



ITALY submission on

ICAO Unmanned Aircraft System Traffic Management (UTM)

Request for Information (Drone Enable 3)

Abstract

At first ICAO Drone Enable Event, September 2017, Italy presented to its approach toward implementation of a national UTM (UAS Traffic Management) instance, scalable and also exportable to other countries, based on a business model that is financially sustainable.

After two years of further development, the Italian proposal offers for consideration to ICAO, other States and industry stakeholders a model based upon the strong cooperation between the national civil aviation authority, the ANSP and the other stakeholders. According to that model the ANSP will play a central role in the governance and in the provision of a set of core, thus regulated, UTM services, i.e. the essential services required for the safe integration of drones, as a public service, and in full cooperation with the wider aviation community. Other non-core UTM services might be provided also by entities in the open market, such as vertical applications, fleet management, improved data feed for more accurate mission design, pre and post-production of data, broad-band data streams, highly reliable C2 links, charging paddock, etc.

In responding to the ICAO RFI on practical solutions, successful research and development activities and/or best practices, the Italian proposal is addressing the area d) *“UTM Service Suppliers’ (USS) organizational construct and approval processes”*.

Introduction

As the development of UTM continues to advance, there is a need to ensure a timely integration, without negatively impacting the safety of aviation operations or the safety of persons and property, while considering security, privacy and accessibility of airspace.

So, the growth in the use of drones for commercial and recreational purposes presents both huge opportunities and significant challenges. Safely enabling such new airspace users into our unique and busy sky requires careful planning and strong cooperation across many different actors. Italy, through a cooperation settled by the Italian CAA (ENAC), the main civil ANSP (ENAV) and the Italian Airforce, has already started the implementation of UTM (in Europe known as U-space) services.

Basic UTM services, such as e-registration, static identification and geo-awareness services, have been provided to operators, through the web portal www.d-flight.it, since august 2016, on an experimental basis. After three years of trials, and considering the ongoing regulatory and technology developments at international level, ENAV and main industrial national players settled a Public Private Partnership, named d-flight S.p.A., which is now ready to launch into operations the U-space foundation services: e-registration, e-identification, geo-awareness, support to mission validation and authorization, under the regulatory and oversight responsibilities of the CAA.

U-space concept

Under the umbrella of the European Union regulations, Europe and its Member States were called for the timely development of the U-space, the European “brand” of UTM.

U-space is a set of new services and specific procedures designed to support safe, efficient and secure access to airspace for large numbers of drones. U-space provides an enabling framework to support routine drone operations, as well as a clear and effective interface to manned aviation, ANSP service providers and authorities. It addresses the needs to support all types of missions and may concern all drone users and categories of drones in all operating environments, and in all types of airspace.

The U-space architecture

The national system is built upon a highly flexible U-space architecture concept which can be easily adapted, depending on needs and national arrangements, to a State, to a Region or to a big municipality.

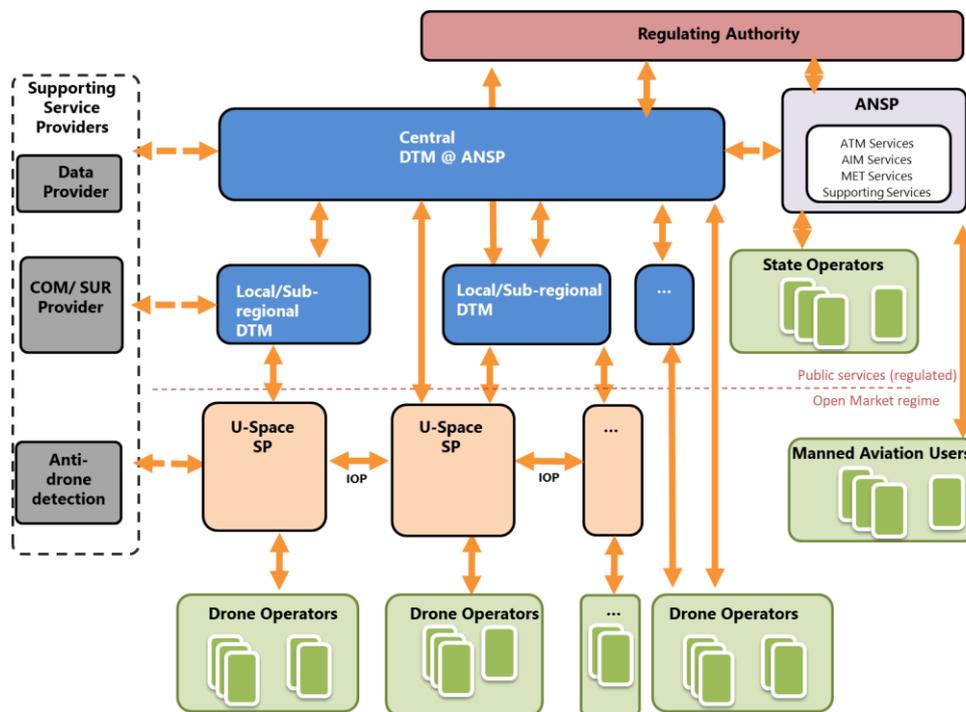


Figure 1 - Proposed U-space Architecture Model

This model foresees an overarching entity, the U-space Service Manager, to be designated by the State, to deploy, manage and operate the essential services required for the safe integration of drones into the airspace and to ensure the coexistence of UTM and ATM (Air Traffic Management), providing, as a public service, a set of basic functions to downstream U-space Service Suppliers.

Services would include drone flight plan dissemination and/or approval where required; the provision of reliable aeronautical and airspace data (restricted areas, temporary restricted zones, etc.) for geo-awareness (responding to ICAO and EU requirements); the interface with the ATC and other civil and military authorities, as appropriate; the interface with downstream U-space Service Suppliers (USSs); the interface with neighboring U-spaces and support to cross-borders operations.

The role of the ANSP in USS provision and the Italian approach

The Italian approach vis-à-vis the general U-space concept is based on the strong conviction that the role of the U-space Service Manager should be played by the national ANSP or by an entity which is fully controlled by the ANSP.

It has to be considered that ANSPs are the entities having in place systems, expertise and procedures which, according to ICAO provisions, can ensure the safety and security of operations within UTM and where UTM and ATM will inevitably overlap.

The growing number of drones operating in the airspace together with the growing performance of drones will make not efficient and not possible to segregate drone operations in specific parts of the airspace.

ANSPs are already adopting measures that help to protect the safety of those existing airspace users especially at or close to the airports. Many of those measures are either the same, or similar, to those required to facilitate the safe growth of drone applications. Having the ANSP, as a single organization, to provide those core essential services, offers the most efficient way to ensure they are only undertaken once but can be used by multiple users in both manned and unmanned operations.

The involvement of the Italian Airforce and other authorities

ANSPs, as recognized national institutions, will have the proper position and recognition to interact with all those entities which might be interested or impacted by drone operations especially in VLL (very low level), such as military, police and other civil servant entities.

In particular, the appropriate involvement and engagement of military authorities has to be properly considered for the defense and security requirements. In Italy, Air Force is a primary ANS provider at national level for both State aircraft (military, customs and police) and civil operations. State operations, whether GAT or OAT, are fully integrated within the national airspace, thanks to an in-depth coordinated integration between the civilian and military (Air Force) ANSPs.

When addressing drones operations it has to be considered that State aircraft are among the main users of low-altitude airspace: they carry out training or operational flight activities featured by high performance and urgency in carrying out institutional security and defense duties, also in the densely populated urban environments in a full range of activities (search and rescue, SAR, civil protection, heli-ambulances, fire-fighters, low level flight training activity, law enforcement etc.) where the need to maintain a well clear, safe and unlimited priority access to such portion of airspace has to be safeguarded in the whole U-space development process.

In this light, it is crucial to ensure maximum visibility on drone operations to ensure that those operations and military activities can co-exist and all users are in the position to carry out their intended tasks. U-space evolution will progressively introduce a “paradigm shift” in airspace surveillance that will most likely require complex collaborative capabilities to maintain an adequate situational awareness and to identify and react to unauthorized/harmful flight. U-space development and regulation shall consider very special military requirements, such as prioritization, stealth operations, management and protection of military data/information, etc. U-space development can benefit from the considerable experience accrued by military community in RPAS operations, in terms of technical, operational and

investigative airworthiness, airspace management, activities in urban areas, simultaneous management of manned and unmanned in the same portion of airspace.

U-space Service manager and the downstream USSs

While the essential services required for the safe integration of drones should remain within the perimeter of the U-space Service Manager, as a public service, other USSs might compete in the market, for the provision of non-core UTM services.

The existence of the U-space Services Manager ensures interoperability and conformity between different U-space Service Suppliers. The U-space Services Manager ensures equitable access to the airspace to all USSs and its subscribers, and harmonizes the interaction between them, the manned aviation and the involved authorities. For every downstream U-space Service Supplier, the U-space Services Manager acts as a proxy/intermediary to the manned Air Traffic Management system. Whilst the core role of the U-space Services Manager is to provide the core U-space functions outlined above, the provider of these services could, dependent on national preferences, also act as default U-space Service Supplier.

Issues on certification

Considering the services which have an impact on the safety of the operation, it is strongly recommended that relevant U-space service provision meets requirements which envisage a certification process; this represents a key requirement especially for the U-space Service Manager, whose certification shall be released and audited by the national CAA. Other USSs, operating as agent of the U-space Service Manager, certification might be required too. In such cases, the U-space Service Manager might act as the certification authority on delegation by the CAA.

It's worth to note that ANSPs, driving the change and managing UTM core services, are already certified entities; hence, the future certification framework should not impact on the status of existing certificates. Instead, the option of having requirements for the certification of providers should be seen as the natural evolution of ANSP certification, with clear additional rules and responsibilities.

Certified ANSPs can already provide UTM services, in order to guarantee the static and dynamic data accuracy, the robustness of the system and the competency of the personnel involved in the provision of UTM.

A key issue in this certification process is the collection of evidence for the acquisition/interoperability with the U-space Service Manager and the presentation of relevant information to the end users especially during the execution phase of the flight. Furthermore, certification should address quality management system, safety management system, security by design, data protection, etc.

Issues on standardization

The availability of Technical Standard will simplify interoperability between all the relevant stakeholders described in the proposed U-space Architecture Model.

Several research projects at international level are proposing suitable input for further proceed in the standardization process. Drone manufacturers world-wide could determine de-facto standards for the U-space airborne components, such as active geofencing, Detect and Avoidance Systems and Vehicle to

Vehicle communication exchanges (V2V) between drones. USSs may integrate these exchanges to complement the U-space viewpoint (strategic deconfliction messages, authorizations, approvals, monitoring alerts, tactical deconfliction messages, clearances/instructions etc.) with the UAS viewpoint (e.g. remain well clear and collision avoidance messages, payload, navigation camera etc.); each interface needs to be identified, defined and standardized for global interoperability and for creating a globally accessible market. The recognized international standardization bodies are moving their first steps in this direction. In the meanwhile, the interoperability between U-Space Service Manager and USSs is growing up based on the initial implementations and software architecture chosen by first movers, mainly at local/national level.

Conclusions

In the long-run, there will be no difference between ATM and UTM, there will be one airspace with a traffic management system or a U-space, respectively, managing all types of air traffic. This will be progressively achieved, relying on greater digitalization, automation and higher pace compared to conventional air traffic management evolution. As for today, U-space systems must be interoperable with existing air traffic management (ATM) systems and must demonstrate that they provide an equivalent level of safety and compliance with the applicable and forthcoming rules. As in ATM, a collaborative approach between stakeholders is essential in ensuring safe, secure, efficient and effective services.

International organizations (e.g. ICAO, European Union) have a crucial role to define consistent global and regional provisions, CAAs to ensure regulation and oversight of national operations covering all aspects (e.g. licences, training, certification, airworthiness), military authorities to ensure the security and military operations and ANSPs, acting as U-Space Service Managers, are best placed to provide a number of essential U-space services critical to its success, while ensuring safe integration with ATM, thus responding to the needs of drones operators.