## 2nd EDA RPAS ATI Industry Exchange Platform Meeting – 26 October 2018
## Executive Summary

### Main takeaways for industry

- Thorough briefing on potential EU-funding mechanisms.

- Focus on EDA processes: Ad hoc projects and projects funded on EDA's Operational Budget.

- Focus on 'CapTechs' as the main instrument for launching new R&D initiatives within EDA, most relevant ones for RPAS ATI addressing Aerial Systems and on Guidance, Navigation and Control (GNC).

- Focus on 'Strategic Context Cases', which are the tool to implement the EU Capability Development Priorities derived from the 2018 Revision of the Capability Development Plan, in close coordination with EDA's CapTech activities and other relevant workshops

- Information on the European MALE RPAS programme and the Air Traffic Integration concept currently under development.

- EUROCAE presentation on the current status of the activities of Working Group WG-105 (UAS) related to the safe integration of Unmanned Systems into the European airspace.


### Envisaged way-ahead:

- Engagement with EDA working groups, mainly the relevant Captechs:
  - Next meeting CapTech GNC: February 2019.
  - Next meeting CapTech Aerial Systems: March 2019.
  - SCC Consultation phase 1 (inception) deadline: 30 November 2018.
  - SSC Consultation phase 2 (follow-up) between 7 January 2019 and 7 February 2019.
  - Workshop: AI in defence 13 and 14 December at EDA.

- Engagement with relevant national authorities in Member States is esential to trigger support for new activities within the EDA framework.


### Main takeaways for Member States and international stakeholders

- The full integration of MALE type RPAS into the European airspace between 2025 and 2030 requires the urgent development of several technical enablers.

- Three priority areas that require development support, identified during the first formal RPAS ATI Industry Exchange Platform meeting, are:
  - Detect and Avoid;
  - Autonomy;
  - C2 datalinks.

- Large validation activities must be ensured soon, in close coordination with the SESAR 2020 programme. General Atomics UK and NLR proposed such a validation exercise using the Skyguardian RPAS to test their DAA and C2 link solution in European Airspace

- Detect and Avoid is still a key enabler and a European solution is needed to ensure strategic non-dependence. Some of the companies from the MIDCAS consortium provided a joint briefing on the current status and way ahead of the programme, with a focus on the EDIDP initiative already supported by FR and SE. Some other approaches to DAA are also available on the EDA Collaboration Platform (ECP)[1].

- Autonomy is considered to be an area with high potential in the airspace integration domain, particularly to address emergency situations with multiple concurrent failures. Autonomy faces several issues in particular with regard to certification. Standardisation is currently limited to automatic (human in/on the loop) activities. CATEC and ESG addressed these issues during the meeting. Some other proposals are also available on the ECP.

- C2 datalink is a very important topic often disregarded when discussing international R&D-activities as the military tend to address this topic at national level. Hensoldt and SENER provided some proposals on activities needed to ensure that European C2 links are available in the market in the midterm. Some other proposals are also available on the EDA ECP.


Envisaged way-ahead:

EDA will present this outcome at upcoming meetings of NAD PoCs, R&T Directors and ESMAB Policy Level, with particular focus on:

- the urgent R&D and validation needs to ensure RPAS airspace integration in 2025-2030;

- the European DAA status and the ongoing initiative by FR and SE in the frame of the EDIDP;

- initiatives regarding autonomous capabilities for RPAS ATI multiple emergency situations;

- C2 datalink proposals and pMS interest' in keeping this work strand active at the EDA.

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[1] EDA ECP: https://ecp.eda.europa.eu/W/RPAS_ATI_Industry_Exchange_Platform/Pages/Home.aspx

## 2nd EDA RPAS ATI Industry Exchange Platform Meeting – 26 October 2018
## Meeting report

Attendance

Representatives from 23 European Industries, EASA, EUROCAE, OCCAR-EA

pMS: DE, BE, FR, ES, PT, SE


Presentations

All material is available at the EDA Collaboration Platform (ECP) at
https://ecp.eda.europa.eu/W/RPAS_ATI_Industry_Exchange_Platform/Pages/Home.aspx.


Summary of proceedings

The meeting was chaired by Roland Van Reybroeck, EDA Director Cooperation Planning and Support, who briefly introduced the Industry Exchange Platform initiative and the agenda that was prepared for this meeting.


*During the first part of the meeting a number of informative presentations were provided, followed by questions/answers and comments:*


**Pierre di Toro** (EDA) presented the European Funding Gateway (presentation 1 on ECP).

To support the defence sector in accessing funding, the EDA provides European industry, research-and-technology organisations and academia, besides Ministries of Defence/Armed Forces, with a comprehensive European Funding Gateway for defence. The presentation showed how all defence-related stakeholders can access both a comparative view per funding dimension, to compare each relevant criterion one-by-one across the many funding opportunities, and a detailed view per funding source, to explore each specific European funding opportunity in detail.


**Giorgos Dimitrou** (EDA) presented the EDA Processes related to Ad hoc projects and projects funded on EDA's Operational Budget (presentation 2 on ECP).

EDA makes use of a number of instruments in order to implement its three-year planning framework and to support the establishment of collaborative projects between Member States, both in the R&T and the Capability areas. During this session these instruments were presented.


**Gerd SCHWIEDESSEN** (EDA) presented the Aerial Systems CapTech (presentation 3 on ECP).

EDA's CapTech (Capability Technology Groups) are EDA working bodies which generally meet three times a year, which are dedicated to a specific technological area and composed by relevant governmental R&T delegates and Defence technologies experts. The main CapTech objectives are the identification of technology gaps, the prioritization of associated R&T needs and the generation of associated collaborative "gap-filling" R&T projects. In support to the identification and

prioritization of R&T EDA has developed the concept of Technological Building Blocks (TBB) to cluster technologies that can enable a functionality / provide a solution to fill identified Defence capability gaps. Among the 12 CapTech, several are dealing with RPAS ATI related R&D, but the CapTech Aerial Systems is the one who's focus area is mainly related to RPAS ATI relevant technologies. Other CapTechs (like the Guidance, Navigation and Control) are also working in this R&T field.

**Christophe Vivier** (EDA) presented the Strategic Context Case – Integration of Military Air Capabilities (presentation 4 on ECP).

*"Integration of military Air capabilities in a changing aviation sector"* is one of the 2018 EU Capability Development Priorities (11) approved by the EDA Steering Board in last June.

This capability area, linked to the implementation of Single European Sky, addresses the effective and safe access to airspace for existing and future military assets, amongst which unmanned systems. The Strategic Context Cases (SCC) are the basis for the implementation of all EU Capability Development Priorities, describing in a conceptual manner how the associated objectives should be achieved. The objective of the SSC is indeed twofold: establishing a reference to generate collaborative projects and contribute to improve coherence and effectiveness of pMS' military capabilities (linking function) and establishing specific objectives/roadmaps to guide the work within the EDA framework (filtering function). Industry will be associated to the development of SSC.

**Alexander Engel,** representing EUROCAE, presented the WG 105 activities (presentation 5 on ECP).

EUROCAE WG-105 has been tasked to develop standards for the safe integration of all types of UAS, into all types of airspace, at all times, for any type of operation. With a scope this wide, a structure was put in place with six Focus Teams managing the work on specific subjects. The main subjects with respect to Air Traffic Integration are covered by the Focus Teams on Detect and Avoid (DAA) and C2 and Security. The latter will play an increasing role for the future challenges on cyber security.

The Focus Team on Enhanced RPAS Automation (ERA) is looking for solutions to automate UAS operations, also with a view to managing abnormal flight conditions. In particular, the work on DAA and ERA is supported by EDA activities.

EUROCAE briefed on the current status and way ahead in the abovementioned groups, directly linked with the areas identified by the RPAS ATI Industry Exchange Platform and the main challenges faced in standardization activities.

**René Guettler** from OCCAR-EA provided a presentation on the European MALE RPAS and the Air Traffic Integration concept (presentation 6 on ECP).

The European MALE RPAS, a programme managed by OCCAR-EA with the participation of four European Member States, is currently closing its definition phase and will enter the development phase within 2019. OCCAR EA briefed about the programme in general and its main milestones, as well as the main topics currently under discussion with regard to the platform's integration in European airspace.

*The second part of the meeting focused on Ideation, based on several scene setting presentations provided by industries, presenting a selection of ideas from the 29 papers received in reply to EDA's call for papers ahead of this meeting.*

**Robert Jackson** from General Atomics UK presented Large RPAS ATM Integration in Europe – DAA and C2 (presentation 7 on ECP).

Existing ATM procedures and processes may not consider unique features or capabilities of RPAS in terms of equipage, automated functions, aerodynamic performance, and contingency procedures.

General Atomics Aeronautical Systems UK briefed on a proposed simulation and live flight trial validation activity for large RPAS integration in European airspace in collaboration with the Netherlands Aerospace Laboratory (NLR). The proposed task is to demonstrate that the equipage, in particular DAA and C2, and capabilities of SkyGuardian - the basis of the UK PROTECTOR programme - provide a means to safely and efficiently integrate into non-segregated airspace consistent with manned aircraft operations. In addition, to demonstrate that the operation of SkyGuardian in civil airspace under ATC through existing Air Traffic Services (ATS) will not unduly burden the air traffic controllers compared to manned aircraft.

The briefing was followed by an open discussion in which Member States, stakeholders and industry shared their views.

Various tests were mentioned by the presenter: the NASA flight of an Ikhana (Predator B) in California last June and the transatlantic flight from the GA's Flight Test and Training Center in Grand Forks, North Dakota, to the Royal Air Force (RAF) Fairford station in Gloucestershire, England. GA reported that those flights were also to provide confidence to the general public (e.g. the flight from North Dakota was reported by the ATCos in charge as "unremarkable" flight which is positive). During all stretches there was the possibility to either return to the home base, to divert to another base or to use a preselected crash-site. The agencies involved for the transatlantic flight were: the FAA, the Iceland Authorities and the UK CAA. GA mentioned that TCAS 2 was validated for the flights.

**Gunnar Frisk (SAAB), Olivier Reicher (SAFRAN), Alessandro Enrico (Leonardo) and René Knorr (ESG)** briefed on the European DAA, its status and the way ahead (presentation 8 on ECP)

Technological non-dependence is an important issue for European military systems in general. In the RPAS domain Detect and Avoid is a critical system as it is considered a key enabler for RPAS operations in European airspace and some substantial R&D activities have already been performed in Europe by industry, with the support of military stakeholders, in order to define a suitable solution.

Several companies from the MIDCAS consortium provided a joint presentation on the current status of this European DAA solution, the main gaps still to be covered and the proposed way ahead, including the SE and FR proposal in the frame of EDIDP.

The briefing was followed by an open discussion in which Member States, stakeholders and industry shared their views.

The applicability of SORA for the "certified"/large RPAS was questioned. The answer by SE was "not to over-interpret" SORA. It is a defined process for the Specific category of operations (applicable on a case-by-case and not "anytime/anywhere"). The Industry asked if SORA will be adapted for the

Military. SE working group mentioned that SORA is a civilian tool and the Military are responsible for their operations.

PT mentioned that the function RWC is not enough for VFR due to cloud and obstacle issues. EUROCAE representative reported that for VLL operations, the obstacle and terrain issues were envisaged. He had no information regarding the cloud consideration. At ICAO level, the RPASP has a limited scope for DAA to conflicting traffic only. Other hazards (like ground) need to be tackled by other means (no planning yet for this activity at ICAO level, as the focus is currently on UTM.


**Antidio Viguria (CATEC) and René Knorr (ESG)** introduced the autonomy area (presentation 9 on ECP).

As technology, and in particular computing power and Artificial Intelligence, progresses we will see an increase in the automation level for certain functionalities potentially reaching in some cases full autonomous capabilities for specific scenarios.

Putting the human out of the loop might be indeed considered in some scenarios such as emergency situations when multiple failures, and particularly data-link loss, are involved.

The technical complexity in the development of these capabilities is just one dimension of the issue and not necessarily the most difficult one. Other problems that are worth mentioning are related to the validation and verification, the standardization and the certification of such capabilities.

**CATEC and ESG representatives** briefed on their approaches to these issues, the main gaps and the proposed ways ahead.

The briefing was followed by an open discussion in which Member States, stakeholders and industry shared their views.

The EASA representative asked the presenters if the system was predictable or not predictable. The presenters answered that the system needs to accomplish a task, not instructions. EDA PO detailed the notion of predictable but "non-deterministic". In this case, the system is predictable (you reach a well-defined result) but you do not know exactly how it will be reached. EASA representative mentioned the need for a "predictable envelope" (not in total freedom). The EUROCAE representative highlighted the need to know first what are "standard" answers from a predictable system. Industry mentioned the need to modify the certification process for AI. Representative from (UN)MANNED mentioned the recent publication of the paper from NASA proposing a new approach combining non-deterministic functions in a deterministic (and currently certifiable) envelope.


**Fernando Horcada (SENER) and Thierry Martin (Hensoldt)** concluded the ideation part of the meeting with a briefing on secure C2 datalinks.

Integration of RPAS in European airspace will require an extremely high level of reliability of the link between remote pilot (RP) and RPA, especially for non-payload communications CNPC (tele command, telemetry, and Detect and Avoid-DAA), and between RP and ATM controller (via voice or Controller-Pilot Datalink Communications – CPDLC). This is to be achieved through robust datalink systems meeting demanding Required Communications Performance (RCP) with the highest quality parameters (continuity, availability, latency and integrity).

HENSOLDT briefed on the design of operationally resilient secure Command and Control RPAS datalinks based on a Functional Hazard Analysis (FHA). In this context they propose the development of an FHA assessing a wide variety of threats including unwanted emissions, spectrum availability, airworthiness level and cyber-attacks.

SENER briefed on the development of an ITAR free Multiband and Reconfigurable Datalink (MBDL) led by the company, its status and remaining activities are expected to be completed in a combined national and European context. This system is expected to be a competitive fully-European datalink solution for very demanding RPAS applications providing high robustness and data rate for both RLOS and BRLOS (SATCOM) communications. Open architecture design and standardization criteria as well as Cybersecurity and COMSEC were addressed during the presentation.

The briefing was followed by an open discussion in which Member States, stakeholders and industry shared their views.

*The meeting was concluded by the chairman, who briefly summarized the main agenda points and presentations, as well as the envisaged way ahead already described in the Executive Summary.*

# 2nd EDA RPAS ATI Industry Exchange Platform Meeting – 26 October 2018

## Attendees list

| Name | Organisation |
|------|--------------|
| BOHLIN Hans | SE FMV |
| DALKOWSKI Jeroen | BE MoD |
| DE ALMEIDA MARQUES Vitor Manuel | PT NAA |
| DA SILVA FELIX Luis Filipe | PT MoD |
| HOUEL Guillaume | FR MoD |
| L'HOSTIS Mickael | FR MoD |
| SANCHEZ JIMENEZ Maria Gema | ES MoD |
| WEDEKIND Madeleine | DE MoD |
| MARCHETTO Antonio | European Aviation Safety Agency |
| GUETTLER Rene | OCCAR |
| ENGEL Alexander | EUROCAE |
| BOUILLY Thomas | BOEING RC Europe |
| CASTAGNA Paola | Leonardo Company |
| DAYOT ALAI N | THALES |
| ERWE Michael | Hensoldt Sensors |
| FRISK Gunnar | SAAB |
| GUNDUZ Mehmet | UN MANNED |
| HENNIG Jens | HENSOLDT |
| HOFFMANN Dieter | AIRBUS |
| HORCADA Fernando | SENER |
| HUDGELL Alison | QinetiQ |
| JACKSON Rob | GAAS UK |
| JIMENEZ GONZALEZ Adrian | everis Aeroespacial y Defensa |
| KLUGER Michael | Rockwell Collins |
| KNORR Rene | ESG |
| LEITNER Roland | IABG |
| MARTIN Thierry | HENSOLDT |
| MIELKE Daniel | DLR |
| MONTERO YÉBOLES Daniel | GMV |

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|---|---|
| PEINECKE Niklas | DLR |
| POLETTI Jean-Charles | EU SATCEN |
| REBOUD Gontran | ViaSat, Inc. |
| SCHAEFFER Eric | THALESGROUP |
| TAURINO Damiano | Deep Blue |
| THOMAS Eric | Rockwell Collins |
| VIGURIA Antidio | FADA-CATEC |
| VOLPI Angelo | CNR |
| VAN REYBROEK Roland | EDA |
| MAZEIKIS Edvardas | EDA |
| VIVIER Christophe | EDA |
| SCHWIEDESSEN Gerd | EDA |
| HASEVOETS Nathalie | EDA |
| DIMITRIOU Giorgos | EDA |
| Di TORO Pierre | EDA |
| DEL VALLE Juan Ignacio | EDA |