ESA-EMSA Workshop “Remotely Piloted Aircraft Systems for Maritime Surveillance”

Summary Report

EMSA, Lisbon

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EMSA

List of Abbreviations

A-NPA	Notice of Proposed Amendment to the rules
AIRICA	ATM Innovative RPAS Integration for Coastguard Applications
AIS	Automatic Identification System
ATM	Air traffic management
ConOps	Concept of Operations
DG MARE	Directorate-General for Maritime Affairs and Fisheries
DG MOVE	Directorate-General for Mobility and Transport
EASA	European Aviation Safety Agency
EC	European Community
EFCA	European Fisheries Control Agency
EMSA	European Maritime Safety Agency
ESA	European Space Agency
EU	European Union
EU NAVFOR	European Union Naval Forces
EUROCONTROL	European Organisation for the Safety of Air Navigation,
FRONTEX	European Agency for the Management of Operational Cooperation at the External Borders of the Member States of the European Union
ICAO	International Civil Aviation Organization
IFR	Instrument Flight Rules
IMS	Integrated Maritime Services
IUU	Illegal Unreported and Unregulated Fishing
JRC	European Commission Joint Research Centre
LRIT	Long Range Identification and Tracking (vessel position data based on telecommunication satellites)
MAOC-N	Maritime Analysis and Operations Centre – Narcotics
MRCC	Maritime Rescue Coordination Centres
RPAS	Remotely piloted aircraft systems
SAT-AIS	Satellite based Automatic Identification System (collected via satellite)
SESAR JU	Single European Sky Air traffic management Research Joint Undertaking
UAS	Unmanned airborne system
UAV	Unmanned aerial vehicle
VDS	Vessel detection system (vessels identified on satellite images)
VMS	Vessel Monitoring System (tracking of commercial fishing vessels based on communications satellites)
VTMIS	Vessel Traffic Monitoring and Information System

Background

The area of maritime surveillance is of growing importance due to a number of factors such as the increase in irregular migration and illegal fishing, concern over safety of navigation, and changes to emissions regulations; consequently, there has been an increasing level of interest on the part of authorities to obtain effective information in support of maritime domain awareness. Recently, on 5-6 March 2015 in Riga, a high level conference on Remotely Piloted Aircraft Systems (RPAS) in the civil domain was organised by the Latvian EU presidency. The European Commissioner for Mobility and Transport, Ms Violeta Bulc, concluded the event by supporting the Riga Declaration on Civil RPAS, which states that 'drones offer new services and applications going beyond traditional aviation and offer the promise to perform existing services in a more affordable and environmentally friendly way'. In May, she made a statement to the effect that, 'RPAS activities would indeed complement very well space-born and in-situ observations and contribute to the quality of the service provided by EMSA.'

The Workshop "Remote Piloted Aircraft Systems for maritime surveillance" was jointly organised by the European Space Agency (ESA) and EMSA for their respective delegates and experts with the objectives to provide participants with an update on the current status of RPAS technology for maritime surveillance, to present ongoing current RPAS projects in the maritime domain, and to discuss and explore how best to use this emerging technology.

The meeting was opened by Markku Mylly, Executive Director, EMSA and by Andreas Schönenberg from ESA.

There were over 80 participants, including representatives from Member States and relevant EU bodies. Several industry participants were also invited as speakers to give feedback on specific RPAS projects. The EU member State delegations included representatives from Belgium, Croatia, Denmark, Estonia, Finland, France, Germany, Hungary, Ireland, Italy, Luxembourg, Malta, Norway, Poland, Portugal, Romania, Slovenia, Spain, Sweden, the Netherlands and the United Kingdom attended the meeting. There were also delegations from the following: the European Fisheries Control Agency (EFCA), the European Agency for the Management of Operational Cooperation at the External Borders (Frontex), the Maritime Analysis and Operations Centre - Narcotics (MAOC-N), the European Union Naval Forces (EU NAVFOR) Somalia, EUROCONTROL - the European Organisation for the Safety of Air Navigation, the European Aviation Safety Agency (EASA), the European Commission Joint Research Centre (JRC), Single European Sky Air traffic management Research Joint Undertaking (SESAR JU).

The workshop was chaired by Leendert Bal, Head of Department C: Operations, EMSA.

The meeting agenda and list of participants can be found in the Annexes. All documents and presentations related to the workshop may be accessed online at: http://emsa.europa.eu/workshops-a-events/188-workshops.html

Meeting programme

1. Welcome and opening

Markku Mylly, EMSA, welcomed the participants and explained the recent interest of EMSA in RPAS activities in the maritime domain. It was reported that EMSA received a letter from the European Commissioner for Mobility and Transport, Ms Violeta Bulc expressing her interest and support to the EMSA RPAS related actions in order to address the current issues we are being faced with in Europe (i.e. migrant issue). EMSA's 5 Year Strategy proposes that 'the Agency will explore the possibility of using a wider variety of sensors using different platforms, feeding into its maritime information applications, offering better monitoring and surveillance services to member states. …', and in the Work Programme 2016, states that the Agency will roll out RPAS campaigns in specific areas of activity. In order to anticipate this task, EMSA, in cooperation with ESA, organised this workshop to explore the use of RPAS for maritime surveillance.

Andreas Schönenberg explained ESA's interest in the development of RPAS which is enabled by both satellite communications and satellite navigation. Furthermore, satellite communications are needed for beyond radio line of sight operation of RPAS. Through the Integrated Applications Promotion programme, ESA actively supports the development of new applications based on RPASs that use space assets to the benefit of user communities. ESA

expressed a particular interest in understanding the user needs and requirements and welcomed the opportunity offered by this workshop to discuss the issue further.

Leendert Bal, EMSA, provided a brief overview on RPAS including the fact that there is evidence of growing social acceptance of using RPAS in the civil domain, and increased political momentum at an EU level for an increased maritime domain awareness due to recent irregular migration in the Mediterranean and security issues. It was emphasized that RPAS can be integrated into the surveillance chain and used in combination with other information available. Furthermore, offering pilot RPAS services to assist EU Member States and EU Agencies could be a cost effective solution. Appreciation was given to the EU Agencies and bodies present at the workshop as well as the relevant regulatory bodies such as EASA and EUROCONTROL who would also bring added value to discussions during the workshop.

2. Keynote speech: Impact of RPAS on society

The keynote speech was delivered by José Achache, ESA IAP Ambassador Switzerland. The presentation provided an introduction to the many and varied applications of RPAS in the maritime domain and beyond, providing a number of examples of RPAS operations for routine tasks and for innovative solutions to problems. It was noted that there will always be the issue of vessels which do not emit position reports, whether because of their size or due to the fact they do not want to be tracked. Ship identification is one of the areas in which RPAS could bring considerable added value. The use of RPAS for mobile detection, taking measurements for weather forecasts, taking images in emergency situations such as floods, precision farming, and sea surface temperature opens new dimensions for safe and secure maritime activities. Solar powered RPAS for very long endurance operations was also presented including their use and benefits.

3. RPAS for maritime surveillance

This session presented a few more detailed examples of how RPAS pilot services have been or are being used in practice by Member States (BE; NL), and the EU Fishery Control Agency (EFCA) gave an overview of the areas in which a need for RPAS has been identified.

Use of Remotely Piloted Aircraft Systems (RPAS) for Marine Pollution Surveillance in Belgium

The presentation given by Eric Donnay (Directorate General Environment Belgium, Head of team “Environmental law enforcement at sea”), introduced some of the problems being faced in the Belgian area of the North Sea, including dense shipping, shallow waters, extensive wind farms, protected areas, etc. One of the surveillance options which has been used for marine pollution surveillance in Belgium is the military RPAS, B-Hunter. Details were given of the technical characteristics of the B-Hunter, and sensors on board. Some examples were given of data collected by the RPAS, including video footage taken in support of pollution control and pollution response operations (which, during operations, is streamed in real time to the Maritime Security Centre (Coastguard)). It was noted that in oil spill cases, RPAS can be useful for providing information to on-scene commanders to ensure they send resources to the most useful place at the scene of an incident. With RPAS suspicious patterns and abnormal traces in ship wakes can be identified. The presentation ended with conclusions regarding the use of RPAS, namely that it has proven to be a useful tool to complement other means for aerial surveillance of ship-sourced marine pollution, and it has assisted to determine user needs in terms of future developments. The possible long endurance, safety of operation for the crew, low noise operations are identified as very positive characteristics of RPAS. However, RPAS still require a reasonably good visibility and weather conditions and are hampered by access restrictions to airspace. The Belgian Federal Public Service “Health, Food Chain Safety, and Environment” has an agreement in place with the Ministry of Defense, under which the B-Hunter system will continue to be used for pollution surveillance operations in a routine way.

The Netherlands Coastguard - Use of RPAS to improve safety and security

Following an introduction to the structure of the Netherlands Coastguard given by Ed Veen (Executive Director of the Netherlands Coastguard), and an overview of its tasks and resources, it was noted that there is a ‘black hole’, i.e. a lack of information available, in relation to certain types of vessels and activities. It was noted that RPAS

could be particularly useful for Search and Rescue, for disaster management and for law enforcement. The AIRICA (ATM Innovative RPAS Integration for Coastguard Applications) project was presented. AIRICA, a SESAR project, had the aim of demonstrating RPAS integration into non-segregated airspace. The conclusion of the project was that RPAS is not currently an alternative option to aircraft and helicopters, but it is potentially a very valuable supplementary asset. Restrictions to the use of RPAS are not an issue of technology, but of the legislative framework. Project AIRICA has helped in building a basis for future legislation for the use of RPAS in Dutch airspace.

EFCA requirements for RPAS

The European Fisheries Control Agency (EFCA) represented by Sven Tahon has undertaken a desk study on the possible added value of using RPAS for fisheries control purposes, and participates in the ESA ARTES 20 “Desire II” project. EFCA identified needs in particular in the following areas: Identification (i.e. for vessels not reporting AIS/VMS/LRIT); Behaviour monitoring (for example, when transhipments take place); Area monitoring (to monitor access to areas closed for fishing); Transit monitoring (of third country fleets). A more detailed list of user needs, and of the main considerations, challenges, and opportunities, were also reviewed. The benefits of a potential EU inter-agency operation was outlined and the need for short deployment and fast data access was highlighted. Details are elaborated in the presentation slides.

4. Legislative and policy framework

The session on the legislative and policy framework was intended to give participants a clearer idea of some of the main obstacles currently restricting RPAS flights, and conversely to highlight areas in which possibilities exist. Developments are occurring at a fast rate, and it is important for interested parties to stay abreast of progress.

EUROCONTROL - RPAS ‘Permission to fly’

The presentation given by Mike Lissone (EUROCONTROL, RPAS ATM integration manager) on permission to fly gave a comprehensive overview of the items which need to be addressed when applying for permission to fly (including, amongst others, considerations related to: mission objectives, contacts, airworthiness and operation approval, spectrum, air traffic management, procedures, contingency procedures, and diplomatic clearances). An overview was given of the present situation, summarising that there are a number of difficulties: no international regulation for Instrument Flight Rules (IFR); no harmonisation; technology is not mature; and there are no standards in place. Some examples were given of how this effects operations in practice, and suggested solutions which are being advanced. Participants were encouraged to do what they can within the existing possibilities, and to promote further developments and cooperation to find (regional) solutions. In particular the “Advanced Flexible Use of RPAS (AFUA)” method was presented for early operations of RPAS and RPAS passports are proposed to ease cross-border operations.

EASA - Roadmap for new regulations

The next presentation from Henri Rodenburg (EASA) focussed on the future of drones according to EASA’s expectations. In 2015, EASA launched a consultation process on a new regulatory framework for drones. The resulting document, ‘A-NPA[1] 2015-10: Introduction of a regulatory framework for the operation of drones’, presents a new regulatory approach for safely operating remotely piloted aircraft. The proposed regulatory approach is operation centric, risk based, and applies to both commercial and non-commercial operations. The three categories of risk identified and suggested for regulation - open, specific and certified – were presented. The document received 3,400 comments from over 250 respondents. Based on this document, EASA intends to send a technical opinion document to the European Commission in December 2015, in advance of an International Civil Aviation Organization (ICAO) event due to take place shortly thereafter.

[1] A-NPA: Notice of Proposed Amendment to the rules

SESAR JU - European RPAS Roadmap: RPAS Activities in SESAR 2020

Mr. Denis Koehl began by describing the SESAR organisation, which is not a European Agency, but rather a public-private-partnership. The presentation then outlined SESAR's vision for RPAS integration in Europe. The conclusions of the Riga Summit (March 2015) were summarised, and an overview was given of how RPAS activities fit into the SESAR Concept of Operations (ConOps). It was noted that there is need for clear leadership within Europe on RPAS matters, which has been somewhat lacking to date. It is hoped that SESAR demonstration activities will contribute to raising the profile of RPAS, providing lessons learnt and wider recognition of the issues at stake. RPAS activities fit into the EU ATM master plan, the SESAR 2020 programme, there is a link to the single European Sky (SES) framework, and an RPAS Outlook Study is being undertaken to analyse the business case and long-term demand for RPAS. However, a number of conditions will have to be met for full RPAS integration, and further work is required in a number of areas. SESAR is intending to launch a call in 2016 related to RPAS projects.

5. ESA activities in the RPAS domain: projects funded by ESA

This session of the workshop was introduced by Rita Rinaldo of the Integrated and Telecommunications-related Applications Department of ESA, who gave an overview of ESA IAP activities in the RPAS domain. It was noted that satellite communication is required for Beyond Radio Line-of-Sight (BRLOS) operations: for command and control, and for NRT download of sensor data; and satellite navigation is essential for precise navigation and for geo-referencing of UAV acquired imagery. Space is a key enabler for RPAS integration in non-segregated airspace, and therefore a pre-requisite for extensive adoption of RPAS-based applications. A brief overview was given of relevant ESA projects, to be addressed in more detail in the following presentations.

RAPSODY

The RAPSODY (Remote Airborne Platform with Satellite Oversight Dependency) project, presented by Ricardo Mendes (CEO TEKEVER, Portugal) will aim to demonstrate the use of RPAS in a maritime context through providing two services: oil spill detection and pollution monitoring, and search and rescue. Tekever leads the project and works with a number of partners (i.e. DSI for security architecture). The RPAS AR5 Evolution by TEKEVER was described, along with the sensor package to be used. EMSA will be the institutional service provider, initially collecting end user requirements, and then delivering the service to end users (member States) during demonstration. The different demonstration areas and scenarios were introduced: North Sea (NL/UK), Atlantic (PT), and Mediterranean (MT). It was noted that the project is still at its early stages, and other member States may still get involved.

STEAM

The project STEAM: Ships' Sulphur Trails Emissions Aerial Measurements, was presented by Mr. Pierre Debucherre (CLS, France) who is leading the project. Its objective is to assist EU Member States to enforce the IMO MARPOL Annex VI regulation using a drone-based SO_X exhaust measuring service. The project kick-off date for the initial feasibility study is 1 November 2015, and it will last 9 months including first feasibility test campaigns. There is a demonstration project proposed afterwards starting approximately in July 2016 which will last an additional 12-24 months. The institutional partner is EMSA, and potential end-users include the French and German national authorities. The Shipowners' associations also have an advisory role.

LUMEN

The LUMEN (Light UAS in non-segregated airspace for Maritime and ENvironmental surveillance) demonstration project, described by Koen Meuleman (VITO, President of the Belgium UAV association), aimed to demonstrate the use of RPAS for offering near real-time imaging (video HR/IR) and maritime information in a pre-operational setting, based on two operational use cases: maritime surveillance, and real-time flood monitoring. The project partners are Belgium and Norwegian companies and the users testing are from 4 Belgian Agencies. Details were given of user needs, and the technical properties of the RPAS. The resulting data was shown and explained including how the images were stitched and geo-referenced so that users can then easily integrate them in their systems. Demonstration flights will take place from March 2016 until mid-2016. Finally, details were given of the 'service concept' of LUMEN, the achievements of the project were summarised, and next steps identified.

DESIRE-2

Telespazio, Giancarlo Cosenza presented the DESIRE-2 (Demonstration of the use of Satellites complementing RPAS integrated in non-segregated airspace 2nd Element) project, which has as a main objective to demonstrate a service based on RPAS flying in BRLOS in non-segregated airspace, using the space asset satellite communication (SatCom) and satellite navigation (SatNav). The project started in April 2015. The project provides new applications to user communities in the context of governmental civilian applications: maritime surveillance and border control, environmental surveillance, and law enforcement. Use cases and examples were provided from the maritime domain, including search and rescue, law enforcement, and fisheries monitoring.

6. Requirements driven approach for RPAS design and use

Joint Research Centre: Requirements driven approach for RPAS design and use

The European Commission's Joint Research Centre, Maritime Affairs Unit, Solon Mias, presented its experiences with RPAS. DG HOME and the JRC collaborated to draft a study on RPAS, with the aim of providing support/advice for DG HOME and member states in their decision-making process regarding RPAS funding/procurement. The main output of the study was a step-by-step checklist to consider when dealing with the design/use of RPAS for border surveillance. An overview was given of all the criteria which should be taken into consideration, and some example scenarios were presented. The checklist has been disseminated to national contact points.

ICARUS - RPAS as an asset for search and rescue activities

CINAV, the Portuguese Navy's research centre represented by Mário Rui Monteiro Marques, has been exploring the use of RPAS in areas of interest to naval operations, and in particular search and rescue. The presentation introduced various projects in which CINAV has been involved (SEAGULL, SUNNY, ICARUS). The ICARUS project (Integrated Components for Assisted Rescue and Unmanned Search Operations) was presented in detail. The project started in 2012 and will last a total of four years. The objective of the project was to explore the use of unmanned search and rescue devices for improving crisis management and reducing risks. A number of initial conclusions and considerations for future were presented.

SEABILLA

SEABILLA presented by Alessandro Mura (CTO, Selex ES) was a project focussing mainly on drug trafficking and irregular migration in the Mediterranean, Atlantic and the English Channel as well as on terrorism in the English Channel. It was an integrated project conceived to develop solutions for maritime surveillance based on a mix of existing and near term available solutions and testing them on end user validated operational scenarios. It started in June 2010 and ended in February 2014. The project included: ad hoc enhancements for carefully selected legacy surveillance systems and sensors; the prototyping of non-conventional sensors, such as Unmanned Air Systems and Passive Sensors, for their adoption as gap fillers in maritime surveillance; an innovative sensors networking architecture and the provision of a highly automated analysis of the so generated, composite maritime picture. RPAS (the Alenia Aermacchi "Sky-Y) and FALCO EVO) were considered in one of the scenario areas, in the Mediterranean).

Discussion following sessions 5 and 6

A number of Member States and EU Agencies requested the JRC study.

The Industry responded to the question posed by EMSA, 'What are the main obstacles for RPAS projects becoming a service? ' that the market is divided into military provision of large RPAS platforms and civil provision of small line of sight (LOS) RPAS. In the civilian market, the size of the RPAS available, limit capabilities and therefore the range of services that can be offered. To bring medium and large RPAS to the civilian market signifies that a number of issues (regulatory, communications, etc.) must be addressed as a prerequisite, assuming there is a strong enough business case.

The workshop participants were asked about the strength of a business case for medium-large civilian RPAS. Industry was of the opinion that the business case exists, but sustainability depends on how strong the concept of operations is in each case. Comments were made on the importance of regulatory issues and reservations were expressed about the resilience of the business case in a private market, noting that to date projects and operations have always been undertaken with the support and involvement of the military or other parts of the government. It was commented that the CONOPS under consideration, such as search and rescue, is always a government activity, so the issue at stake is whether governments will want to assume the full cost of RPAS operations. Further comments by industry suggested that the main problem to use RPAS is the legislative framework which is not there to allow RPAS to fly.

ESA remarked that there were two main points to be made in relation to cost: 1) that the purpose of many ongoing projects is to identify what the real user needs are, what are 'nice to have' additional features, and where compromises may have to be made in order to reduce costs; 2) that projects have already moved on to become commercially successful, showing that there is a demand for at least some of the services developed, at real cost.

The Netherlands remarked that RPAS will not replace the use of existing assets such as helicopters and planes, but could be a useful complement by filling the gaps, and government need to analyse what sort of services they need and can use for which purposes. The potential added-value of RPAS has not yet been fully realised. Legislation needs to be in place, and technology will undoubtedly become cheaper. These initial actions and projects serve the purpose of pushing developments forward faster.

Belgium noted that although much activity is still in R&D, the potential is there for RPAS to be a useful tool although they need to be easy to integrate into the operational toolbox of users. There is still some reluctance in some administrations to use RPAS, and so the role of promoting, explaining and educating is important. The most limiting factor however remains the regulatory framework. Belgium agreed with a comment that successful demonstrations do help change mindsets and combat resistance to change at an operational level. General acceptance of RPAS has been achieved in Belgium although it has not yet been accepted across Europe. It was suggested that a network could be developed to disseminate information and share experiences. There are currently some initiatives underway between Belgium and the Netherlands to fly RPAS in each country's airspace and cross-border flights. This should help prompt discussion on the notion of shared jurisdiction.

A comment was made on the fact that the traditional aviation world is conservative, and RPAS is seen as a newcomer. The aviation world needs to be convinced by missions which make sense and demonstrate solid business cases. SESAR would welcome more applications and missions grounded on operational needs, and fewer demonstrations focussing purely on technical capacity. Cross-border operations, such as those mentioned during the workshop, are particularly interesting. It was also suggested that Google and Amazon also have a mission to use RPAS and they could be used to assist in creating public awareness and acceptance of using it in the civil domain.

7. Integrated maritime surveillance by RPAS

Session 7 was directed at exploring the potential of new technology to further the capabilities for RPAS operations in the maritime domain.

DFRC - Mobile interception

The presentation delivered by Iwona Maciejewska, DFRC introduced the company and the software called SeaSearch which can detect people in large areas based on a small number of distributed sensors which are able to locate cellular and WiFi signals (and soon also signals from satellite phones), potentially useful in the maritime domain for search and rescue, irregular migration, and smuggling operations. For vessels not emitting other signals (e.g. AIS), it provides a means of tracking the vessel and may provide an estimate of the number of people on board based on the signals received from mobile phones. This could be very useful in search and rescue cases where it may give rescuers an indication of passengers hidden from sight who may need rescuing or possible migrants on a small craft lost at sea. . The technology depends on mobile phones being switched on; however the current use of mobiles phones suggests that this assumption is reasonable. Information was provided on a pilot project for the Irish Coast Guard, in which the sensor is attached to a patrol vessel and to a buoy. A short videoclip of the sensor aboard a small rotary RPAS flying over Lake Thun in Switzerland up to a height of 300 metres was shown as an example for RPAS operations. There is a need for further testing on fixed wing RPAS. During the

discussion, workshop participants stated that the sensor would be useful to identify uncorrelated vessels (i.e. vessels which have deliberately switched off their AIS), while others thought it would be most useful for tracking small craft.

EMSA- Technology for multi-purpose operations

EMSA, Olaf Trieschmann presented the operational domains in which RPAS could potentially bring added value, namely in maritime pollution monitoring, search and rescue operations, surveillance and safety, fishery control, emissions monitoring, and in-situ verification. For these purposes, certain operational modes are required for the RPAS (monitoring, identifying irregularities, directing and pinpointing, loitering). For each operational scenario identified, a summary was given of the requirements (e.g. endurance, control, payload capacity). Two RPAS/sensor configurations were identified which can cover the operational scenarios for (i) search and rescue, maritime security and safety and marine pollution monitoring, and (ii) for emission monitoring. It was stated that for maritime surveillance, in particular for EMSA end-users, short range may be useful in limited cases, e.g emission monitoring, but most added value would come from long endurance, medium-range RPAS equipped with appropriate sensors. The presentation was concluded with the proposal for the integration of multi-purpose RPAS into the Agency integrated services, which would allow RPAS to complement existing information already coming from satellite and in-situ data in order to provide the different operational communities with a comprehensive and enriched maritime picture by combining information from all available data sources. .

8. Information on user benefit analysis and steps forward

EMSA, Leendert Bal presented current activities and interest in RPAS from the Agency's perspective. Initial exploration has taken place in order to better understand the potential of RPAS as an additional data source for the maritime picture. EMSA is currently undertaking a user benefit analysis to better understand maritime user needs. Participants were invited to support the study and to provide their maritime surveillance needs in order for EMSA to frame the future RPAS activities. Furthermore, EMSA is also involved in both RAPSODY and STEAM projects presented earlier and has had some technical cooperation with the Portuguese air force for small scale tests of data transmission, usage of data formats, and data integration. It is anticipated that EMSA will use the initial report from the user benefit analysis study as input for public procurement, which will result in: contracts for pilot operational RPAS services. This will include the set-up and flight hours and will present a business case for efficient maritime monitoring by using RPAS . These will be focussed on three types of services: (1) maritime surveillance; (2) pollution detection and monitoring and (3) emissions monitoring. This service would be for Member States and also EU Agencies to be able to use. There are certain preconditions which must be addressed for this to occur and/or which will influence the development of this procurement:

- the approval of the EMSA Administrative Board via the 2016 Work Programme;
- the availability of industry to provide service solutions; this will be analysed during the ESA/EMSA organised industry consultation meeting at ESTEC on 25 November with interested companies and
- the willingness of national air traffic management organisations to enable RPAS operations: a continued dialogue with EASA/Eurocontrol/NAA on the legislative framework is already in place.

The agenda for the 25 November industry consultation meeting at ESTEC will shortly be announced and will also be publicised on the ESA and EMSA websites. All interested industry representatives are welcome.

Discussion

EMSAs main interest is to provide added value to users which is more important than the price per se. However, given the amount of money spent on RPAS in the military field, a clear message needs to be conveyed to industry

that acceptable costs in the civil domain are much lower than in the military domain. It should be made clear what range of budget may be available, and that industry should work on solutions which are appropriate. It is the aim to demonstrate that RPAS operations could be more cost efficient than manned aircraft operations. Supporting this Belgium noted, the key issue is not that RPAS should be cheaper, but that they provide value for money for the services used and that they bring added value for maritime surveillance operations. They are not to be thought of as replacing other assets, but complementary to them, and as such should be shown to be added value and efficient what needs to be done in the specific operation.

9. The way ahead

Tour de table Discussion

All participants were given the opportunity to remark upon and give feedback on the workshop and on the role of RPAS in maritime surveillance. Comments received are summarised below:

EUROCONTROL: Horizon 2020 has pre-procurement activities in addition to research and development activities, and therefore it might be worth exploring further funding support. However EMSA responded that the Agency is not involved in R&D but in delivery of operational services, and needs services which are ready to be implemented.

SESAR JU: The practical and pragmatic approach shown throughout the workshop has been very positive, with an explicit focus on missions. As activities in the maritime domain are particularly sensitive at the moment, RPAS in support of maritime monitoring could be used as a springboard for other areas. The ‘bottom-up’ consolidation of user needs of the maritime community should meet with the ‘top-down’ aviation policy approach at a European level, to produce concrete results.

Belgium: Belgium drew the attention on the fact that, although cost is an important issue in the current context of budgetary constraints, one should favour a “value for money” approach for the introduction of RPAS for the purposes of maritime surveillance and not use the cost as a unique evaluation criteria. Belgium pointed out that RPAS should not be considered as a stand-alone surveillance tool but that their use must be considered on the basis of a global approach combining different complementary assets for maritime surveillance.

Croatia: There is no existing national experience in RPAS, but both the Coast Guard and Ministry of Maritime Affairs are interested in exploring this area. The Ministry of Defence has plans to buy short-range RPAS for monitoring activities in fisheries, with funding support from Horizon 2020.

Estonia, Finland and Germany expressed thanks for the interesting workshop. The German off-shore wind industry is very much interested in RPAS derived information.

Hungary: although Hungary is landlocked, some of the ideas presented could be used in the context of monitoring activities (SAR and pollution) on waterways and lakes.

Italy: Italy is enthusiastic about the prospect of using RPAS. In search and rescue, the problem is not just finding ships, but also finding survivores and especially those not wearing life jackets.

Luxemburg: The ESA delegate from Luxemburg stated that RPAS will add value in a number of domains as a complementary form of data, adding to other sources. Technology is now fairly advanced, but creative thinking is needed to move forward with regulations. There is public funding available, but there should also be commercial funding and public-private partnership opportunities should be explored.

Malta: Malta will certainly benefit from RPAS technology, and expresses willingness to be involved in projects. They made a specific offer of their facilities to be used as a test hub for projects developing RPAS services. Furthermore, it was suggested that ground stations could be set-up in Malta for the European pilot RPAS service.

Norway: Norway’s search and rescue area is enormous, and presents a number of climatic challenges for search and rescue operations. RPAS may help in this activity.

Portugal: The Portuguese authorities have already been active in developing programmes in this area. There are some new areas still to be explored: obtaining samples of oil pollution using RPAS, for example, and in the area of emissions control.

Romania: There were two points which Romania wished to raise. Firstly, Romania is particularly interested in small RPAS for pollution monitoring. Laws should be developed around the technology available, and small RPAS which can also fly at high altitude are currently available. Secondly, manufacturers of RPAS can play a big role by ensuring that best practice is adhered to and by flying responsibly; this is critical for widespread acceptance.

Slovenia: There is interest in Slovenia in engaging in cooperation with neighbouring countries or partners such as EMSA for search and rescue and pollution monitoring purposes.

Spain: SASEMAR was representing Spain at the workshop, and had the following observations: 1) there is room for improvement in monitoring of pollution related to Annexes 2 and 6 of MARPOL (HNS and air pollution) as well as oil; 2) missions should be multi-purpose, and able to search for small vessel targets while monitoring for pollution; 3) budget limitations are a serious consideration; 4) Spain has had some experience with RPAS, and the potential limitations, e.g. when flying RPAS next to commercial airspace or under bad wind conditions.

Sweden: Sweden is studying the potential of RPAS, and is currently tending towards smaller solutions, possibly ship-based. Sweden encouraged all interested parties to think carefully about what they may need before progressing with RPAS services, and acknowledged that the JRC checklist could be an interesting starting point. The experience needed to analyse the data was also stressed.

The Netherlands: The Coast Guard always needs more information, and would welcome new sources of data and welcomes a transnational data sharing approach. The potential of RPAS is high, but progress depends heavily on costs and the regulatory framework. Nonetheless, the Netherlands has some experience with RPAS and is interested in continuing to explore options. It is encouraging that EMSA is becoming involved in this area to try to come up with a common approach in this area.

EASA: EASA reiterated the importance of an appropriate regulatory framework, and reminded participants of the A-NPA paper to be sent to the Commission in December. The need for dialogue with EASA, EUROCONTROL, and national administrations was also stressed.

EFCA: Indicated that, apart from the technical innovation, the added value of using RPAS can only be fully exploited when available at the moment of operational demands. EFCA thanked presenters and workshop participants for the interesting information presented.

Frontex: Frontex has been investigating this technology since 2009 and is therefore aware of their capabilities and difficulties in operating them. In 2012, Frontex outsourced a study on RPAS and according to it there are 3 cases of interest for border surveillance using RPAS: MALE RPA endowed with EO/IR sensors and maritime radar, which has high costs and operational limitations due to the weather; small Vertical Take Off and Landing (VTOL) RPA, ship offshore patrol vessel (OPV) based, in order to increase its surveillance range; mini RPA for land missions. Obtaining the Frontex needs for using RPAS for border surveillance is a complex undertaking. An answer on this topic cannot be provided during this meeting. At the moment Frontex doesn't use RPAS in its operations. Usually, after defining the operations and the needs for aerial surveillance for each operation, FRONTEX has bilateral talks with Member States and establishes the aerial means which can be provided by MSs. At the end of this process, the gaps are analysed and decisions are taken (on how to fill in the identified gaps). A framework contract for the next 4 years has been recently concluded by Frontex and concerns manned aerial border surveillance services. FRONTEX asked EMSA to send a more official request concerning the contribution to the user benefit study.

JRC: the JRC is planning to rent RPAS to test some sensors which are under development. The JRC expressed interest to receive user requirements that could support its RPAS tests. JRC recommended that users should details their requirements in a functional and ambitious manner, even if these are not feasible in the short-term as these requirements could provide industry with an indication of what might be needed in the future and hence drive future technological development.

Final Discussion/Conclusions

The workshop concluded that RPAS is a valuable tool to complement satellite surveillance and in-situ monitoring in the maritime domain. With the budget restrictions in member States a cross national implementation could provide the necessary economies-of-scale. EMSA and ESA highlighted their intention to collaborate on the development of pilot RPAS services in the maritime domain. A user-benefit study is currently being undertaken, and pilot operational services will be contracted by EMSA for the second half of 2016. Member States were invited to reflect their involvement and participation in the upcoming demonstrations and pilot services.

The industry meeting on 25 November at ESTEC was reiterated. The consultation addresses particularly industry/consortia which would be able to provide such RPAS pilot services. As the envisaged pilot service requires RPAS operations flying beyond radio line of sight (BRLOS), space assets are essential. This meeting will be a consultation to explore market availability, capability, and readiness to provide RPAS based pilot services for maritime surveillance.

EMSA thanked participants for the useful presentations and for their contributions during the roundtable discussions. EMSA will proceed with procuring pilot RPAS services. If any member State would like to be involved, they should contact EMSA to express their interest.

Annexes

Annex 1 – Meeting Agenda

Annex 2 – Attendance List

Annex 1: Meeting Agenda

ESA-EMSA Workshop "Remotely Piloted Aircraft Systems for maritime surveillance"

Location: Loyola de Palacio Conference Centre at EMSA, Lisbon

Wednesday, 28 October 2015

Time	Agenda Item	Speakers
9:30 – 10:00	Registration & Coffee	
10:00 – 10:30	Welcome and Opening Objective of the meeting Introduction EMSA & ESA	Markku Mylly, EMSA Andreas Schönenberg, ESA Leendert Bal, EMSA
10:30 – 10:50	Keynote speech Impact of RPAS on society	Jose Achache, ESA IAP Ambassador Switzerland
10:50 – 11:45	RPAS for maritime surveillance RPAS in the different maritime domains Member State experiences User needs of EU Agencies	Eric Donnay, Belgium Ed Veen, Netherlands Coastguard Sven Tahon, EFCA
11:45 – 12:40	Legislative and policy framework Permission to fly Roadmap for new regulations Legal aspects	Mike Lissone, EUROCONTROL Henri Rodenburg, EASA Denis Koehl, SEASAR JU
12:40 – 14:15	Lunch	
14:15 – 15.45	ESA activities in the RPAS domain RPAS projects funded by ESA: RAPSODY STEAM LUMEN DESIRE - 2	Rita Rinaldo, ESA Project presentation by the companies: Ricardo Mendes, TEKEVER Pierre Debucherre, CLS Koen Meuleman, VITO Cosenza Giancarlo, TELESPAZIO
15.45 – 16:30	Coffee break	RPAS Demonstration of the TEKEVER AR5

Time	Agenda Item	Speakers
16:30 – 17:30	Requirements driven approach for RPAS design and use RPAS projects ICARUS SEABILLA	Solon Mias, JRC Mário Rui Monteiro Marques, Portuguese Navy Alessandro Mura, SELEX ES
17:30 – 19:00	Icebreaker cocktail	

Thursday, 29 October 2015

Time	Agenda Item	Speakers
9:30 – 9:45	Coffee	
9:45 – 10:30	Integrated maritime surveillance by RPAS Mobile interception – a new technology Technology for multi-purpose operations	Iwona Maciejewska, DFRC Olaf Trieschmann, EMSA
10:30 – 11:00	Information on user benefit analysis and steps forward foreseen by the Agency	Leendert Bal, EMSA
11:00 – 11:30	Coffee break	
11:30 – 12:45	The way ahead Tour de table (based on seed questions sent out to all registered participants) Final Discussion	All participants
12:45 – 13:00	Summary of the workshop Closing of the meeting	Leendert Bal, EMSA Andreas Schönenberg, ESA
13:00 – 14:30	Lunch	
14:30 – 15:00	An optional visit to the EMSA Maritime Support Services for interested participants	

Annex 2: Participant List

country	firstname	lastname	city	organization
Belgium	Yves	Maekelberg	Brussels	Agency for maritime & coastal services, shipping assistance division
Belgium	Eric	Donnay	Brussels	FPS Health, Food Chain Safety and Environment
Belgium	Dominique	Defruytier	Brussel	Belgian Air Force (80UAVSqn)
Belgium	Benoît	Hoffmann	Bruxelles	Belgian Air Force (80UAV Sqn)
Belgium	David	Praet		Belgian Science Policy - BELSPO
Croatia	Roko	Mrvica	Zagreb	Ministry of Maritime Affairs, Transport and Infrastructure
Croatia	Antonela	Marinov	Split	Croatian Coast Guard
Denmark	Louise	Raasgaard Mathiesen	Valby	Danish Transport and Construction Agency
Estonia	Jürgen	Saarniit	Tallinn	Estonian Police and Border Guard
Finland	Juuso	Halin	Vaasa	Finnish Transport Safety Agency
France	Anna	Milesi	Cherbourg	Ministry of sustainable development/Maritime affairs /Jobourg MRCC
Germany	Barbara	Cembella	Bremen	WFB Wirtschaftsförderung Bremen GmbH
Germany	Thomas	Hunsaenger	Koblenz	Bundesanstalt für Gewässerkunde
Hungary	Csaba	Bellyei	Budapest	National Transport Authority
Hungary	Krisztián	Antóci	Budapest	National Aviation Authority
Ireland	Declan	Geoghegan	Dublin	Irish Coast Guard
Italy	Andrea	Vitali	Rome	Italian Coast Guard
Italy	Massimo	Motta	Rome	Italian Coast Guard
Luxembourg	Patricia	Conti	Luxembourg	Luxinnovation GIE
Malta	Clinton	O'Neill	Malta	Armed Forces of Malta
Malta	Pierre	Zammit Endrich	Malta	Transport Malta - Merchant Shipping
Malta	Charles	Pace	Malta	Transport Malta
Norway	Arvid	Bertheau- Johannessen		Norwegian Space Centre
Poland	Leszek	Czerwinski	Gdynia	Maritime Office Gdynia
Poland	Jaroslaw	Bomba	Gdansk	Maritime Office in Gdynia
Portugal	Nelson	Marques	lisbon	DGRM
Portugal	Jorge	Caseiro	Lisbon	DGRM
Portugal	José	Maciel	Lisbon	DGRM
Portugal	José	Morgado	Lisboa	Portuguese Air Force
Portugal	Mario	Marques	Lisbon	Portuguese Navy
Portugal	Antonio	Mourinha	Lisbon	Portuguese Navy
Portugal	Luis	Serina		Ministry of Education and Science

Portugal		Ferreira de Carvalho	Lisbon	Portuguese National Maritime Authority
Romania	Constantin	Visoiu		INCAS-National Institute for Aerospace Research
Romania	Florin	Mingireanu		Romanian Space Agency - ROSA
Slovenia	Arturo	Steffe	Koper	Maritime administration
Slovenia	Danijel	Rihter	Koper	Maritime administration
Spain	Néstor	Perales Gómez	Madrid	SASEMAR
Spain	Eugenia	Sillero Mate	Madrid	SASEMAR
Sweden	Yngve	De Bourg	Karlskrona	Swedish Coast Guard
Sweden	Calle	Borg	Stockholm	Swedish Coast Guard
The Netherlands	Col	Offermans	Amsterdam	Ministry of Infrastructure and Environment, Rijkswaterstaat
The Netherlands	Cornelis	Kool	Amterdam	Ministry of Infrastructure and the Environment, Rijkswaterstaat
The Netherlands	Ed	Veen	Den helder	Coastguard
	Denis	Koehl	Brussels	SESAR JU
	Mike	Lissone	Brussels	EUROCONTROL
	Sylvie	Grand-Perret	Brussels	EUROCONTROL
	Robert	Mourachko	Lisbon	MAOC (N)
	Rui	Rocha	Lisbon	MAOC (N)
	Quentin	Royet	Lisbon	MAOC (N)
	Michael	Risley	Lisbon	MAOC (N)
	José	Achache	Genéva	AP-Swiss / Altyn
	Gontran	Reboud		ViaSat
	Ferdinando	Tiezzi		ViaSat
	Detlef	Schulz	Luxembourg	SES
	Alessandro	Mura	Rome	Finmeccanica, Selex ES
	Koen	Meuleman	Brussel	VITO
	Pierre	Debusschere	Toulouse	CLS
	Giancarlo	Cosenza	Rome	Telespazio
	Maria	Angelucci	ROME	e-GEOS SpA
	Iwona	Maciejewska	Dublin	DFRC AG
	Ricardo	Mendes		TEKEVER
	Pedro	Petiz		TEKEVER
	Robert	Whitehouse		TEKEVER-UK
	Mark	Baxter		TEKEVER-UK
	João	Araujo		Spin.works

	Henri	Rodenburg	Cologne	EASA
	Jeroen	van Overloop	Antwerpen	DG Maritime Transport Belgium
	Solon	Mias	Ispra	JRC
	Sven	Tahon	Vigo	European Fisheries Control Agency
	Jocob	Terling	Brussels	EC DG MOVE
	Dragos	Voicu	Warsaw	FRONTEX
	Amnon	Ginati		ESA
	Rita	Rinaldo		ESA
	Markku	Mylly	Lisbon	EMSA
	Leendert	Bal	Lisbon	EMSA
	Olaf	Trieschmann	Lisbon	EMSA
	Stephanie	Seddon-Brown	Lisbon	EMSA
	Catrin	Egerton	Lisbon	EMSA
	João	Sequeira	Lisbon	GMV
	Paulo	Gomes	Lisbon	GMV
	Pedro	Golmayo	Lisbon	GMV
	Rui	Alves	Lisbon	GMV

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