

Australian Government
Department of Infrastructure, Transport, Regional Development and Communication
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National Aviation Policy Issues Paper on Emerging Aviation Technologies

Airbus UTM welcomes the opportunity to comment on the Australian government's paper on National Aviation policy issues. We agree that the paper is a good starting point for ongoing discussion and collaboration between government, industry and the broader community to develop a comprehensive national policy. This will allow Australia to benefit from the considerable opportunities provided by emerging aviation technologies whilst effectively managing the risks and impacts associated with their use.

Our comments focus on UTM only and we welcome further dialogue on any area listed below.

1. Safety

Airbus UTM believes system-level safety is a priority in the development and implementation of UTM and encourages the Australian government to consider adopting standardized simulation-based testing as a supplemental layer in the verification of UTM systems. This concept is similar to the verification of ACAS X, where simulated encounters between aircraft were used to support the certification tests for the collision avoidance system. In the case of ACAS X, simulation was not a replacement for system-level risk analysis or flight testing, but instead a critical supplemental component that was used to accelerate the software certification process while still meeting the highest levels of safety requirements. A similar simulation driven verification approach is possible in the UTM ecosystem, and it could serve as an accelerator of development and deployment of UTM services.

2. Architecture

Airbus UTM supports the guiding UTM architecture proposed by the Australian government. In particular, we believe that the proposed federated architecture composed of multiple interoperating service providers (USSs) with centralized government services (FIMS) providing directives, constraints and requests is an effective way to enable a system that is market driven, can be iterated upon, and meets key safety and fairness requirements that exist in the airspace.

The role that centralized services play in UTM may be a key difference between UTM systems in various nation states. Airbus UTM welcomes an architecture that allows the FIMS to be more directly involved in managing the airspace through directives to USSs as proposed by the Australian government. We believe that a set of centralized FIMS services that supports USSs in enabling safe integration of UAS operations, in an efficient and fair manner, is critical to a sustainable UTM ecosystem.

3. Importance of demonstrations, technology trials and simulation.

Airbus UTM supports the use of demonstrations, technology trials and sandboxes to refine and validate proposed UTM architectures and technologies. Demonstrations, in particular, provide an opportunity to experiment safely to prove out additional future technologies.

The NASA Technology Capability Level demonstrations, which brought together participants from industry and government, made important progress in the development of the UTM architecture and technologies now being proposed by the FAA and ASTM. An example is the federated architecture with deconfliction in an interoperable environment supported by a discovery and synchronization service. As a result of their success, these demonstrations are being emulated for UAM by NASA in the National Campaign.

In Europe the European Commission launched the European Network of U-space Demonstrators to support U-space projects and solutions. The network is a forum to share knowledge on how to keep drone operations safe, secure and green. EASA's engagement in the current network of U-space Demonstrators allows them to engage with stakeholders in innovation activities to expeditiously move U-space regulation forward.

Architecture and functional allocation are foundational to further technology development. Demonstrations will play an important role in validation, but it is appreciated that they take time to coordinate and complete, especially when involving multiple participants. Simulation provides a useful tool to study trade-offs between alternative architectures and functional allocations at scale. We encourage the Australian government to partner with industry to use simulation alongside demonstrations to validate the UTM architecture and functional allocation between the FIMS and USS's in Australia. This should include identification of services that would be provided by the government. A timeline on how the Australian government sees these fitting into initial FIMS development by Airservices Australia would be very helpful.

For the verification of UTM systems, Airbus UTM proposes a simulation driven approach for validation that can automatically discover the failure modes of a decision making system, and optimize the parameters that configure the system to improve its performance. A simulation driven testing paradigm has emerged in autonomous driving that allows systems to undergo rigorous testing before the systems are used to make driving decisions. These methodologies have shown to dramatically reduce development time, and significantly improve safety. However, the challenge with safety-critical systems is that it is the rare and non-intuitive events and configurations that lead to system failures. Simulation can be prohibitively expensive in cases where billions of configurations must be evaluated and considered. To address this issue, adaptive stress testing has been recently proposed as a practical approach to finding most-likely failure scenarios. Airbus UTM and Iowa State University recently published a paper on this topic¹

4. Traffic management for the future

Looking further ahead we envision a single airspace management system to manage all air traffic. UTM will offer digital and automated services which can pave the way for future services and new concepts of operation, while working alongside and converging with current ATM advancements. It is critically important however that the system must be interoperable across countries, and compatible with ATM upgrades. Industry can play a greater role helping to address these challenges, and in turn, help realize the benefits arising from ongoing innovation across the aviation sector.

UTM is being implemented today in a patchwork of different standards and regulatory frameworks. Unless we follow a cohesive, global approach, it will result in non-interoperability and inefficiency. UTM development must have provisions for evolution in order to support a future "integrated airspace and ATM" operating concept, not just the

¹ https://cpb-us-w2.wpmucdn.com/web.seas.gwu.edu/dist/9/15/files/2020/05/Stress_Testing.pdf

needs of the here-and-now small UAS sector. More detailed information is available in a recently released joint paper by Airbus and Boeing².

5. Remote ID

Airbus UTM agrees with the Australian government that there is a critical need for UAS surveillance capabilities. We believe that additional services and technologies need to be developed to ensure robust and reliable surveillance of UAS. Based on our involvement in the ASTM Remote ID standard and the FAA Remote ID USS cohort, we see Remote ID as a complementary service to surveillance. Remote ID can be thought of as means to verify the identity of the UAS, while surveillance is real-time tracking of operating UAS in the airspace.

6. Fairness

Airbus UTM welcomes that the Australian government includes fairness and equitable access to airspace as a core component of Australia's UTM system alongside safety and security. We also welcome that the Australian government identifies the need to safeguard fairness and equity in integrating new aircraft with existing airspace users. We suggest that studies be included in the development of regulation that consider competitive behavior and gaming, which could be useful for identifying approaches to deconfliction that ensure fairness. Airbus UTM has published a white paper on fairness in UTM, and a conference paper on fairness in strategic deconfliction³.

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² <https://www.airbusutm.com/a-new-digital-era>

³ <https://www.airbusutm.com/airspace-fairness>