

Overcoming drone culture clash



Credit: Adobestock/agnormark

A regulatory infrastructure to cover the diversity of drones and their myriad applications is essential.

Achieving a coherent, harmonised regulatory framework for unmanned aircraft systems will not be easy but is essential in light of the sector’s extraordinary growth.

Unmanned aircraft systems (UAS) – commonly referred to as drones – are growing in number across the world. In the US, for example, the Federal Aviation Administration anticipates 7 million drones by 2020. Retail sales are almost doubling each year and corporate investment in the sector is surging.

Already there have been many instances of drones endangering safe operations. In July 2016, for example, an Airbus A320 carrying 165 passengers came within 66 feet of a drone on its approach to London Heathrow. Earlier, in 2015,

two flights reported a drone operating near New York’s JFK Airport. These incidents are by no means isolated.

Work continues on the correct regulatory response. Previously, the scarcity of drones meant they could be handled on a case-by-case basis, especially since the military were the main drivers behind the technology. But that paradigm no longer holds.

A regulatory infrastructure to cover the diversity of drones and their myriad applications is essential. The complexity of the challenge has led to fundamental questions on what a UAS traffic management (UTM) system might include.

There is no “one size fits all” solution... so it needs a notional framework that could be agile and adaptable for each State, but that maintains a minimum set of common core performance and equipage requirements that satisfy a global baseline.

“There is no one-size-fits-all solution here,” says Doug Davis, Director of Airworthiness at Northrop Grumman and Chair of the CANSO Remotely Piloted Aircraft Systems and Emerging Technologies Workgroup.

“Consequently, we should be looking at a notional framework that could be agile and adaptable for each State, but that maintains a minimum set of common core performance and equipage requirements that satisfy a global baseline.

"Identifying that global baseline and implementing a UTM framework should be the responsibility of regulators, ANSPs, and the industry working together," he adds.

"I think ICAO is best suited as the proper organisation to act as the convener of this, and CANSO, obviously, is best suited to act as the voice of the ANSPs."

Safety first

Arguably the biggest unknown is how to reconcile UTM with the existing rules governing civil aviation. On the face of it, UTM cannot be developed in isolation but must take full account of the safety-first, State-driven ICAO mandates governing ATM.

The drone-sector, however, is a fast-moving, business-oriented sector that pays little heed to national boundaries. Because of this clash of cultures – which can also be thought of as a top-down versus bottom-up battle – ANSPs remain cautious about incorporating UTM into the existing system.

One idea is to accept that caution and keep the two sectors separate by implementing a buffer zone. This entails ensuring UAS and civil aircraft do not use the same airspace at the same time.

The safety advantage is clear – civil aviation would be protected from unauthorised drones flying too close to aircraft. At the same time, it permits the drone sector to benefit from established rules and a mature, safety-first industry.

Though keeping the two sectors completely separate is impractical, any boundary crossing would be subject to strict conditions. One obvious step would be to ensure any drone in civil aviation airspace is able to replicate aircraft functionality or at least remain well clear from other aircraft.

This is an idea endorsed by Sean Cassidy, Amazon Prime Air's Director of Strategic Partnerships. He agrees that "access should be defined by capabilities." In a recent interview, he noted that Amazon believes "there are different classes of operations that would require different equipment depending on the complexity of the operation and the type of airspace that they want to operate in."

Geofencing technology might be the best way to support this effort. The ability exists to ensure drones simply cannot operate in civil aviation airspace, for example by limiting its

The ability exists to ensure drones simply cannot operate in civil aviation airspace, for example by limiting its altitude. In addition, drones would need to come equipped with the necessary capabilities to detect and avoid aircraft. They would also need to have the ability to communicate with each other, sharing their precise position across the UTM.

New opportunities

UAS traffic management represents a new area of business for ANSPs, charging a fee to ensure drones keep to the rules. And the impact of this new sector may be well be the oft-mentioned disruptive technology that will spur air navigation to greater performance and service levels.

The greatest opportunity offered by drones may well be the chance to test new traffic management designs and procedures in a way that cannot be replicated in the existing ATM framework. Once validated, all that has been learned from UTM can be transferred to civil aviation to the benefit of all concerned.

In addition, drones would need to have the necessary capabilities to detect and avoid aircraft. They would also need to have the ability to communicate with each other, sharing their precise position across the UTM.

Carefree drones

Davis accepts that finding ways to mesh UAS with civil aviation is "a daunting challenge." But he insists that embracing this new technology is an exciting prospect. "We are watching new capabilities unfold on a weekly basis," he notes.

"That is very unnerving to many traditional aviation users, and for good reason. Our aviation traditions have been founded on a safety regime that has made the airspace system today safer than at any time in history. No one is interested in dismissing that heritage. We need to embrace the changes while maintaining the intent of providing a safe environment for all airspace users."

The chief concern is that a plethora of carefree drones will endanger civil aviation, as seen in the many examples of 'near misses'. But these incidents largely concern drones that are flown too close to airports, which is already illegal in many countries. In this respect, some observers are questioning the necessity of UTM.

Very few drones are expected to be authorised to actually share airspace with civil aviation, for example, operating instead at low or very high altitudes. The suggestion is that a flight plan, predefined corridors and minimal regulation would be enough to cope with drone operations.



Prime example: should access be defined by capabilities?

Credit: Amazon

Davis believes that the industry's vision must be longer term. "The advent of complex automation has the potential to reshape the entire aviation sector," he says. "We are already seeing the seeds of it in the rail and automotive industries so it stands to reason that the migration to aviation is next.

"Rather than pursuing a low altitude and high altitude entrance criteria, we should take a more holistic approach to future airspace regulatory and operational requirements," he continues.

"Our current airspace structure was founded on ground-based technologies and has served us well. With the advent of exciting new space-based capabilities that are already being taken advantage of in areas like performance-based navigation, the opportunity to reshape the future for all airspace users, manned or unmanned, is right before us."

Embedded ability

Relying on technology rather than regulation is consistent with a performance-based regulatory approach.

In a paper on UTM, Francis Schubert, Deputy CEO of skyguide, suggests the elements of a performance-based regulatory framework for the UAS environment would include:

There is the question of who might be responsible for managing and overseeing UTM. An ANSP is one possibility. A new operator or network of operators is another. These new operators could in theory be private companies and, if UTM airspace is separated from civil aviation airspace, there could even be competition.

- the need for UAS operating in the UTM to have the embedded ability to remain outside airspace sectors where such operations are prohibited
- the need for UAS entering the airspace open to civil aviation to have the capability to operate as ordinary aircraft or to maintain distance from ordinary aircraft and from each other
- the need for the operation of any UAS that cannot comply with the above requirement to be based on a concept of operation prepared by the operator and approved by both the competent regulatory authority and ANSP
- the need for any manned aircraft flying within the UTM airspace (e.g. low-flying helicopter) to carry equipment making it fully conspicuous to UAS so the latter can keep clear from the manned civil aircraft.

Then there is the question of who might be responsible for managing and overseeing UTM. An ANSP is one possibility. A new operator or network of operators is another. These new operators could in theory be private companies and, if UTM airspace is separated from civil aviation airspace, there could even be competition.

A UTM's economic and political context will be different from the legacy infrastructure making competition possible and practical. A competitive model would be more difficult in non-segregated airspace, however.

Davis suggests that conducting critical research to prove UTM concepts is necessary before decisions can be made about oversight responsibility. "A list of key assumptions including regulatory constraints, compliance to rules of the air, flight over population and so forth needs to be developed," he says.

"Research needs to be identified and completed to assist the community in the right aspects and applications of risk management. Once complete, ANSPs can make an informed safety and business decision about the appropriate level of management for UTM."

Whatever that research reveals, there is little doubt that the magnitude of drone flights in the future means that UAS operations must be properly supported. While there has been activity at the national level, the vision must be for harmonised, global UTM.

The big challenge will be successfully blending two different cultures. The key will be merging the robust safety culture of civil aviation air traffic management with the disruptive nature of UAS and so force innovative thinking, technology and procedures. ➤



Credit: AdobeStock/pixone3d

Drone operations close to airports are already illegal in many countries.