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Remotely Piloted Aircraft Systems (RPAS) for Extreme Missions in the Arctic and the monitoring of the Ukraine crisis by the Organization for Security and Co-operation in Europe (OSCE)

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Abstract

Arctic conditions and the territorial politico-economic crisis in Ukraine are two different types of extreme conditions, where civilian authorities need to use Remotely Piloted Aircraft Systems (RPAS) to support manned processes and other information systems. Due to the lack of adequate research and publications, best practice may remain unshared. Therefore authorities may not be aware of potential rewards and knowledge sharing is also restricted.

This paper is a contribution to the research and development of innovatory ideas in order to better attach RPASs to the activities of authorities and related information systems, helping them fulfill their duties.

Keywords: RPAS, extreme missions, multilateral diplomacy, Organization for Security and Co-operation in Europe (OSCE), Arctic Council, information system development, innovation, Ukraine crisis

1. Introduction – Interest in the Arctic and lessons learned from the OSCE

Remotely Piloted Aircraft Systems (RPAS) are becoming more widely used. They are being used more and more in cases of extreme conditions. One example would be harsh Arctic weather conditions; another would be politically challenging situations, such as the Ukraine crisis.

This paper takes evidence from a workshop on RPAS in extreme cold in Project AIRBEAM and lessons learned from the deployment of RPAS in the monitoring of the Ukraine crisis by the Organization for Security and Co-operation in Europe (OSCE). Experiences from this politically extreme case of cooperation in an international crisis are compared with another extreme monitoring environment, the Arctic. An approach for enhanced situational awareness monitoring still lies ahead for the Arctic Council, another multilateral diplomatic organization.

The subject of the Arctic is very important for northern countries. Europe, for example, is investing 140 billion Euro in projects to enhance the economy and the ecology of the Arctic. Canada is investing about 30 billion Canadian dollars to develop its maritime industry. The United States will also have to invest. They have only one icebreaker capable of operating in the Arctic regions [1], and “the cost of maintaining an Arctic fleet and icebreakers, as well as port infrastructure is extremely high”; Russia levies costly tariffs for assistance, for icebreaker assistance, sailing master services, radio communication, and logistical and hydrographic information on its Northern Sea Route [2]. Minerals, gas, and marine transportation routes will require an increased focus on safety and security on the Arctic area [1, 3, 4, 5].

RPAS based systems can be one answer to these questions. The Finnish weather service, for example, has used satellite information to chart ice conditions in the Northern Baltic and to identify oil spills, and have plans to take this knowledge to the Arctic Ocean [4], and also the nuclear industry is actively studying the use of RPAS.

Sea ice intelligence with a helicopter is reported to cost 15.000 USD an hour, and with an RPAS the cost is "no more than one tenth of that" [7]. The RPA Aeryon Scout, for example, assisted the U.S. Coast Guard cutter Healy, which is not a heavy-duty ice breaker, in escorting the Russian tanker Renda into Nome, Alaska to make "the first maritime fuel delivery through sea ice in Alaskan history" [6].

Fig 1: Charting sea ice conditions from heavy-duty ice breakers is one potentially lucrative use for an RPAS

European public research interest funding focuses on commercial services, and on predicting weather and ice conditions, overseeing oil and gas, green mining operations, and data communications [1]. Norway has plans for an oil spill recovery center on Spitzbergen and Finland is working towards an oil spill recovery training center in Kemi, where there is ice every winter [4].

There have been many initiatives that have to do with sea transport related ice and climate conditions: ESA – the European Space Agency has held Arctic related seminars, but only a few ESA based projects have been launched. Canada and Russia are working towards better satellite coverage over the Arctic. It is interesting to speculate how and where RPAS platforms could supplement or even replace the use of satellite data [4].

2. Research - The Problem

This paper looks at RPAS not just as a flying machine, but as an information system for authorities. There are over 1.500 certified Remotely Piloted Aircraft Systems (RPAS) operators in Europe alone. [8]

Unfortunately many EU based research and development projects disappear after they have been completed [4]. The OSCE is currently using RPAS and the Arctic Council is in a position to co-ordinate the future development of Arctic Search and Rescue. The question this paper sets out to research is therefore:

- What barriers and facilitators can be identified for future extreme missions with Remotely Piloted Aircraft Systems (RPAS) in naturally and polito-economically demanding environments?

By extreme missions we mean the carrying out of difficult and demanding monitoring tasks under conditions which are extreme for RPASs. Extreme conditions can be of natural origins (such as when we tackle the icy cold of the Arctic) or of human origins (such as the politico-economic risks in the crisis in Eastern Ukraine). We define authorities as those commonly under the ministries of the interior, search and rescue, police and border guards. This paper also identifies research gaps and gives direction for future focus in RPAS research.

3. Research Methods

This paper is based on, and conclusions are drawn from, the interaction between two sources:

1. Participation in and facilitation of a two day expert panel workshop and related expert discussions – Wise Guys Panel – on RPAS use in the Arctic. This workshop was part of the EU funded RPAS innovation project, AIRBEAM [4], and
2. Semi-structured expert interviews of various players involved in and associated with the deployment of RPAS by the OSCE in monitoring the Ukraine crisis [7].

Project interaction between these two sources is defined as an issue arena, which Luoma-aho and Vos [9], define as "interaction of stakeholders regarding an issue in the public debate in the traditional or virtual media". This paper applies this definition to mean the interaction between project stakeholders on the issue of RPASs, which have become an issue in public and academic debate.

The AIRBEAM Wise Guys Panel (WGP) workshop included 30 RPAS specialists and players from various authorities and industry, and also researchers from 21 organizations from different EU Member States [4]. The selection and work process of the panel were conducted applying the *delphi*-method [10]. The panel focused on operations in the Arctic by law enforcement (LEA) and search and rescue (SAR) authorities, and also made an effort to discuss other authority and commercial use in cold environments, such as border surveillance and the counting of animals [4].

All WGP discussions were held, in accordance with the *delphi*-method, and confidentiality and anonymity were respected under the Chatham House Rule [11]. The computer aided idea facilitation system Etherpad, that was used to generate ideas and idea based comments, is also based on the anonymity of participants' comments. All comments were instantly visible to all participants and they thus served as a basis for live discussion.

As AIRBEAM is a multi-stakeholder innovation project, its Wise Guys panel and expert discussions were addressed in the framework of the analytical model of communication in issue arenas [12]. The content of the notes from the discussions and from Etherpad were analyzed inductively, beginning with the data collected from participants; through which common themes could be identified and classified and best practice determined.

Four major issue arena themes emerged:

1. Technical
2. Regulatory
3. Environment
4. User

The expert WGP workshop results were then viewed in the light of lessons learned from the OSCE to identify possible barriers and facilitators within the four issue arena themes mentioned above. Conclusions could then be drawn on the challenges that face the Arctic Council in building RPAS based search and rescue capabilities for the Arctic.

4. The Arctic Expert Panel Workshop – Demonstrations and Discussions

The WGP workshop focusing on RPAS usage in extreme cold environments [4], (found in the northern Arctic, southern Antarctic and areas with high mountain ranges), met north of the Arctic Circle in Finland. The Arctic area has weather that is often cold, windy, and with heavy rain or snowfall. The average annual temperature north of the Arctic Circle is below 0 °C [13]. The panel saw two practical RPAS demonstrations:

The first demonstration involved a scenario in which a person had to be found in a snowy forest. The weather was -0 °C, with a light 3 m/s Easterly wind, 8/8 cloud cover, and light wet snowfall. The demonstration showed how demanding these cold and wet conditions are. Video feed from the RPAS was lost by the ground station. The thermal camera remained operational.

The second demonstration [4, 14] involved an RPAS and two police land patrols. One patrol was on snow scooters, the other patrol had a highway patrol vehicle. They were supported by an RPA. The police officers noted that the benefits of RPA air support can be valuable in SAR and first response to situations that include persons possibly armed and dangerous.

It was noted that the snow cover was over one meter deep which made moving in the terrain on foot practically impossible. Thus, these demonstrations showed that there are benefits in having a light RPAS available to the patrol first arriving on the scene [14].

The RPAS which was used fitted in the trunk of a car and the launch procedure took only approximately five minutes [4].

5. OSCE and the Arctic – Concern over Capabilities

Seven semi-structured interviews were conducted under anonymity between the 1st of February and 14th of July 2015 with diplomats and politicians who have been in key positions related to the OSCE and its Ukraine Monitoring Mission [7].

The first interview started as follows: Question: “What is the system for transmitting information from a flying drone from Ukraine to the desks of OSCE policy makers?” Answer: “There is no such system … There have been cases when an OSCE diplomat in charge has first informed the capital of his home country instead of the OSCE Head Quarters in Vienna!” [7].

Experience was gained (for the OSCE) in the use of RPAS in United Nation missions in Africa [7]; “it is unclear how this experience was taken into account when deploying RPAS in a rushed manner in the OSCE mission in Ukraine.” When the use of RPAS was established, all attention was focused on getting approval for flights from Ukraine. At that time a crisis was not yet at hand and RPA flights were considered to be a measure of building confidence [7].

“The costs of RPAS usage started to swallow an ever greater part of the 88 million Euro mission budget, because flights became more and more frequent”, and “better, more expensive surveillance cameras were added” [7]. These matters will be on the table in the OSCE to renew the mandate of the monitoring mission beyond 1 March 2016.

Ilkka Kanerva sees the Helsinki “+40 process” as an opportunity to bring OSCE participating States together to find a joint solution to the crisis in Ukraine [15].

Adm. Robert Papp, U.S. Special Representative for the Arctic, emphasized the willingness of the U.S. to have a transparent agenda for the Chairmanship of the Arctic Council to ensure continuity in the efforts the council. The top concern raised will be the issue of the safety of the thousands of passengers on board cruise ships built before 2010, which do not meet the requirements of the Polar Code of the World Maritime Organization (WMO). [16, 7]

6. Monitoring of the Ukraine Crisis by the Organization for Security and Co-operation in Europe (OSCE)

The OSCE Special Monitoring Mission to Ukraine is being deployed following a request to the OSCE by the government of Ukraine and a consensus agreement by all 57 OSCE participating States. The monitors are to contribute to reducing tensions and fostering peace, stability and security [17].

"By deploying unmanned aircraft systems the OSCE wanted to show that they were up to date … This deployment was not intended for the situation that later developed in Ukraine" [7]

In March 2014, all 57 participating States of the OSCE unanimously agreed to establish the OSCE Special Monitoring Mission (SMM) to Ukraine. The SMM to Ukraine is an unarmed, civilian mission and its main tasks are to observe and report in an impartial and objective way on the situation. The SMM also establishes and reports facts in response to specific incidents [18].

A separate confidential memorandum of understanding was drawn up concerning the operating of RPAS in Ukrainian air space. "A lot of attention was paid to the establishment of the (RPAS) service itself into Ukraine … and not to make a process that would link the data from the RPA to the political reporting to the OSCE headquarters in Vienna." [7]

On the 17th of October 2014 Didier Burkhalter, Swiss Foreign Minister and OSCE Chairperson-in-Office thanked Italy, France, Germany, Ukraine and Russia for their offers to place RPAs and associated personnel at the disposal of the OSCE in order to enhance its monitoring capacities in Ukraine [19].

On the 23th of October 2014 the OSCE SMM successfully completed the maiden flight of its unarmed RPAs. The RPASs (Schiebel CAMCOPTER® S-100) are being provided, flown and maintained by the Austrian company Schiebel. They are under contract to the OSCE and under the authority and direction of the SMM. Data collected is the property of the OSCE and for the sole use of that organization.

Fig 2. Schiebel CAMCOPTER® S-100, prior to deployment by the OSCE Special Monitoring Mission to Ukraine [18].

The purpose of the Mission's use of RPAs is to further the fulfilment of its mandate through complementary aerial information-gathering focused on monitoring the general security situation in Ukraine borders near Mariupol in eastern Ukraine.

RPAS will also be used for other tasks that are in line with the SMM's mandate; such as monitoring and reporting on the implementation of the Minsk Protocol of 5 September and the Minsk Memorandum of 19 September 2014.

"The RPAS will enhance existing monitoring capabilities in fulfilment of our mandate in Ukraine," said Chief Monitor Ambassador Ertugrul Apakan. "They will complement what our monitors observe on the ground, which will still be our primary source of information gathering."

Initially, and until further notice, the SMM's RPA will operate over areas south of Donetsk and down to the Sea of Azov, eastwards as far as the Ukrainian-Russian international border and westwards towards the line of contact. [18]

7. Results: End Users are Looking for Solutions

Though the global development agenda for RPASs is still dominated by military applications [20], commercial bodies and authorities in many countries are investigating how to use RPASs both instead of and in association with manned airplanes and helicopters [21, 22, 23, 24]. Industries where civil RPAS are expected to be used in the future include security, search and rescue, agriculture, telecommunications, conservation, energy, and logistics [24].

It is expected that security services will increase the use of airborne surveillance systems at populated events and in dangerous situations. Search and Rescue are looking to replace some manned services with unmanned technologies. Agriculture will use RPAS for the monitoring of crops. Telecommunications may create temporary communications links fast and efficiently. In conservation work endangered species and wildlife habitats can be tracked by RPAS. The energy industry will monitor power lines, and construction progress. Logistics services plan to use RPAS for the delivery of parcels or emergency equipment [24].

As Frost & Sullivan [20] point out in examining RPASW counter measures, with the rapid proliferation of military, civil, commercial, and recreational applications, there will be a need and a demand for countermeasures to detect and negate UASs with malicious intentions.

When the situation in and around Ukraine evolved into a crisis RPAS, which were initially intended to function as a confidence building measure only, were more and more required to produce intelligence information and situational awareness of the demarcation line.

RPASs were therefore equipped with expensive intelligence cameras and began to be considered as objects of warfare; they were shot down as such, causing the refusal to renew their insurance [25]. This led to other insurance arrangements and rocketing premiums.

In AIRBEAM, based on end-user accounts a total of 501 different cases of use by authorities were identified [4]. These were then frozen to provide unchanging concepts of operation (CONOPS) to serve as the design platform for participating industry engineers. Later Wise Guys Panel meetings, however, demonstrated that we live in a constantly changing world, which also should be taken into account when planning systems for authority or commercial use.

7.1. Use Case 1: Rescue

The WGP [4] discussed a search and rescue operation for a missing person who was deemed armed and dangerous. In fact, winter conditions, with the correct equipment, may make it easier to respond in the Northern Finnish wilderness because all areas are accessible by snow mobile due to the snow cover. Also thermal differences will be clearer, making thermal camera images more helpful. It was noted that thermal camera images, in warmer conditions, may be fooled by ground water coming to the surface, as this has the same heat color as a human being [4].

This scenario is similar to situations in the Alps, where an alert would often be made in the evening and require initiating an overnight response. Developing systems and processes that enable the use of RPAS at night time are required. Based on mission details this mission was deemed to need a middle weight (~300 kg) RPA with both IR and TV [4].

Mountainous areas are very challenging for GPS-coverage and communications signals, as mountains create harmful reflections and no-signal zones. RPASs are best suited for quickly searching open areas, paths, lake and river surfaces. They are ill suited for searches in dense forest conditions [4].

7.2. Use Case 2: Police

The Arctic area in Finland, Sweden and Norway is very sparsely populated, distances are long, and wilderness areas are large. There is considerable seasonal tourism and a growing mining industry. For example, two (2) million tourists visit Finnish Lapland every year. Official safety monitoring resources are scarce.

The police force in Lapland, for example, consists of 400 officers. Most of them work in the three cities Rovaniemi, Kemi and Tornio, where police response time for approximately 20.000 emergency call-outs is between 10 and 20 minutes. The rural areas have 12.000 emergency call-outs, and due to the long distances involved response times may be as much as or even well over 60 minutes [4].

The Finnish police officers whom the panel met saw possibilities for RPAS in search missions and in missions where there is a threat of encountering violence or in SAR situations. The RPAS can provide a quick overview of the situation, especially when snow makes it difficult to search the area on foot [14]. Though, official airborne help comes from manned Border Guard helicopters and from military UAVs. This official assistance is free for the Lapland police department [4].

Thus, an RPAS service which has to be paid for may not seem very attractive for the Finnish police department. Also, in some situations any assistance would need to come from trusted official partners [4].

7.3. Use Case 3: Inter-agency Cooperation / ENLETS

Sharing best practice, activating co-creation, and driving research is important to support front line policing and to fight against serious and organized crime [21].

The main goal of the European Law Enforcement Technology Services (ENLETS) is to operationally strengthen the European security forces or police. ENLETS promotes the use of modern Technology and its Development by exchanging information, experience and knowledge on a practical level [26].

ENLETS acts as a hub between member states and a point of contact for external partners, and industry. It includes 27 member states, but there are 9 core members: United Kingdom, Finland, Poland, France, Germany, Italy, Romania, Belgium, and the Netherlands. The organization is driven by end user needs and is an activator in providing funding and other opportunities for promoting research and development [26].

Project AIRBEAM and OSCE are two examples illustrating how Europe is building closer cooperation in the areas of rescue and border security.

The United States (US) Department of Homeland Security (DHS) [27] reported that RPAS have potential in filling a gap in current border surveillance, as technical capabilities of UAVs can improve coverage along remote sections of borders by providing precise and real-time imagery to a ground control operator. This information can be disseminated "so that informed decisions regarding the deployment of border patrol agents can be made quickly". RPAS are less expensive than the manned aircraft that are used for border security [26].

Unfortunately not only authorities use RPAS; drugs are smuggled over the US - Mexican border in innovative ways. Not only is a fast and low flying RPA very difficult to detect, but also difficult to stop [28].

8. RPAS for the Extreme

Their aim will be relief and support in extreme environment and catastrophic events. Their scope should cover successful operation in the Arctic, Antarctic, and high mountain areas. The focus should be to improve surveillance by robust and reliable RPAS which can operate in harsh cold conditions [4].

The need is not only for SAR, but also for border control, wildlife protection, ice monitoring, etc. They must be suitable for long range and long endurance, have short reaction times, and be able to operate in icy conditions at low speed, have the capability to hover and to transition from vertical to horizontal flight [4].

Remotely piloted aircraft with autonomous capabilities will be needed for successful safety and security, and environmental monitoring.

The panel saw possibilities in the concept of a balanced operation for environmental monitoring in Northern regions based on different ground, air and space sensors combined in an intelligent and problem specific system approach. Communication could be earth observation and satellite based, for beyond-line-of-sight operations [4].

It was noted that RPAs cannot replace helicopters. But RPAs can supplement and minimize the need for expensive helicopter flight hours. Searches could be done by RPAS and the actual rescue by helicopter in the traditional way. The "Extreme RPAS" should be capable of monitoring large areas [4].

8.1. Technical / Payload, Power, and Sensors

Today combustion engines need to be applied to RPAS operating in extreme cold conditions. Even the most modern battery systems lose their power twice as fast in cold weather. User experience has showed that, for example a temperature of minus 40 degrees Centigrade will cut battery operation times in half. Development should focus on a quick and easy battery change. The battery of the RPAS unit that was demonstrated to the panel can be changed in just one minute [4].

There are solar cells that have up to 35 % efficiency, but to achieve that, the panels must be pointed towards the sun. Hydrogen fuel or burn cells can be used to recharge batteries. There are hybrid RPAs that have both piston engines and electrical engines [4].

To ensure operational success and effectivity, RPAS produced imagery must be professionally analyzed, stored, and archived. Data should be made accessible to the various appropriate organizations who may have both need and authority to use it [4]. Data from the different sensors in RPAS operations can be combined to form a general operational picture. Wide Area Motion Imagery (WAMI) will enable the user(s) to simultaneously and autonomously zoom in to several different areas of the WAMI image [4, 29].

8.2. Regulative / Sharing Airspace & Opportunities for the Arctic Council

It will be important to share best practice through co-creation and common research to determine how to integrate RPAS into the same airspace as manned aircraft. [4]. Wider support for this view can also be found in RPAS literature [22, 27, 30].

RPAS integration into shared airspace is a challenge [21, 31, 32]. Totten [21] proposes that military, government, and civilian agencies integrate remotely piloted aircraft (RPA) into emergency response plans to support relief efforts following major disasters.

Project AIRBEAM [33], funded by the European Commission "proposes a situation awareness toolbox for the management of crisis over a wide area taking benefit of an optimized set of aerial (unmanned) platforms, including satellites."

Totten [21] concludes: "Ultimately, long-term solutions — air traffic control systems improvements, new platforms with built-in avoidance technologies, and incorporated training — will allow unimpeded RPA flight anywhere in the NAS" (National Air Space).

Román Cordón et. al. [32] list three main challenges which will need to be solved when RPAS are integrated in non-segregated airspace.

1. Standards to certify the airworthiness of the RPAS systems as a whole must be established.
2. Civil aviation authorities should approve the technological status of RPAS systems.
3. RPAS adherence to the operational rules applicable to manned aviation should be assessed.

Pastor et. al. [33] write that providing continuous separation between all aircraft is a critical requirement for integration.

The aim of research and development of RPA navigation and flight control systems [30] is to develop smaller and more accurate solutions to allow safer flight operations and larger pay loads. "There are many processes and practices which need to be automated in order to be safe when flying RPAS [22].

"The location of the cockpit does not change the essential function of the pilot, in terms of his or her direct responsibility for the safety and overall management of the flight" [34].

Ex-premier minister of Finland Paavo Lipponen has published a paper on Arctic policies [1]. There is 120 billion € investment potential in the European High North – the Arctic Barents Region. Examples of potential new activity are the many new investments into mining and the Fedinskij High, potentially one of the biggest oil & gas fields. It is 160 NM North-East of Vårdø [1, 4].

8.3. Environment / Night Time Operations

Careful preplanning, awareness of obstacles, and greater autonomous capabilities will be needed for successful night flight. The experience and training of the pilot are critical [4].

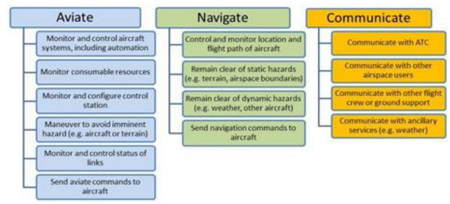

Fig 3: Model of UAS pilot tasks according to Hobbs & Shively [35]

It was noted by the panel [4] that under current legislation airspace must be segregated. Flight in the dark is not visual line-of-sight; one cannot see possible obstacles at night. Not all countries, Finland among them, permit the use of chase planes, and some countries allow flight in controlled airspace.

It may actually be easier to find targets at night, when there is no sun to create misleading shadows. Night time surveillance flights can be flown lower, as long as the target is approached from downwind to prevent detection. This is critical in stealth missions.

Flight operations over maritime and land environments have been tested and proven feasible with a 250 – 300 kg RPA with an operating time of up to 12 hours [4].

8.4. User / Mission Command & Support for RPAS Operations

An overall mission search or flight plan must be discussed together with the mission commander, often the police officer in charge of the search. Plans should be amended in the light of input from the pilot. Tactical approaches have to be changed when situations change [4].

Cloud cover prevents satellite photography and satellites do not have the resolution needed for search missions. When higher satellite image resolutions are used the target area must be known very precisely. Satellites are very good for photographing static targets which have a known location. They are not suited for moving targets [4]. Ship wakes from satellite images can, however, be used to determine vessel speed and direction, and even to identify vessels. Ship wakes are individual and thus recognizable [36].

RPAS operations in rural areas require special logistics. Just reaching the search area can be demanding. Being able to re-charge batteries or re-fuel, and to find food and shelter for the operators may need extra effort and preparation. It was noted that RPA can, in quieter rural areas, be more obtrusive, and are even seen as hazardous to farm animals, and create unnecessary 911 / 112 phone calls.

Hall [27] sees that there is a need for a universal vocabulary to facilitate international dialogue on RPAS and a need for "a clear and robust international framework for certification".

RPAS are "called unmanned, however, the most important subsystem of an UAS (Unmanned Aircraft System) is the human element. The crew necessary to operate an UAS depends on operational concept and autonomy level, complexity, mission, type of the design" [37].

RPAS operations include the different roles of the RPA and RPAS crew, and also the incident or on-scene commander, duty officers, operative units, and support personnel. All these people will need to have an introduction and training in the RPAS system, operative concept, payloads, and tactical use – this is especially important for the incident commander [4].

Training, consulting, and flight operations could be turnkey solutions, like support activities, life-cycle support, and research and development [4].

9. Conclusions

Firstly, it is safe to say that RPAS are here to stay. Authorities are looking to find solutions for better performance and more efficient processes. However much of the work is done separately, each authority following their own line of investigation. Resources are thus wasted and best practice may remain unshared.

Secondly, it is recommended that the different authorities cooperate toward finding workable RPAS solutions and services that can benefit a wider range of uses, while keeping the operative costs at a sensible level. Inter-agency and international cooperation can speed the process of finding robust working solutions and services that can provide a range of uses for different authorities.

Thirdly, to achieve the above, industry should provide a wider range of smaller, more robust, durable, and affordable products; and we see that there is room for service innovations and service based approaches to RPAS. The focus of development should however not concentrate too much on the flying object and its communication systems, but draw a bigger picture of the whole system. More research in this area is needed. End users and engineers have different vocabularies for the same topics. AIRBEAM for example, was very industry driven from the beginning. Wise Guys Panels were intended to provide a mechanism for re-examination and comment within project AIRBEAM. Despite these intentions AIRBEAM end user scenarios were frozen at a very early stage, thus risking their not reacting to new information and technical innovations, and thereby preventing their evolving to meet end user needs.

Fourthly, activities in the Arctic are increasing. This puts a focus on proactively developing the levels of security and safety measures in the area. The Arctic and the extreme environments are remote and hostile - a first response must come fast.

Fifthly, RPASs offer alternatives to supplement and augment manned processes. This megatrend should be seen in RPAS development. RPAS capable of missions in the extreme should be developed. Research and development should focus on cold, power, and the payload needed to fly successful missions in extreme cold and windy conditions. Also reliable night flight will be needed.

It has been noted that RPAS can be used for a range of uses: ice reconnaissance, counting wildlife, monitoring power lines, and for rapid response to both dangerous and SAR situations as well as monitoring military and polito-economical crises.

Sixthly, sharing common air space will be a sizable regulatory challenge. This must be solved, not only on the technical level, but also by the legislative process and on the human level.

Seventhly, another important element involving the human factor is mission command. We recommend that persons involved with RPAS missions are trained to understand the possibilities and limitations of these systems. RPAS system capability is a combination of a multitude of elements, such as platforms, sensors, communications, ground control, pilot, mission command, and integration with other information systems.

Eighthly, it is necessary to raise the awareness of political decision makers that there is a need for extreme RPAS missions in order to obtain the resources to meet the learning curve and the budgets needed for further research, development, and innovation. It has been 40 years since the signing of the Helsinki act, and recent events have driven the OSCE community further from its goals than ever before. The OSCE now has a major role to play in the Ukrainian crisis. The Arctic Council has the chance to learn from these previous multi-lateral UN and OSCE ventures.

Ninthly, the successful adaptation of RPASs should always include structured design, purchase, and implementation projects. These should take into account the operating of the flying platform, attached sensors, communications, and information sharing with other information systems, such as command and control or situational awareness systems.

Finally, we need to ask if there is a political state of will, as well as the resources needed, for deploying RPASs for search and rescue (SAR) functions in the Arctic, where no nation, not even with all of their combined forces, including industries, is capable of carrying out SAR functions alone at the moment? This state of will should include a deeper awareness of the rewards of sharing information in a multi-agent environment [38].

As early as 1993 OSCE diplomatic conferencing raised issues of computer support in groups that are not similar to `business teams' [39]. This paper underlines the need for an enhanced, more customized, holistic approach beyond normal business vending procedures for the further development and use of RPASs to support OSCE decision making.

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