Advise	Providing FAA link(s) per [3.4.4c] minimally satisfies this rule. USS may read digital SUAs for these other types and display them. Blocking is permissible but not required.
[3.4.4j]	Operations within 3NM of a stadium (§107.47)	Advise	Identifying stadium area minimally satisfies this rule. USSs may offer additional guidance (e.g. event times) on a best-effort basis. Blocking is permissible but not required.

Data + Rules + Testing = **Approved Provider**

CASA approach to RPAS Application

From RPAS Platform Approach to Market:

- … delivering this [service] via a single-supplier application endorsed or sponsored by CASA is not the most cost effective approach for CASA.
- As CASA seeks to introduce a range of digital RPA services to support the safe integration of RPAs into Australian airspace, it will be challenging for CASA to deliver a single-supplier application that meets the requirements of the broad range of RPA users.
- CASA recognises the opportunity for industry-developed solutions to industry information sharing needs in an evolving commercial, operational and regulatory landscape.
- Globally, other National Aviation Authorities (NAAs) have responded to similar problems through a collaborative approach with industry, with some NAAs choosing to provide the underlying data, tools and approvals platform that enables industry and app developers to develop their own software applications to interface the NAA's platform.

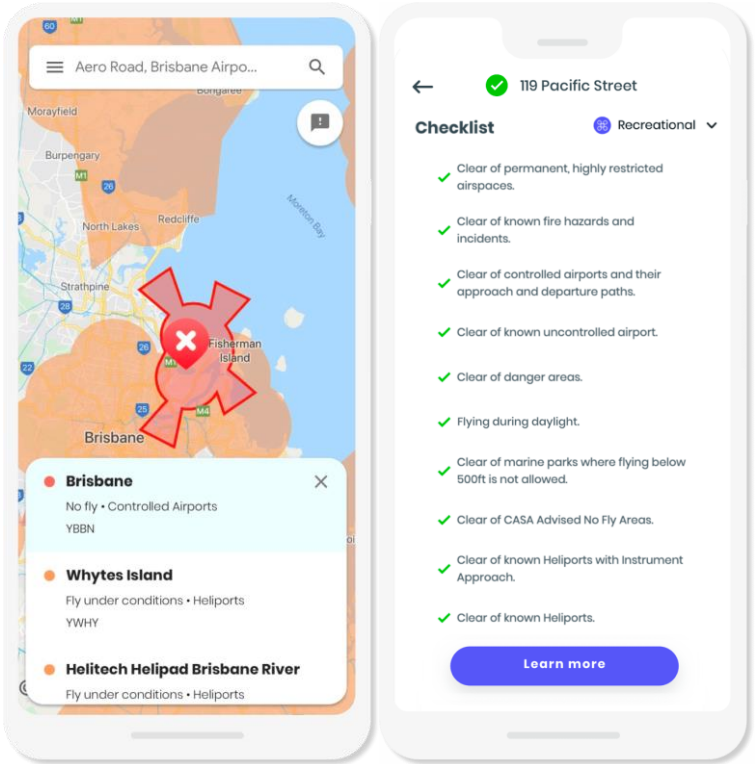

CAA Activities
Approved Provider Process
3rd Party Activities
Approved provider program advertised on CAA website, including rules,authoritative data, and testing
Also allow access to developer support website (APIs)
Publicize
Discovers program, has interest, willing to comply with requirements
Using guidelines previously established, verify that applicant is serious/suitable service provider
Apply
Reject
Done
Applicant presents qualifications and identifies specific intended services
Application fee payable to CAA
Accept
Enable access to development/test environment
Provide developer assistance in use of APIs and understanding of rules, authoritative data, and testing
Develop & Integrate
Develops capabilities consistent with rules, data and testing requirements, using the APIs provided by the CAA's integration platform
Fail
Observes testing activities, reviews test documentation
Determines compliance/noncompliance with rules, authoritative data, CAA-branding, etc.
Assessment Process
Provides documentation to explain compliance (including standards compliance), conducts all required tests, captures required artifacts (e.g., screenshots) and data, submits test report
Pass
Enable access to operational web services
Added to Authorized Providers list on CAA website
Approved Provider
Software redirected from test to operational interfaces
Commence operational service delivery
Free to advertise
Automated testing / reviews to ensure ongoing compliance
Communicates required updates based on new rules/APIs
Ongoing
Supports end points for automated testing
Supports ongoing oversight via SMS process
Responds to CAA-required updates

The start of a ecosystem in 3 months

Data + Rules + Testing = **Approved Provider**

- Created a list of required and authoritative data
  - Included non aeronautical data for support of fire incidents
- Tailored definition of rules per flight rule (recreational, commercial excluded, ReOC)
- Initial onboarding and testing procedures
- First industry application through adhering to the process
  - More applications coming with broad demand

CASA Verified Drone Flyer App



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Consideration for an Ecosystem

- Don’t build it - oversight it
  - Technology world is rapidly changing
  - Challenging to keep pace in an RFP market
- Don’t be overly prescriptive
  - Especially when it comes to User Experience
  - Beware of subjectivity - remain performance-based
  - Business cases and products will evolved
- Do leverage standards
  - Commitment to Interoperability and Open-Source Software
- Do expect to learn over time
  - How do we adapt to the a new vehicle type or app or service?
- Do focus on automated and ongoing validation

UTM Ecosystem