European High-Level Unmanned Aircraft Systems Conference

Background on EDA UAS activities

Unmanned Aircraft Systems

UAS: new opportunities for Europe

UAS are a key element for present and future CSDP operations. Furthermore, it is estimated that UAS will become increasingly important for a civilian end-user community. Despite this growing civil/security/defence need, a true European UAS market has not materialised yet.

The major challenge which hinders broad usage of UAS is the lack of certified technologies and accepted rules and regulations. However, airspace integration cannot be achieved by addressing these "hard factors" alone. 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 realised if both elements are successfully addressed.

The European Defence Agency (EDA) and the European Commission (EC) have already paved the way for a shared understanding on the needed UAS technologies and future actions. As the next recognised step, both organisations are launching this common political awareness initiative aimed at increasing support at all levels.

The aim of the first civil/security/defence UAS Conference is to raise public awareness and political support for the stepped integration of unmanned vehicles in non-segregated airspace.

The philosophy of the 2010 UAS Conference builds on the European vision of coordinated efforts towards innovation for a better life. The aim is to inform decision-makers on the added value of UAS designed, produced and used in Europe. This will give the EU the opportunity to (i) create new sources of growth; (ii) develop innovative solutions; (iii) further strengthen the European Technological and Industrial Base (ETIB); and thus make UAS usage a reality.

UAS AS A PRIORITY

The European Commission has successfully included UAS in its Framework Programmes 6 and 7 focusing on UAS Air Traffic Management integration as well as civil UAS stakeholder networking.

UAS air traffic insertion has been an EDA priority 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 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."

EDA STEERING BOARD TASKING

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. Several major work strands were initiated and have already delivered concrete results in the area of technology demonstration, certification and standardisation.

THE JOINT CIVIL/SECURITY/DEFENCE WAY FORWARD

The 2010 EDA-EC co-organised Conference marks a cornerstone in the efforts undertaken by both parties. As the first European joint civil/security/defence initiative in the field of UAS, it will widely open the path to sustainable technological innovation and bridge into a future European UAS market. As the first UAS conference especially designed for European leaders, it creates an important opportunity to address the subject within a wider community, outlining its benefits for the European citizens and the shared approach among civil/security/defence end user communities.

"There is a need for concrete synergies and result-oriented projects to effectively connect Civilian Security and Military Capability Development. In this context EDA's initiative on a 'European Framework Cooperation' aims at systematically reaping the benefits of working together with partners such as the European Commission and ESA, including the strategic research area of UAS for air traffic insertion by 2015."

Alexander Weis, EDA's Chief Executive

Future European Aerial Capabilities

OVERALL CONTEXT

Europe's Aerospace Defence Technological Industrial Base (DTIB) is critical to meeting Member States' military requirements including CSDP today and in the future; underpinning deployability and manoeuvrability and providing theatre-wide intelligence, strike and air defence capabilities adapted for Network Enabled Capabilities.

Military Aerospace is economically significant – as well as delivering the defence capabilities that Europe requires; it represents over 55% of Europe's Defence Industrial Base. The sector directly employs around 200,000 people with high-tech jobs spread across Member States. It comprises important system integrators and a dynamic and innovative supply chain rich in SMEs. Annual turnover is in the region of 45bn euro. This technically advanced area drives high added value in other sectors contributing to technological progress and innovation through its spill-over effects and is a key component of a strong European DTIB. Maintaining and strengthening European key aerospace capabilities would contribute to maintaining competition in world markets and Europe's freedom of action in its external policies.

However Europe's military aeronautics sector is facing some tough challenges. How will it preserve the capability to provide the high tech aerial capabilities Member States forces require with reduced R&T investment and constrained procurement budgets? EDA believes European collaboration must be an important part of the solution.

EDA'S ROLE

Lisbon Treaty

Under the provisions on the Common Security and Defence Policy (Article 42) it is stated that the European Defence Agency shall "contribute to identifying and, where appropriate, implementing any measure needed to strengthen the industrial and technological base of the defence sector, shall participate in defining a European capabilities and armaments policy, and shall assist the Council in evaluating the improvement of military capabilities".

EDA Steering Board tasking

The European Defence Technological Industrial Base Strategy endorsed by EDA Defence Ministers recognised that there was a need to determine "which key industrial capabilities must be preserved or developed in Europe" and it was subsequently agreed that work on identifying key industrial capabilities should begin with Future Air Systems (FAS). FAS with its ambition to conclude a strategy for a sustainable European military aerospace industry for 2035 with an immediate focus on underpinning important helicopter and UAS capabilities offers the opportunity for a more systematic and comprehensive approach.

EDA's objective

Europe is at a cross-road. Further investment in co-operative European aerospace development programmes including in collaborative Research and Development should be a priority. However, with defence budgets increasing under pressure and Member States looking for savings progress can only sensibly take place with a commitment to improved, more efficient, forms of collaboration which maximise the output from constrained defence investment. EDA is engaged in a dialogue with stakeholders on the collaborative policies, plans and programmes which could aid European decision makers safeguard European industry's ability to competitively respond to future military capabilities requirements. UAS and unmanned aerial technologies have been identified by EDA Member States as priority areas.

NEXT STEPS

Safeguarding Europe's future aerial capabilities will take time and the concerted effort of all aeronautic stakeholders. An important contribution to this work will be the

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roadmap and implementation plan activity which EDA plans to launch in the following weeks.

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Reaching for the sky

A competitive European industrial base for world class aerial capabilities

A strategy to maintain Europe's excellence in military aviation, through:

- promoting European technological excellence and leadership in military aerospace
- improving the effectiveness of military expenditure, through cost-effective European collaboration
- identifying the key industrial capabilities to meet Europe's future needs
- developing key technologies and skills
- enhancing the competences that make Europe a challenging partner
- exploiting military and civil synergies

Knowing what happens: the European case for strategic research and development investment in Unmanned Aircraft Systems for situation awareness

Unmanned Aircraft Systems are a key means for long endurance surveillance and reconnaissance, and not only for European civilian security and Common Foreign and Security Policy capabilities. UAS are key to a wide range of missions for sustained situation awareness in border surveillance, asset monitoring, environmental protection, crisis management operations and the like. They deliver the required coverage of relevant areas of interest in terms of space, time, signal spectrum, accuracy and sources of information.

Over the next two decades the foreseeable demand will still be limited, and would mainly be generated by European governmental, civilian security and defence end users. These limited market volumes will not allow the European supply chain to develop indigenous solutions, or at least not without substantial pre-commercial support from the public end users. Furthermore, the integration of Unmanned Aircraft Systems in the unrestricted airspace, prerequisite for effective accomplishment of their future mission spectrum, requires the cooperation between a wide range of authorities at national and at European level.

Lacking cooperation among the public end-user communities risks growing unnecessary duplication, jeopardizing the effectiveness of public expenditure in a situation of extreme pressure on the budgets, missing the objective of strengthening Europe's innovation base in key technology areas.

The European Defence Agency therefore promotes a joint European public-public partnership of civilian, security and defence stakeholders in the coming years to unfold the full potential of European Unmanned Aerial Systems for situation awareness. This European Framework Cooperation aims at maximising complementarity and synergy of civilian security, space and defence-related research programmes. It aims at being the European key means for strategic research and development investment in Unmanned Aerial Systems for situation awareness capabilities.

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Intelligence, Surveillance and Reconnaissance (ISR) Capability Development for CSDP: establishing the role of UAS in EU crisis management operations

The objective of ISR capability development at EDA is to provide the EU with electronic collection capabilities and resources required to achieve 'Persistent intelligence supporting knowledge-based operations' as highlighted by EDA's Capability Development Plan (CDP).

To achieve this objective EDA and its Member States are developing an 'ideal' ISR Capability Package for CSDP operations taking into account the optimum balance between cost, benefit and risk, for medium and long term. Using a 'gap' analysis the optimum ISR capability package will allow pMS and EU to rationally select effective ISR collection capabilities and resources for further consideration in terms of pooling and sharing and/or development and procurement to effectively support CSDP operations (as well as national requirements) from 2013 onwards.

The core mission of ISR assets within CMO is to deliver a sufficient coverage of relevant Areas of Intelligence Interest (AOII) in terms of space, time, spectrum, and sources of information. ISR collection, platforms and sensors, such as UAS, satellites, information exploitation, etc. have to fulfil explicit requirements which are derived from operational needs and own experience in the field of military conflicts and crisis management in general. Among others, the following requirements are considered to be of specific relevance:

• Response to relevant scopes for the EU and pMS (incl. non-military aspects)
• Response to the ISR relevant guidelines in the EU Requirements Catalogue 05
• Fulfilment of NEC standards in order to gain interoperability with all ISR structures and other EU owned domains
• Usage of state-of-the-art technologies for ISR sensors
• Appropriate data & information processing, analysis, and evaluation techniques
• Usage of existing and developing standards
• Sufficient parameters of geo-reference and time-truth (especially of imagery)
• Near real-time (NRT) transfer of processed data to the user.

As a result the availability of relevant information on demand, on time, in sufficient quality, at any appropriate level is required in terms of ISR capabilities called for.

The required ISR capabilities are derived from the updated task list, formulated in the Headline Goal Task Force lessons, identifying and following objectives given in the Head Line Goal 2010 as well as in the ISR relevant guidelines in the EU Requirements Catalogue 05 and in the EU Common Staff Targets for EU ISR Architecture (2009) and Surveillance & Reconnaissance Sensor Capability (tbd. 2010).

EU ISR Architecture Design Study (09-CAP-015) - Contractors: FOI (SE), ISDEFE (ES), QinetiQ (UK)

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Sense & Avoid demonstrator for Unmanned Aircraft Systems: European Standard for a Mid-Air Collision Avoidance System

The use of Unmanned Aircraft Systems in phase for testing, training or in operations is limited today to airspace ensuring a strict segregation in time or space with the remainder of air traffic.

The EDA MID-air Collision Avoidance System (MIDCAS) project aims at solving the midair "sense and avoid" issue for UAS. The approach is to develop a demonstrator and to evaluate it in flight on manned as well as unmanned flight test platforms.
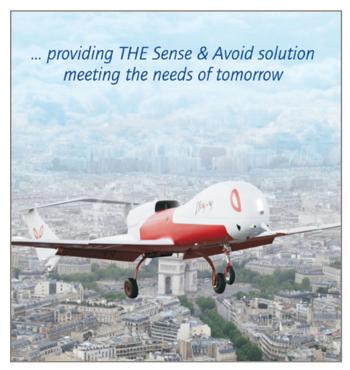
The sense and avoid issue is considered as the most critical issue to solve in order to allow UAS to fly in non-segregated airspace.
The MIDCAS overall objectives are:

• To demonstrate a Sense and Avoid system for UAS able to fulfil the requirements for traffic insertion and mid air collision

avoidance in non-segregated airspace for both cooperative and non-cooperative traffic situations.

• To provide the technical background for the establishment of a European Sense and Avoid standard in close cooperation with the European regulating and servicing organisations, e.g. EASA, EUROCONTROL and EUROCAE. This includes permanent information and interactive dialogue about the progress of the project.

... providing THE Sense & Avoid solution meeting the needs of tomorrow

• To build up an architecture and performance based on simulations and flight tests.

• To demonstrate the technical capability for future operations in all airspace classes with the same degree of access as manned aircraft. This includes the interactions with Air Traffic Control and the system functional and procedural performance in simulation and real flight.

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Reliable Command and Control link to Air Traffic Control for UAS: creation of a future C2 capability using Satellite Services

The reliable and secure data link and communication link to Air Traffic Control is essential to enable Unmanned Aircraft Systems to operate in non-segregated airspace.

This capability represents the UAS independent element of communication services supported by Satellite Systems in order to cover the operating area.

The Study aims to provide technical as well as economic evidence whether a safe and secure C2/ATC link can be provided via satellite services and whether a convincing demonstration is feasible of an UAS Beyond Line Of Sight mission supported by satellite-based command and control. This shall help resolve technical challenges linked to the integration of UAS into non-segregated airspace and provide furthermore European governmental stakeholders with a relevant business case to conduct a specific demonstration project. ESA initiated a parallel study with identical scope and purpose. In addition to the demonstration of safe and secure C2/ATC, the mission payload BLOS communication shall be considered as it is the prime interest of the end-user.

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SIGAT : Radio Spectrum Solutions In Support of UAS Insertion Into GAT

For the time being, Unmanned Aerial Systems (UAS) remotely piloted from ground are flown in segregated airspaces, where no other aircraft are allowed. The next major step would be the ability for UAS to be safely operated over long haul flights in shared airspace where civil aircraft is flying in the general air traffic (GAT). The European Defence Agency (EDA) has launched a major Study on the Insertion of UAS in the GAT (SIGAT) which is delivering its results in 2010, in view of the World Radiocommunication Conference (WRC) in 2012. In 2008, EDA participating Member States agreed a € 1.5 million funding for SIGAT to deal with specific UAS Radio Spectrum aspects.

SIGAT has identified requirements and possible solutions in terms of bandwidth assessment for command and control, payload and sense and avoid links, according to operational scenarios, industrial inputs and civil aviation and telecommunication regulatory matters. The SIGAT Consortium successfully reengineered previous bandwidth assessments and went further to address short term requirements in 2012 and made an overall spectrum need forecast for the next decade.

The primary output of SIGAT consists of a list of candidate bands for both line of sight and beyond line of sight communications, to be promoted in the preparation of the WRC at European and international levels. The details of spectrum requirements and candidate bands are available on separate leaflets.
The UAS insertion in non-segregated air space will greatly benefit from the SIGAT approach, if the proposed solutions results in new radio regulations world wide.

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NEC in support of UAS insertion into GAT

In recognising the informational challenges of today (and even more so in the future) Network Enabled Capability (NEC) represents an effort to improve information management by enabling faster, more reliable and better controlled exchange of information and allowing enhanced decision-making based on more complete information and analysis. As such, member States have identified NEC as one of the 12 EDA priority actions for capabilities development.

The Political and Security Committee (PSC) has noted in 2009 the "EU concept for NEC" in support of CSDP. To support the process of making the NEC Concept become reality, EDA is currently proposing a NEC Vision and a NEC Roadmap, benefiting from the expertise of a dedicated industrial consortium called Euronec.

The Vision takes the provisions of the NEC Concept and expands it, describing the level of ambition, the communities of interest and their required services, plus the core existing and required resources. The protection of the information is a very important factor and embedded into all aspects.

The Roadmap is made up of Decisive Conditions (clear, costed, interlinked

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SIGAT consortium - co-contractors

RHEINMETALL DEFENCE · BAE SYSTEMS · SELEX Communications · DASSAULT AVIATION · iABG · EADS · gmv · THALES

DIEHL BGT Defence · SELEX Sistemi Integrati · Sagem Défense Sécurité SAFRAN Group · Defence & Security SA Deutschland GmbH CASA · TNO · ThalesAlenia Space

SIGAT consortium - sub-contractors

EADS Astrium SAS Defence & Security Systems Limited Paradigm · SeCom · QinetiQ · SAAB

recommendations) and Supporting Effects (ongoing or planned related projects within MS and the EU institutions which can facilitate or have an impact on how NEC is further developed and implemented),

The NEC implementation process scrutinise the future up to 2025, in a gradual, evolutionary approach, starting from the existing baseline and is seen from three perspectives:

- People (social aspects, governance/management, business processes, rules & legislation, policies, cultural change, awareness and training, human interface)

- Information (management, sharing and protection)

- Technology (Systems & sensors, networks, federation of networks, standards, research, testing, evaluation, simulation, development, cooperation programmes)

In parallel, one of the main functions of NEC is to ensure the synergy with various capability, R&T and armaments cooperation projects and programmes. For this purpose EDA is conducting a NEC Synergy campaign across all relevant groups of experts (national and EDA staff). But to ensure focus on EU wide NEC, this synergy campaign reaches as well beyond the EDA, in order to exchange information and seek cooperation of NEC relevant developments and projects in the whole EU and other organizations.

UAS are a clear example of a future capability which is network enabled, dealing with several aspects of exchanging and sharing a wide range of types of information, from the Command and Control to the Sense and Avoid functions and to various payloads.

Their insertion in the non-segregated air space would greatly benefit from this systematic NEC approach.

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Image shows solutions offered by industry as part of the FUAS RFI exercise, not implying any EDA/cMS position.

ORKKA Courtesy from EADS

Future tactical Unmanned Aerial System: preparation phase

The FUAS (Future tactical Unmanned Aerial System), was established as an EDA Ad-Hoc Cat B project in November 2008, by 7 EDA contributing Member States (cMS): Finland, France (lead), Germany, Poland, Portugal, Spain and Sweden.

The main aim of the FUAS project is to fulfil cMS' identified requirements, in the field of tactical Intelligence, Surveillance and Reconnaissance (ISR) for both Navy and Army use.

The project can be seen as a good example of the EDA approach to satisfy the combined needs of a set EU Member States for near real time information through transmission of multi-sensor imagery. The first step was identifying those cMS needs, by drafting a Common Staff Requirement (CSR) document; secondly, based on those requirements, the establishment of a basis for a future Armaments Cooperation Project, including the release of a Request for Information (RFI) to Industry; a third step, already initiated, is the drafting of a Business Case Document with recommendations for the next steps in the project, based on the cMS findings through the RFI process.

The FUAS combines the high capacities perceived as key to developing European Industrial capabilities. FUAS would utilise Research & Technology efforts already carried out within EDA. FUAS also offers excellent potential for civil/applications (Homeland Security, Environmental Protection, etc).

Some of the features of the FUAS favoured by cMS are: "multiple sensors/payload capability", "Helicopter foreseen as a medium range/endurance Aerial Platform" and "growth potential to accommodate future cMS needs".

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