

European Defence Agency

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UAS Airspace Insertion Europe's Strategic Dual Approach for Civil/Military Integration

Unmanned Aerial Systems (UAS) are a key element for present and future CSDP operations. At the same time, it is estimated that UAS will become increasingly important for a civilian end-user community. Hence, operating UAS within the general airspace is rather restricted; a true European UAS market has not been established yet.

Today it is simply not possible to regularly fly an unmanned aircraft safely in non segregated air space despite the fact that there are numerous UAS already in service with our Armed Forces in Europe, ongoing development programs and national purchases. We are not exploiting the full potential of our Unmanned Aircraft Systems, hence not providing our state or governmental users with the full capability of this important tool.

The challenges which hinder the broad usage of UAS range from certified technologies, accepted rules and regulations, procedures and training to transversal issues. A smooth integration of UAS in the European airspace can only be realized if all elements are successfully addressed through an integrated civil/military collaboration and drawing on the synergies created from the widest stakeholder involvement. In conclusion, creating a common understanding of integrated UAS employment is a prerequisite for success.

UAS air traffic insertion has been a priority of the European Defence Agency since its establishment, when it was introduced in the Agency's first work programme for 2005. By March 2007 the three major European stakeholders - European UAS companies under the ASD, the European Commission and the EDA - had identified, within the Air4All project, a common objective "to open the European Air Space and have the required technology demonstrations in order to produce Unmanned Aerial Vehicle Systems that can routinely fly across national borders".

In May 2007 the Defence Ministers tasked EDA to prepare a common Road Map and a subsequent implementation plan for UAS integration, outlining the way to achieve the common target by 2015. The ultimate goal for Europe is seamless integration of civil as well as military UAS into the non segregated European Airspace. This common civil/military European initiative received strong support from various stakeholders around Europe.

In the past few years, EDA started actively preparing, together with the participating Member States, the needed business cases to support the decision in what areas investments should be made and focused on. This approach is of course developed in close consultation with other European stakeholders such as Eurocontrol, European Aviation Safety Agency, EUROCAE WG 73 etc.

From this, several major work strands were initiated by EDA and have already delivered concrete results in the area of technology demonstration, certification and standardization. In

complete synergy with these work strands and drawing on the added value of civil/military cooperation, EDA strongly supports the European Commission's initiatives in this field. But let us proceed to analyzing these initiatives and the way ahead to the Europe's Strategic Dual Approach for Civil/Military Integration.

Safety and Regulatory Aspects in the Single European Sky Requirements

Aircraft have evolved to one of the safest and most reliable means of transportation and into very complex and effective defence and security systems. High level of safety has been reached through various means, which basically are regulated by very detailed Airworthiness Certification rules, processes and procedures developed by relevant authorities. While this is a fact for manned aircraft in general, Unmanned Aircraft System related regulations still focus on certification of the entire inventory of system elements.

To maintain the high level of safety is crucial for aviation in Europe and elsewhere. Military aircraft, including UAS, are widely used in a variety of contexts and environments all over the world. However, due to national sovereignty and the sensitivity of defence issues, airworthiness for military or state owned aircraft has over the years not been part of the international harmonisation procedures but being kept as a national concern. In Europe this is about to change.

As mentioned before it is clear that it will be difficult to progress on the current status or even increased freedom of UAS flying outside of segregated areas within the SES airspace without succeeding in the effort to align as much as practicable with the civil - military harmonization of safety and regulatory aspects up to the level of civil SES SESAR EASA requirements.

In this area EDA is making huge effort under the airworthiness and new SES SESAR activities to establish strong partnership with SES, SESAR JU, EASA, Eurocontrol etc.

Civil - Military and Military - Military Harmonisation of Relevant Airworthiness and Certification Rules

The EDA pMS Military Aviation authorities are aware of the stronger public opinion on the need to increase the safety of Military and state aircraft including UAS. Moreover, there is an enormous potential to speed up the development of new air systems and decrease their cost. Therefore, in line with the decision of EDA Steering Board in November 2008, EDA set up a forum for Military Airworthiness Authorities (MAWA) with a view to developing an EU-wide regulatory framework and explore external work requirements.

MAWA forum aims at achieving harmonization and identify commonalities that could form the basis for a common EU approach and shortfalls that are currently not addressed in comparison to the acknowledged civil approach which should in the end lead to a commonly agreed and supported set of airworthiness documents, rules and regulations for adoption by pMS military airworthiness authorities:

- Common regulatory framework;

- Common certification processes;
- Common approach to organizational approvals;
- Common certification/design codes;
- Common approach to preservation of airworthiness;
- Arrangements for mutual recognition;
- Formation of a European Military Joint Airworthiness Authority.

In order to achieve these goals, the forum creates links with other bodies and organizations including industry to ensure a coherent approach and avoid unnecessary duplication.

Separation & Collision Avoidance - Technology demonstration and Standardization

A major strategic technology development, which was started under the EDA responsibility, was signed and kicked off during the Le Bourget Air Show in Paris in June 2009. It is the so called MIDCAS project (Mid Air Collision Avoidance for UAS), run by five EDA Member States: France, Germany, Italy, Spain, and Sweden. The MIDCAS industry consortium is composed of thirteen companies of the five participating nations. They have a large portion of the European knowledge on Sense & Avoid as well as on all technologies relevant for the project.

The 50 million Euro technology demonstrator aims to support the development of the critical Sense & Avoid technology and thus, complementary with other activities, enable the operation of UAS in non-segregated airspace. The MIDCAS mission is to "demonstrate the baseline of solutions for the Unmanned Aircraft System Mid-air Collision Avoidance Function" acceptable by the manned aviation community and compatible with UAS operations in non-segregated airspace by 2015.

The support to progress Standardization of Mid Air Collision Avoidance for UAS is a central activity throughout the project. By providing standardization proposals, safety case contributions and through participation in EUROCAE WG 73, it aims at having a major impact on the European standardization process. A number of workshops will be arranged to support the acceptance of the results of the project, with the first such workshop to be held in autumn this year.

The project will make use of background technologies and knowledge from all parties of the consortium. A wide collaborative approach is proposed in the parts of the project where a shared view is important to support the acceptance for standardization and solution proposals. All is built around a safety case that is supporting standardization, design tradeoffs and finally flight test approvals.

Fundamental to the creation of the safety case and the design in the project is the iterative build up of reliable simulations with frequent feedback loops between design-simulation and simulation- flight tests.

The project addresses this in an iterative approach where requirements and standards are progressed in parallel with recommended solutions. Therefore the MIDCAS project is designed with tracks for functional design, demonstrator design and demonstration as well as standardization. All these ingredients will be integrated in development logics with frequent feedback between them.

Currently, the European Defence Agency is looking into a strategic standardisation approach for a common, transatlantic way forward. The European Defence Agency believes that this standardisation approach can help the future European security customer - military as well as civil - to get sound UAS capabilities.

For the European UAS agenda, the use of a common set of European Standards for UAS Traffic Insertion will enhance competition, foster innovation, release company investments and lead to further advances in technology and new civil and military applications. Hence, a common European inventory of standards will contribute to a much stronger UAS European Defence Technology Industrial Base (EDTIB) and enhance the potential export of "UAS made in Europe" due to greater economies of scale.

EDA will continue to provide support to its Member States on this important initiative and aims at responding to specific military needs in many of those fields as UAS will increasingly contribute to meet EU's security objectives

Two further important UAS work strands under the EDA umbrella are worth mentioning, both initiated out of the Air4All Road Map development.

Secure, Sustainable Communication of Command & Control

An excellent example of civil - military coordination for UAS integration is the EDA - European Space Agency (ESA) combined activity regarding Command and Control (C2) of UAS and satellite services, as well as the Air Traffic Control (ATC) data link.

Building on their respective work in the areas of UAS Air Traffic Insertion and Satellite - UAS cooperative operations, EDA and ESA have joined forces since the start of 2009 to demonstrate that technological challenges in Command and Control / Air Traffic Control can be overcome through the use of satellite services.

On the occasion of the 2010 EDA Annual Conference on "Bridging Efforts - Connecting Civilian Security and Military Capability Development" held in February 2010, EDA and ESA signed two contracts for feasibility studies on "Satellite Services for the integration of Unmanned Aircraft Systems (UAS) into European Airspace".

The two studies, worth 400,000 Euro each, explore the feasibility of a demonstration mission in the timeframe 2010/2011. In particular, the studies will look at:

- The feasibility and the overall planning for a UAS mission, demonstrating that UAS can be integrated into non-segregated airspace using satellite communications and satellite navigation for Command and Control, Sense and Avoid, and Air Traffic Control, and the added value of satellite communications for high data rate payload links;
- The viability of such a solution for future services based on UAS supported by space systems;
- The future necessary investments and the following steps required in technical and regulatory terms to effectively establish such a service;
- The roadmap for civilian, security and military services development.

Whatever the technical solutions chosen, they will have to be accompanied by a continuous regulatory work targeting ultimately the International Civil Aviation Organization level since this is the mandatory level of regulation for satellite operations.

The main drivers of UAS operations are reduced costs, improved safety, and more sustained/persistent surveillance. In this context, satellite communications and satellite navigation can provide a flexible infrastructure for UAS operations and even multi-mission capability.

The key advantages of using satellite services for UAS missions include:

- Satellite communications enable an 'always-on' communications capability to all flight levels over a wide area;
- Command, Control and Communications beyond line of sight allow the UAS pilot to be based at a mission independent central location;
- A payload data return capability beyond line of sight can provide near real-time access to mission data;
- Space-based navigation is highly accurate and may be the only option where terrestrial infrastructure is limited or non-existent.

Close coordination between the two Agencies ensures that both European civilian and defence actors will benefit from the use of multiple integrated space systems as enablers for cost-effective, sustainable and competitive UAS services in the future. This project is another promising approach which may lead towards a European International Operating Capability by 2015 in this area.

Radio Bandwidth Allocation

In order to operate UAS it is necessary to have certified safe and secure data links as well as acquire the needed frequencies (for governmental as well as civil UAS). Furthermore, common protocols are needed to allow multiple UAS on the same frequencies. Such achievements need to be compliant with the arrangements of the International Telecommunication Union.

In August 2008, EDA participating Member States tasked the Air4All Frequency Group to work towards the identification of appropriate spectrum requirements to define, consolidate and promote a common European position on the regulatory and operational UAS requirements for the 2012 World Radio Conference. The "Study on Military Spectrum Requirements for the Insertion into the General Air Traffic for UAS" (SIGAT) is one of the first steps in this direction. The 1.56 million Euros SIGAT Initiative, a support activity sponsored by 26 EDA participating Member States, targets this challenge to provide supporting information for the next World Radio Conference in 2012 (WRC12) and subsequently for the one in 2015.

... and Beyond

Beyond the technological, standardization and certification aspects building up the "hard factors" of the UAS air space integration strategy, efforts in this direction need to also address transversal issues. The "soft elements" shaping the accepted image of UAS are of paramount importance for enhanced civil-governmental use. A smooth integration of UAS in the

European airspace can only be realized if both dimensions are successfully addressed.

To this end, the European Defence Agency has accepted the European Commission's invitation, through DG MOVE, to co-organize the first high level European conference on UAS. Fully acknowledging the wide potential of UAS usage as well as the necessity of proceeding timely and in a coordinated manner, EDA recognizes the paramount importance the EC-EDA initiative has on the civil/military common project towards UAS air traffic insertion.

In the same spirit of civil/military common approach, the European Defence Agency presented to the Steering Board in Defence Minister formation the proposal for a new European effort. The proposal was to unite the efforts of EDA and its participating Member States with those of the European Commission and Industry, to meet the same challenge of overcoming the obstacles to operating military and security UAS in European airspace.

Based on its structure and mandate, EDA brings together expertise regarding capability development, research & technology, armaments, as well as industry and market, in view of ensuring a capability-driven output and incorporating technologies and industrial knowledge at an early stage of planning. The military market for UAS per se, however, will be too limited for industry to reach sufficient economies of scale and to be confident regarding its future competitiveness and return on investment.

I am therefore convinced that a fruitful and mutually beneficial dialogue between the defence, security and civilian sector, with a strong transatlantic link, will allow Europe to be a major player in preparing the future of UAS and to use our European taxpayer's money the best we can, to open the sky for Unmanned Aircraft Systems.

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