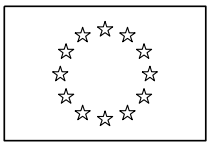

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COMMISSION STAFF WORKING DOCUMENT

Towards a European strategy for the development of civil applications of Remotely Piloted Aircraft Systems (RPAS)

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1. INTRODUCTION

1.1. The emergence of civil applications of RPAS, a source of growth and jobs

In these times of economic downturn, Europe needs more than ever to identify and support, in the context of the Europe 2020 Strategy, opportunities to boost industrial competitiveness, promote entrepreneurship and create new businesses in order to generate growth and jobs. The emerging technology of Remotely Piloted Aircraft Systems[1](RPAS) applied to the development of civil aerial applications (commercial, corporate or governmental non-military) can contribute to these objectives. However, to fully exploit the potential of this technology it is necessary to develop and implement operational concepts and associated technical enablers as well as specific rules for RPAS operations in non-segregated airspace.

The development of RPAS started in the 50's. RPAS have been used by armed forces for decades. Recent conflicts and peace-keeping operations around the world have demonstrated their operational capacities and led to a quasi-exponential increase of military applications. RPAS have also a great potential for civil applications. These applications are starting to develop, driven by both state and commercial interests. If their full potential is unleashed, they are expected to bring important benefits to European citizens and the European economy as a whole.

An emerging market of innovative aerial services…

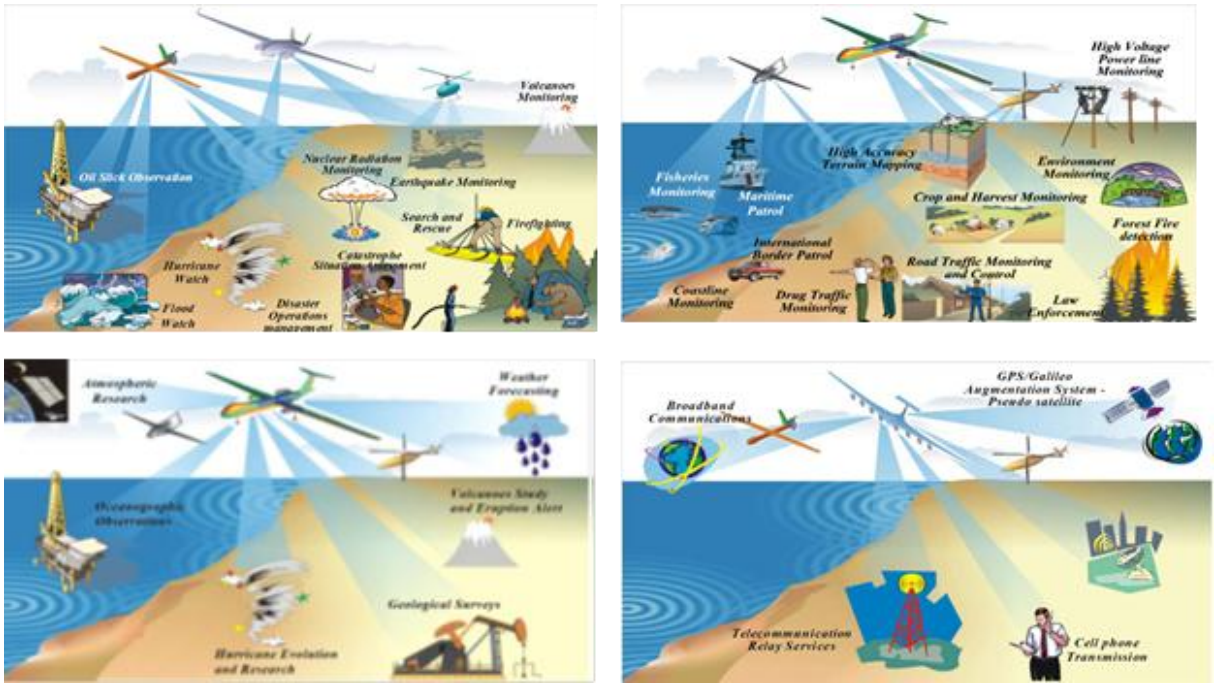
Being remotely piloted, Remotely Piloted Aircraft (RPA) can perform tasks that manned systems would not be able to perform. They are well suited to perform long monitoring tasks (e.g. > 24 hours) or risky flights into ash clouds or in proximity of nuclear or chemical plants after major incidents. RPAS can efficiently complement existing infrastructure (manned aircraft or satellites) to support governmental applications like crisis management, law enforcement, border control or fire fighting. RPAS can also deliver profitable commercial aerial services in various areas. Applications are, for instance, emerging in precision agriculture and fisheries, power/gas line monitoring, infrastructure inspection, communications and broadcast services, wireless communication relay and satellite augmentation systems, natural resources monitoring, media/entertainment, digital mapping, land and wildlife management, air quality management/control. Hundreds of potential civil applications have been identified[2]. Many more are expected to emerge once the technology is widely disseminated. Creativity, innovation and entrepreneurship will play a major role in the development of commercial aerial services.

The expansion of this new market will not only support growth and create highly qualified jobs in the industry producing the RPAS or developing the applications; it will also foster the emergence of a totally new service industry offering RPAS operations and aerial work to commercial and state customers. This service industry

[1] This Staff Working Paper, in line with ICAO, adopted the term Remotely Piloted Aircraft System (RPAS) instead of Unmanned Aircraft System (UAS) previously used by the international community, to highlight the fact that the systems involved are not fully automatic but have always a Pilot in Command responsible for the flight. The name used for the consultation process "UAS Panel Process" has however been kept.

[2] See "UAS Panel Process - Workshop 1 - Discussion Paper", UAVSI, Annex 5 and EC/EDA high level conference held on July 1st 2010.

is expected to generate revenues even bigger than the RPAS manufacturing industry itself.



Source UAV-Net

…able to boost industrial competitiveness and support the development of SMEs…

The development of RPAS technologies is supported by a dynamic industry. More than 400 RPAS developments across 20 European countries have been identified[3] involving companies of all sizes, from global aerospace and defence industries producing large systems for military and state applications to start-ups and SMEs developing small systems for commercial or corporate applications. The structure of the industry reflects the wide range of systems varying in size and performance (from the size of an Airbus 320 to a few grams).

The development of large RPA (>150 kg) has been the most dynamic growth sector of the aerospace industry[4] during the last decade. RPAS technologies are a source of important spin-off to civil aviation and a key element of the future aeronautics sector. Presently, the U.S. and Israel dominate the sector although also other non-European countries show great potential to becoming strong competitors. The European aeronautics industry is still lagging behind and must quickly catch up to be able to compete on this global emerging market.

RPAS are themselves multi-systems and involve a great variety of equipment and payloads. Beyond the RPAS manufacturers and system integrators the RPAS industry also includes a broad supply chain providing a large range of enabling technologies (flight control, communication, propulsion, energy, sensors, telemetry, etc.). The development of RPAS technologies is likely to create spin-offs with significant impact in many sectors.

3 See "UAS Panel Process - Workshop 1 - Discussion Paper", UAVSI

4 World Unmanned Aerial Vehicle Systems Market Profile and Forecast, 2011 Edition, Teal Group

SMEs represent more than 80% of the companies involved in the development, manufacturing and exploitation of light RPA. Hundreds of developments of light RPA (<150 kg) are currently on-going, often driven by start-ups, and associated with concrete applications. The expansion of the RPAS sector is actively supported in a number of European regions[5]. Boosted by local initiatives and policies, the cooperation between large industries, SMEs, research organisations and academia (universities) allow the development of local networks of RPAS expertise. Finally, innovative aerial services will help their customers to improve their own products and services or increase their own competitiveness.

… provided regulatory deficiencies and market failures are addressed.

The potential of RPAS technology to create new businesses and support industrial competitiveness is huge. Today, however, the emergence of the civil RPAS market is hampered by the absence of an operational concept and associated technical enablers as well as a supporting regulatory framework. Only a few developments have led to sustainable services, illustrating the difficulty to turn these projects into real businesses.

To reap the full benefits of this new technology for growth and jobs, Europe should remove, in a coordinated way, the existing barriers and support the internal market for civil RPAS services.

The United States of America has recently approved an ambitious plan to insert RPA in the National Airspace by 2015. Europe should not lag behind. There is an urgent need to develop agreed European objectives for unrestricted RPAS operations in the Single European Sky. This can only be possible if, in Europe, well-coordinated actions are implemented at the same pace as in the U.S. Europe should also consider relevant legal, operational and technical issues linked to the utilisation of RPAS for civil applications, like liability and data protection. Only in this way can Europe achieve the development of a true internal market for aerial services. Lastly, Europe should also ensure that the conditions are in place for a wide public acceptance of these new applications.

1.2. Towards the development of a European Strategy for civil applications of RPAS

Considering the emergence of RPAS, their potential benefits for European citizens and economy as well as the current lack of an internal market in this area, DG Enterprise and Industry and DG Mobility and Transport, in close consultation with other Commission services, launched, on 23 June 2011 at the Paris International Air Show, a broad stakeholders' consultation, the "*UAS Panel Process",* with the aim to contribute to the development of *a Strategy for the development of civil applications of RPAS in Europe.* Such a strategy is likely to require concrete steps to foster the development of civil RPAS applications in Europe, including through regulatory, R&D and complementary initiatives, leading to the insertion of RPAS into non-segregated airspace.

Building on various initiatives already carried out by the European Commission in the past 7 years[6], the "*UAS Panel Process*" has analysed the barriers to a full

[5] See for instance the AETOS cluster initiative supported by the French Aquitaine region

[6] The European Civil Unmanned Air Vehicle Roadmap (UAVnet/CAPECON/USICO, 2005), the INOUI study (Innovative Operational UAS Integration, 2007), the Policy Statement on Airworthiness

exploitation of civil (commercial, corporate and governmental non-military) RPAS in Europe and discussed possible ways forward to overcome them.

The "*UAS Panel Process*" was open to most relevant stakeholders and involved Eurocontrol, the European Civil Aviation Conference (ECAC), the European Safety Agency (EASA), the scientific community, European Civil Aviation Authorities, ICAO, JARUS, Ministries of the Interior (border surveillance, police forces), the European Defence Agency, Ministries of Defence, European Space Agency (ESA), international military organisations, non-governmental organisations, international stakeholders, European citizens and broad industry representation from SMEs to global players which manufacture and/or operate RPAS.

This process mainly consisted of two elements:

(a) a call to all interested stakeholders to provide information and comments on the need for a *Strategy for RPAS in Europe* and

(b) the organisation of 5 thematic workshops from July 2011 to February 2012. Each of these workshops was prepared by individuals with highly recognised expertise in the following fields: UAS industry and market, UAS insertion into airspace, UAS safety, societal impacts of UAS applications and research and development needs. Overall, the workshops were attended by more than 800 participants.

This Staff Working Paper presents the outcome of the "*UAS Panel Process*" and summarizes the common understanding of the issues to be addressed in order to foster the development of civil RPAS applications. The key findings of this report are based on the content of the discussion papers and conclusions prepared for each workshop. These documents, as well as all workshop presentations and written contributions received, are published on the website http://ec.europa.eu/enterprise/sectors/aerospace/uas/index_en.htm.

DG Enterprise and Industry and DG Mobility and Transport would like to thank all contributors and, especially, the five experts that lead the organisation of the workshops, as well as Eurocontrol who so kindly hosted four of the five workshops.

2. OUTCOME OF THE "*UAS PANEL PROCESS*" STAKEHOLDERS' CONSULTATION

2.1. RPAS Industry and Market

The first Workshop of the "*UAS Panel Process*" took place on 12 July 2011 and discussed the potential for civil RPAS applications, the market structure and the industrial landscape.

2.1.1. The global RPAS market – a high growth rate

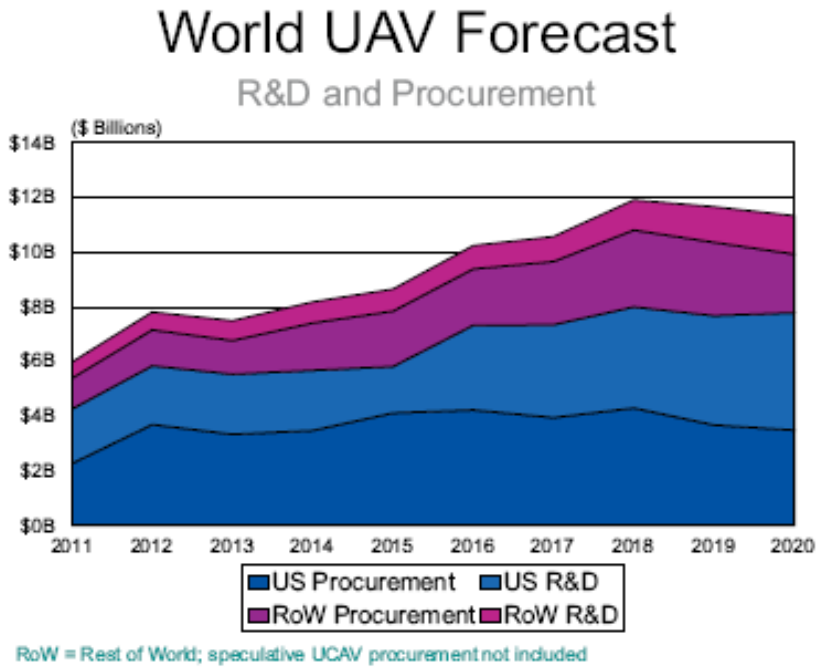
Today, military RPAS applications are driving technology development and market expansion[7], leading the way in terms of research and development, standards, certification and pilot training. RPAS are currently almost exclusively used for

Certification of UAS (issued by EASA in 2009), the Hearing on Light UAS (2009), the High-Level-Conference on UAS (2010).

[7] See for instance, UK Trade and Investment : Report on inward investment in the unmanned aerial vehicle industry, 10/ 2008

military applications (±95%[8]) although their potential for civilian applications has been widely recognised.

Teal Group[9] estimates that the global RPAS procurement and R&D expenditures reached $6 billion in the year 2011, with about 40% spent on R&D. With respectively 66% and 10% of the worldwide RPAS sales, the U.S. and Israel dominate the sector. The production of European countries, all together, does not represent more than 10 %[10]. Teal Group estimates that the worldwide RPAS market will double over the next decade to represent an annual procurement and R&D market of $11.3 billion in 2020 with European and Asian manufacturers falling behind. Overall, it is estimated that 35,000 RPAS will be produced worldwide in the next 10 years[11]. The European market should experience the same growth trend but at lower scale. If Europe's ambition is maintained at current levels, the United States together with Israel will remain, in the foreseeable future, the dominant players in a growing RPAS market. This is why it is imperative for the EU to take action now.



Graph 2, World UAV Forecast

Source: *World Unmanned Aerial Vehicle Systems Market Profile and Forecast*, 2011 Edition, Teal Group

2.1.2. The civil RPAS market – still in its infancy but with high potential

It is highly likely that a civil market for RPAS will emerge in the next decade[12].

The United States adopted in February 2012 the Federal Aviation Authority (FAA) Modernization and Reform Act of 2012[13] which

8 Industry estimate at the 1st UAS Workshop

9 World Unmanned Aerial Vehicle Systems Market Profile and Forecast, 2011 Edition, Teal Group

10 Idem.

11 NextGen UAS Research, Development and Demonstration Roadmap, Version 1.0, 15 March 2012

12 Idem

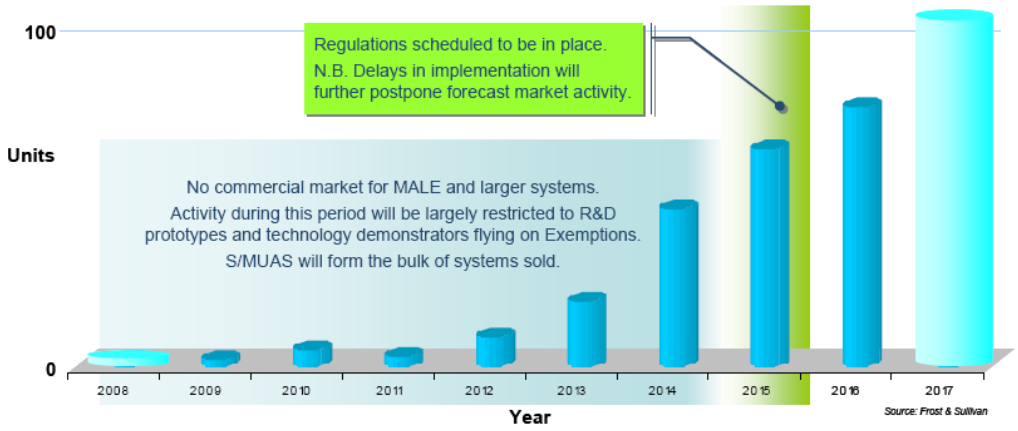
13 112th Congress of the Unites States of America , H.R. 658, Subtitle B – Unmanned Aircraft Systems

- tasks the Federal Aviation Authority to develop a comprehensive integration plan within 9 months which will result in a five-year RPAS roadmap;
- sets 30 September 2015 as a deadline for the safe integration of RPAS into national airspace;
- aims at supporting the civil uptake of RPAS technology by law enforcement, fire fighters, emergency responders, etc.;
- sets short-term targets for the flight of very small and small RPAS;
- tasks FAA to develop certifications standards and air traffic requirements.

The first major RPAS applications are expected to be governmental: border security, fire fighting, traffic monitoring, environmental monitoring, earth observation and communication, etc. Long endurance and the considerable payload of the military systems, render them perfectly fitted to a large number of such governmental application. The reduction of the number and intensity of military operations conducted in "out of area" theatres could free a extra RPAS capacity which could lead to a possible mutualisation of military RPAS in support to governmental requirements and a quick implementation of governmental applications.

The current market for commercial RPAS services is practically non-existent due to difficulties for RPAS to obtain flight permissions and their restriction to segregated airspace. It is expected that once the barriers limiting RPAS flight will be removed the understanding of the RPAS potential will quickly spread amongst potential users creating new markets of aerial services, in the same way that the iPad created an entirely new and unpredicted market for mobile data services.

A study commissioned by the European Commission, and published in 2007, estimated a huge potential for an increase of civil RPAS applications as soon as appropriate legislation is in place.

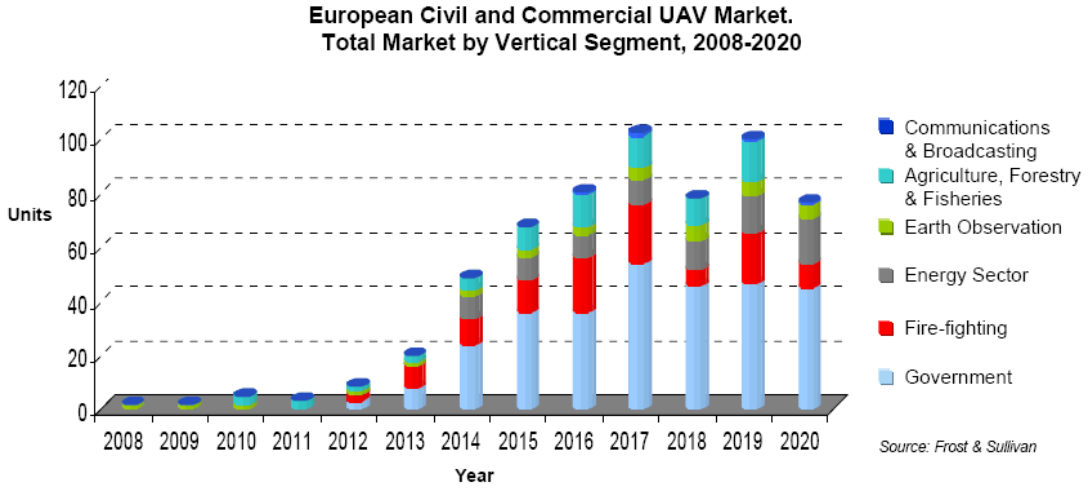


Market Forecast European Civil UAS market[14]

Source: Frost & Sullivan, Study analysing the current activities in the field of UAV, ENTR/2007/065

In the long term, the commercial and public RPAS markets have huge growth potential as forecasted by several studies.

[14] Presentation ASD 1st Panel Workshop



Forecast European Civil UAS market per application[15]

Source: Frost & Sullivan, Study analysing the current activities in the field of UAV, ENTR/2007/065

In Europe, about 400 RPAS are currently under development in 19 EU Member States[16].

Most of the European aircraft manufactures and equipment suppliers are today involved in the development and production of large RPA (>150 kg). 69 models of large RPAS are currently developed or produced in the EU with 11 in service and 7 market-ready[17]. The use of large systems will especially depend on the progress in the development of airspace insertion.

RPAS also have a huge potential for overall European aeronautics capability enhancement. The spin-in / spin-out effects between RPAS and civil aircraft are estimated to be significant: technologies are multi-purpose in areas such as: one-man cockpit, novel and highly automated flights, better automated collision avoidance systems, optionally piloted general aviation aircraft etc.

SMEs[18]represent more than 80% of the companies involved in the development, manufacturing and exploitation of light RPA (<150 kg). Most of these SMEs are not part of the traditional aviation sector. 335 light RPAS models have been identified in the EU with 179 under development and 115 market-ready, showing the dynamism of a sector involving many entrepreneurs and start-ups in most European countries[19]. However, only 25 are in service today, illustrating the difficulty to turn these projects into a real business.

While Europe's RPAS technology basis is highly diversified, there may be a fear that this capability is not finding its market implementation. Particularly the fragmentation of the industrial base for the development of large RPA, the lack of end-user requirements and the lack of rules and a standardised technical and operational environment makes it difficult to harness Europe's industry technology

15 Presentation ASD 1st Panel Workshop

16 UVSI discussion paper for workshop 1, page 5

17 UVSI discussion paper for workshop 1

18 158 industries over the 194 identified in the development of light RPAS (< 150 kg) are SMEs (UVSI DP for workshop 1)

19 Activities have been identified in 20 European countries (UVSI DP for workshop 1).

basis. Additionally, there are structural problems and key skills (design and engineering skills) could be lost over the coming years unless the industry is reorganised and investment is increased.

2.1.3. Workshop Conclusions/Recommendations:

Stakeholders widely agreed that RPAS are real innovations which are of strategic importance and have the potential to create growth and jobs.

European RPAS producers have made significant progress in the development of critical technologies and in the systems integration expertise required to field mature and globally competitive RPAS systems. However, when evaluated against the track record of Israeli and US manufacturers it is clear that European RPAS producers have significant work to do to increase competitiveness in the global market[20].

The RPAS technology has also the potential to create an important market of innovative state and commercial applications and services. To achieve this, RPA air traffic insertion is crucial. Access to non-segregated airspace will allow quick development of awareness about RPAS benefits. It is also a pre-requisite to develop cost-efficient applications.

A commercial market for light RPAS flying in uncontrolled airspace (mainly in Visual Line of Sight - VLOS) is already emerging, although under difficult conditions, supported by the dynamism of a number of entrepreneurs and start-ups. In this segment safety is a critical factor as well and must be demonstrated to provide the necessary confidence for the authorities and investment from industry. Clear rules, mainly on the pilots and on the operations, are urgently needed, considering especially, that so far no more than 10 EU Member States have published rules for RPAS operations. Supporting this market segment by developing appropriate safety regulation would be a quick win.

Mutualisation[21] of RPAS assets (use of military RPAS for civil government applications, e.g. for crisis management) has made state applications possible so far. Therefore, examples of good practice could be collected and published to inspire possible users. The development of an institutional market for public non-military applications could also be supported by raising awareness among prospective users about the benefits of the use of RPAS.

2.2. Safe integration of RPA into European Airspace

The second and third workshops of the "*UAS Panel Process*", which took place in September and October 2011, discussed the air traffic insertion (ATI) of Remotely Piloted Aircrafts (RPA), including Air Traffic Management (ATM) and safety related aspects.

[20] Frost and Sullivan, 2007

[21] The term "mutualisation" is used to designate the operation of military RPAS assets by the military for non-military governmental applications. The basic advantages of mutualisation appear to be: (1) Offers the military additional RPAS flight training opportunities; (2) Supplies added value to military flight training exercises; (3) Permits to increase the return on investment for military RPAS by using them for non-military governmental missions with societal benefits (incl. improved European external border surveillance) – from UVSI Discussion Paper on RPAS Industry & Market Issues

2.2.1. The situation today – RPA fly in segregated airspace

RPA are in the first place aircraft. As such they are subject to aviation rules in all domains (Airworthiness, Air Operations (OPS), Flight Crew Licensing (FCL) and ATM). Since there are no people on board the RPA, the safety objective is targeted at the protection of third parties on the ground and in the air.

Today, operations of RPA are always segregated from other air traffic and from normal airport operations. In order to boost the development of RPA, obtaining the permission to fly in non-segregated airspace and across the 27 EU Member States, would need to become a standard procedure ("*File and Fly*"[22]).

This would require, in addition to the 'mutual recognition'[23] of certificates and approvals, that RPAS are inserted into the 'total civil aviation system' (i.e. first airworthiness; then OPS and personnel licensing and finally into ATM). However, detect & avoid technology, a key enabler to support this integration, is not fully developed yet. A stepwise approach therefore needs to be taken starting from what is possible today without undermining air safety and setting more ambitious objectives for the longer term when this technology will be fully implemented.

Insertion of RPAS into the total civil aviation system can only happen after the definition of rules for airworthiness, personnel and operations have been done and the compliance with these has been demonstrated. It must also be achieved in a transparent and cooperative way with other airspace users. RPAS must not have a negative impact to overall aviation safety objectives, must not require changes to ATM procedures and must not have an impact on the air traffic control capacity of the Air Navigation Service Providers. The future RPAS "safety objectives", to be defined at European level, need however to be reasonable and adapted to RPAS specificities and developed with a 'dual use' concept, as much as possible, (i.e. civil or military)

Achieving this requires defining specific regulations, procedures and standards for RPAS. Following amendment 43 to Annex 2 to the Convention on International Civil Aviation (ICAO) the three essential domains of airworthiness, crew licensing and air operations are a pre-requisite for airspace insertion. RPA with an operating mass below 150 kg are currently under the regulatory control of the Member States while RPA above 150 kg not engaged in military, customs, police, or similar services, have to comply with Regulation (EC) No 216/2008 and fall in the competence of EASA. In parallel, a gap analysis must be conducted on the present Single European Sky (SES) regulations to identify if amendments are needed to accommodate RPA in the SES. Finally, further key enablers for RPA operations must be secured through specific initiatives at EU level, inter alia safe and secure data links and sufficient allocation of radio frequencies (see chapter 2.3), detect and avoid, certification and standardization.

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22 See Discussion paper produced by EUROCONTROL for the second workshop on Air traffic Insertion

23 Ref. Article 11 of Regulation (EC) No 216/2008 of the European Parliament and of the Council of 20 February 2008 on common rules in the field of civil aviation and establishing a European Aviation Safety Agency, and repealing Council Directive 91/670/EEC, Regulation (EC) No 1592/2002 and Directive 2004/36/EC (OJ L 79, 19.03.2008, p. 1). Regulation as last amended by Regulation (EC) No 1108/2009 of the European Parliament and of the Council of 21 October 2009 (OJ L 309, 24.11.2009, p. 51).

2.2.2. RPA with an operating mass above 150 kg – a crucial role for EASA

EASA is already engaged, although with limited resources, in developing a safety Regulatory Roadmap for civil RPA above 150 kg. EASA's work plan for 2013 includes specific rulemaking tasks related to RPAS. It would be advisable that these tasks, currently planned in the EASA Rulemaking Programme 2012-2015, are confirmed in the EASA Rulemaking Programme 2013-16 and that the expected delivery date of 2016 is at least maintained. Knowing that the human resources for these tasks are currently not funded, the necessary budgetary resources would need to be made available.

Limited resources (this situation applies unfortunately not only to EASA) and the need to preserve air safety standards suggest a step-wise approach towards RPA full insertion in all classes of airspace. At the same time it would be advisable to exploit, to the maximum possible extent, the investments already made by Member States individually or by regulatory groups (i.e. by JARUS) to harmonize RPAS rules and developing safety and operational requirements.

In the near and midterm future, the segment of RPA >150 kg will most likely be populated by governmental non-military RPA whose operations are under the legal competence of the Member States. However those RPA will use concepts and technologies applicable also to civil RPA (e.g. command and control; detect and avoid, etc.). It is therefore important that both EASA and Member States harmonise their regulatory approaches across the whole range of RPA. This common interest is likely to be shared by the military side as the ATC procedure applicable to military RPAS will not differ from the ones to be applied to the civil systems.

2.2.3. RPA with an operating mass below 150kg – enhancing the coordination

This segment of RPA (further named "light RPA") appears to be very promising, not only for European industry but also for the short term RPA users' aspirations. Particular care should be given to avoid introducing heavy or unnecessary regulatory burden for light RPAS and involved organisations, as most industries acting in this sector (mainly SMEs) would not be able to cope with a disproportionate burden.

Given that current Regulation does not empower EASA to conduct certification tasks for light RPA, a number of National Civil Aviation Authorities (UK, France, The Netherlands, and the Czech Republic) have already developed and adopted national rules, because they have received large numbers of application requests from RPA operators[24].

Processing these applications in the absence of well-defined guidelines induces considerable efforts from both RPA operators and the competent authority. These applications are today handled case-by-case, necessitating individual assessments based on airworthiness rules and operational practices applied so far for manned aircraft, hence delays are inevitable. Aerial work operators and their customers are therefore obliged to plan the flights far in advance and to submit their applications well ahead of the planned flight. Furthermore, some Member States are not able to respond to RPA applications for aerial work license, because no pilot licensing or

[24] During the 2nd workshop of the *UAS Panel Process*, a number of European CAA (France, Belgium, etc) reported receiving tens of requests every year. On its side, the FAA's Unmanned Aircraft Program Office (UAPO) had issued as of June 18, 2011, 249 Certificate of Waiver or Authorization certificates.

certification of RPA operator's organisation exists. In some Member States civil RPA operators are already operating without approval from the authority, with potential impact on air safety.

In the absence of harmonized regulatory solutions this situation is progressively leading to a fragmented approach while hampering the development of this important segment of RPA.

Since 2007, a number of national, including non-EU, Civil Aviation Authorities are also joining efforts under the lead of the Dutch CAA in the JARUS[25] initiative to try harmonising these rules. So far only a minority of the 27 EU Member States have however been in a position to allocate resources to JARUS. It seems that this could change if an initiative is launched by the European Commission aiming at coordinating European and national approaches for flying RPA of all categories.

It is therefore essential that, with the aim to maintain uniform protection of all the citizens in the Union and to provide the European industry with harmonized rules across the continent, the European Commission takes actions to promote an harmonized approach, as far as pertinent, between EASA (for RPA > 150 kg) and JARUS (for RPA < 150 kg) and the adoption of the JARUS recommendations by the Member States.

2.2.4. The International Civil Aviation Organisation's global approach to RPAS

At the global level the International Civil Aviation Organisation (ICAO) is the Agency of the United Nations responsible for the development of Standards and Recommended Practices (SARPs) applicable to international civil aviation[26].

To support the rapidly growing demand of RPA applications, ICAO established in 2007 the RPAS Study Group[27] providing support to the development of regulatory provisions for this fast emerging sector.

In 2011 ICAO published the *Circular 328 "Unmanned Aircraft Systems"* which was the first important milestone in clarifying the general principle underpinning RPAS operations, the legal implications as well as some taxonomy for RPAS.

In March 2012, ICAO adopted amendments to Annexes 2 and 7 of the Chicago Convention, achieving another important milestone for the RPAS insertion in the total aviation system. According to these amendments RPAS needs to be certified for their safety, be under the command of a licensed remote pilot, and be under the responsibility of a certified RPAS operator. ICAO approach to RPAS airworthiness certification reflected in these amendments separates the certification of the Remotely Piloted Aircraft (RPA) from the certification of conformity of its Remote Pilot Station (RPS). This would facilitate operational flexibility, including RPA

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25 The following countries participate in JARUS: Australia, Austria, Belgium, Brazil, Canada, Czech Republic, Denmark, France, Germany, Israel, Italy, Malta, The Netherlands, Norway, South Africa, Spain, Switzerland, United Kingdom and the United States of America.

26 An operation is 'international' even when a RPAS registered in a State is carried (e.g. by a van) to take off from an adjacent State.

27 The *ICAO UAS Study Group* consists of 18 State representatives (Austria, Australia, Brazil, Canada, China, Czech Rep., France, Germany, Italy, Netherlands, New Zealand, Norway, Russian Fed., Singapore, South Africa, Sweden, UK, USA), as well as representatives from EASA and EUROCONTROL and 9 international organizations (CANSO, EUROCAE, IAOPA, ICCAIA, IFALPA, IFATCA, NATO, RTCA, and UVS International).

control hand-over between two RPS and opens the way to the provision of data links via SATCOM. This would however require amending the definitions of "product" (to e.g. include RPS) in Art. 3 of Regulation 216/2008

ICAO is currently developing Guidance Material in a form of a 'Manual' expected around end of 2013 and Standards and Recommended Practices (SARPs) immediately after. ICAO also plans to organise a world-wide RPAS Symposium in spring 2014.

ICAO acknowledges RPA as legitimate airspace users which must comply with rules equally safe as those applicable to manned aviation. This is complicated by the fact that RPA are piloted remotely and that there is a huge variety of types. Therefore, rules and procedures need to be developed to accommodate these particularities. ICAO is also, very much relying on the limited contribution of resources from its contracting states.

European Commission support to ICAO should continue also with the aim to balance and complement the strong engagement recently shown by the United States on RPAS. Contributions by EASA, JARUS, EUROCONTROL and other European actors, as mentioned above, are strongly appreciated and should be better coordinated.

2.2.5. The role of Eurocontrol

Eurocontrol has played, and will continue to play, an extremely valuable contribution in support to RPAS since the outset.

It has developed a great expertise and gained wide experience through its effective network of ATM relations with European States even beyond the Union, as well as with all international organisations acting in the ATM domain (including with ICAO). Eurocontrol is also the appropriate body where civil-military coordination on ATM can take place (in this respect contribution from the European Defence Agency would also be essential). This civil-military expertise could become relevant when discussing potential mutualisation of military RPA for civil applications. Moreover, the insertion of RPA in the Single European Sky may require a revision of the existing SES regulations for which contribution from Eurocontrol would be of utmost importance.

Finally, Eurocontrol will continue to be an important focal point in collecting fact findings and lessons learned while providing support to the Member States.

2.2.6. Workshops Conclusions/Recommendations

The existing threshold of 150 kg set out in Regulation (EC) No 216/2008 exacerbates the complexity of the regulatory framework for RPAS and results in the production of one set of rules for RPAS > 150 kg and 27 distinct set of rules for RPAS < 150 kg. The absence of harmonised rules[28] for light RPAS is especially detrimental for the uniform protection of citizens and the opening of the market to RPAS manufacturers and operators. While recognizing the fact that the lack of a legal base for regulating the light RPAS sector at EU level can however not be overcome until a revision of the aforementioned Regulation is put in place, every possible attempt should be made

[28] I.e. developed by JARUS, recommended by the EC for adoption in the 27 EU MS, but transposed in respective legal orders on a voluntary basis and at different times.

to try to overcome this legal impediment and avoid that a fragmented approach persisting. National Aviation Authorities and industry strongly called indeed on the Commission to provide support in developing rules for RPAS or to enhance the coordination of the regulatory work at the EU level.

As a matter of fact, none of the European regulatory organisations is capable of carrying out the massive regulatory work for RPAS alone. There is however already clear evidence that the launch of the *UAS Panel Process* and the expectation of further initiatives by the European Commission is producing positive effects and creating the right momentum amongst all stakeholders.

An overall coordinated approach should, in consequence, be established which builds on the existing expertise, presently spread around different organisations.

This coordinated approach should be based on a Roadmap for the development of RPAS applications in Europe and their insertion into air traffic by 2016 (RPAS Roadmap). This Roadmap would in particular define the regulatory steps to be achieved, linking them with the other required activities, in particular the development of the necessary technologies. The Roadmap should be available by end 2012.

To support the coordinated approach and, in particular, the definition of the Roadmap, one possible solution could be the coordination of all regulatory initiatives under a *European RPAS Steering Group (ERSG).* The *ERSG* should involve, as a minimum EASA, Eurocontrol, SESAR JU, EDA, JARUS, industry and EU Member States experts on a voluntary basis. This approach would allow the European Commission to gather the necessary expertise under an overarching process (which also includes research and other complementary measures) and coordinate all required regulatory actions.

Under the aegis of the *ERSG*, the European Commission could assign EASA, with the support of other regulatory organizations, the responsibility to develop the Regulatory component of the Roadmap. This would include clear indications on achievable milestones and the division of labour amongst all interested bodies.

2.3. Radio spectrum requirements for RPAS

The needs for additional radio spectrum for RPAS were discussed in the 2nd workshop of the "*UAS Panel Process*" in September 2011.

2.3.1. Radio spectrum is a scarce resource

RPAS have to be provided with a number of radio communication systems to ensure, on the one hand, the safe navigation of the RPAS in the airspace - command and control (C2) and detect and avoid (D&A) - and on the other hand the functioning of the payload of the RPAS, which might involve high data-rate transmission for some applications. The type of system depends therefore on the task the RPAS is deemed to carry out. The focus lies, however, for the time being on the allocation of spectrum for C2 and D&A.

Radio spectrum is a scarce commodity, because the spectrum which is protected against harmful interference and capable of maintaining a high level of integrity and

availability[29] is shared by the ever growing civil air transport system and the military and is allocated on the basis of the International Telecommunication Union (ITU) Radio Regulations. Therefore, given that no dedicated spectrum has so far been assigned to RPAS, civilian RPAS flying today for research or commercial purposes rely on ad-hoc frequency assignments[30]. Radio spectrum availability is therefore an important element for the growth of RPAS services.

EDA commissioned in 2009 the SIGAT study[31], which analysed the potential frequency bands usable by military RPAS in General Air Traffic. Spectrum required for command and control of RPAS is needed for Line-of-Sight (LOS) communications and for BLOS (Beyond-Line-of-Sight), which is also called SAT communication (satellite). SIGAT recommends in line with the ITU-R study the provision of 34 MHz for Line-of-Sight or terrestrial and 56 MHz for Beyond-Line-of-Sight or satellite operations.

2.3.2. Way forward: Influencing the decisions in WRC

The International Telecommunication Union, ITU[32], has studied the needs of RPAS for radio spectrum allocation for several years. Agreement on the allocation of frequencies needs to be achieved at the meetings of the World Radio communication Conference (WRC), which only takes place every 3-4 years[33] and which reviews and revises the ITU Radio Regulations (an international treaty).

In 2007 the WRC adopted Resolution 421, which proposes to study spectrum requirements and possible regulatory action including appropriate allocation of radio spectrum for the operation of RPAS. However, it is clear that current airspace users, especially the civil aviation sector, are not prepared to surrender already allocated spectrum to the operation of RPAS. A way forward could therefore be a) to identify new spectrum allocations (which, however, might need to be already allocated spectrum for military operations, which would then need to be freed by other instances, as this is not up to WRC's to decide) or b) to develop radio technologies which would allow a more efficient use of available spectrum.

The last WRC took place in January/February 2012 and included an agenda item on spectrum allocation for RPAS:

> *"1.3 to consider spectrum requirements and possible regulatory actions, including allocations, in order to support the safe operation of unmanned aircraft systems (UAS), based on the results of ITU-R studies, in accordance with Resolution 421 (WRC-07);"*

This agenda item was discussed in terms of terrestrial and satellite components, with the following outcome:

> **Terrestrial Component**:
>
> WRC-12 concluded on a new allocation to the Aeronautical Mobile (Route) Service (AM(R)S), limited to the operation of UAS, in the 5030

29 http://www.eda.europa.eu/Libraries/Documents/SIGAT_Leaflet.sflb.ashx

30 CAP 722, Unmanned Aircraft System Operations in the UK airspace – Guidance, chapter 3

31 SIGAT : Spectrum requirement for military UAS Insertion in General Air Traffic

32 http://www.itu.int/en/Pages/default.aspx

33 the next WRC takes place in February 2012 and then in 2015

– 5091 MHz band. This is a positive outcome from a European perspective.

The European proposal on a possible allocation to the AM(R)S in the band 15.4 – 15.5 GHz was not accepted by the Conference, not even as a regional allocation, because this bandwidth is currently used by satellite services.

Satellite component:

No new allocations were agreed at WRC-12 for the RPAS satellite component, but a new agenda item was developed for WRC-2015, intended to study a possible use of frequency bands allocated to the fixed-satellite service (FSS) for the operation of UAS: *"2.1 To consider spectrum requirements and possible additional spectrum allocations in the radio determination service to support the operation of unmanned aerial systems (UAS) in non-segregated airspace;"*

The European Commission is a sector member of the ITU and responsible for the development of coordinated policy positions in the WRC's, which is done, in advance, by way of a Communication[34].

However, concrete radio spectrum needs for RPAS, based on specific EU policy goals, will need to be continuously fed into the process by the relevant European Commission's services.

2.3.3. Workshop Conclusions/Recommendations:

The European Commission, the EU Member States and European industry stakeholders will need to work together to identify the relevant EU policy framework with specific targets and related justifications for the need of adequate radio spectrum for RPAS in order to establish appropriate policy coordination at EU level to obtain sufficient support within the CEPT[35] and other regional entities during the preparations of the next World Radio Conference in order to come to concrete conclusions in WRC 15. Close cooperation with ICAO and Eurocontrol for use of aviation bands is also strongly suggested.

To this end, further studies would be necessary (which also need to involve the SESAR JU) to assess interoperability with the future ATM system and more specifically the impact of RPAS spectrum requirements on manned aviation. These studies should also include the smarter use of existing frequencies.

Coordination with EDA on RPAS spectrum identification and allocation needs to be established.

Furthermore, it needs to be explored if the current satellite communication systems will be able to meet the required communications performance (huge increase in communication expected). Current cooperation launched between the European Space Agency and EDA could provide input and guidance on this issue.

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34 Communication COM(2011)180 of 6 April 2012 on the European Union's policy approach to the ITU WRC-12: http://ec.europa.eu/information_society/policy/ecomm/radio_spectrum/_document_storage/communications%20_et_al/com2011_0180_en.pdf

35 CEPT: European Conference of Postal and Telecommunications Administrations

2.4. The Societal Dimension of RPAS

The fourth workshop of the "*UAS Panel Process*" discussed in November 2011 issues linked to the impact of civil RPAS applications on the society: the responsibility in the case of an accident, liability for damage, insurance requirements for RPAS operators, privacy and data protection laws and societal acceptance of RPAS.

2.4.1. Setting the Scene

The workshop emphasized specifically the usefulness of RPAS for crisis management. RPAS would even have the potential to complement GMES (Global Monitoring for Environment and Security) and become part of a European disaster surveillance system. It was proposed to explore the link between RPAS and space capabilities further.

2.4.2. Responsibility, Liability and Insurance

The use of RPAS can only be allowed if the responsibilities for the operation and the liability in case of damage to third parties are clearly defined and RPAS activities covered by adequate insurance schemes.

The workshop participants agreed that third party liability for damage caused by RPAS should be developed on the basis of the principles for manned aviation. Automation creates an additional level of complexity to the question of responsibility and liability. However, legal experts concluded that strict liability will fall on the operator of the RPAS. The competent authorities have to ensure that the operators comply with the applicable national and/or European rules and regulations.

As in the case of manned aircraft, a pre-condition for the issuance of an operating licence by Member States should be the proof of insurance. Insurance requirements for air carriers and aircraft operators are defined by *Regulation (EC) No. 785/2004* which covers the liability of the operator for passenger, baggage, cargo and third parties. The Regulation also covers the risks related to acts of war, terrorism, hijacking, acts of sabotage, unlawful seizure of aircraft and civil commotion. The Regulation applies to the commercial utilisation of all kind of RPAS. It does not apply, however, to state aircraft. RPAS operated by public authorities are therefore exempted from insurance requirements.

Issued 8 years ago, this Regulation does, however, not take into account the specificities of RPAS. It requires some adaptations to better address the real risks related to the commercial and corporate exploitation of RPAS (i.e. limitation to third parties damage, introduction of further categories to accommodate different classes of RPA below 500 kg, adaptation of risk levels to the flight characteristics of the very light RPAS, etc.), as highlighted by the recent fitness check performed on this regulation.

Insurance products for RPAS exist, but given that most RPAS missions are currently carried out by state aircraft, demand for such products is limited. Whereas the methodology for the calculation of premiums for large RPAS is comparable to that for manned aircraft (based on weight), this methodology would need to be adapted to also cover light RPAS.

2.4.3. Privacy and Data Protection

All actions related to the development of the RPAS must respect the rights and principles enshrined in the Charter for Fundamental Rights of the EU, and in particular the right to private life and family life (Article 7) and the protection of personal data (Article 8). The Lisbon Treaty recognises that the rights, freedoms and principles set out in the Charter shall have the same value as the Treaties. Article 16 of the Treaty on the Functioning of the European Union enshrines the right to the protection of personal data.

Directive 95/46/EC of the European Parliament and of the Council of 24 October 1995 on "the protection of individuals with regard to the processing of personal data and on the free movement of such data" sets out the data protection legal framework.. It applies to the processing of personal data in the European Union. It sets out the principles for the processing of personal data and the rights of data subjects over their personal data. It applies also to RPAS, because RPAS do in principle not add new features to already available information collection systems such as manned aircraft, satellites or cameras.

The Commission recognised in 2009 that rapid technological developments have brought new challenges for the protection of personal data. A revision of the Directive was therefore launched and two draft legal instruments were presented on 25 January 2012 by the Commission[36]The transformation of the Directive into a 'General Data Protection Regulation' which regulated the processing of personal data and the free movement of these data, and a Directive which regulates data processing by competent authorities for the purposes of prevention, investigation, detection or prosecution of criminal offences or the execution of criminal penalties, and the free movement of such data (Police and Criminal Justice Data Protection Directive).

The General Data Protection Regulation will apply to data processing by private or commercial RPAS operators. Therefore, no need for a new or modified legal privacy and data protection regime to accommodate commercial RPAS applications seems necessary at this stage.

National rules might impose restrictions on the use of RPAS by states, for example for public video surveillance. In order to allow for the development of RPAS services for state use, some degree of harmonisation might need to be envisaged. To that end, the different national rules would need to be analysed. The future adoption of the new Police and Criminal Justice Data Protection Directive, would, if adopted, define the benchmarks for data processing carried out by state authorities.

Privacy and data protection should already be considered during the development phase of a payload for a RPAS. "Privacy and Data Protection by Design" (e.g. automated deletion of data) could become a principle for civil RPAS operation.

[36] Proposal for a REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL on the protection of individuals with regard to the processing of personal data and on the free movement of such data; COM/2012//0011 (COD); Proposal for a DIRECTIVE OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL on the protection of individuals with regard to the processing of personal data by competent authorities for the purposes of prevention, investigation, detection or prosecution of criminal offences or the execution of criminal penalties, and the free movement of such data; COM/2012/010 final.

Space law concepts could also be useful for the development of liability and/or privacy and data protection issues related to RPAS.

2.4.4. Societal impacts and acceptance

Citizens still feel uncomfortable with RPAS because their most publicized use concern military and peace keeping missions. Therefore, the policy making process supporting the development of civil RPAS applications needs to be transparent and involve the consultation of stakeholders, for example bodies like the European Group on Ethics, the LIBE Committee of the European Parliament or the European Union Agency for Fundamental Rights and European Data Protection Supervisor. Furthermore a certain range of permissible or forbidden uses of RPAS could be defined to increase the confidence of citizens. Guidelines for certain civil uses of RPAS would be based on a 'privacy and data protection impact assessment' and involve interested stakeholders.

2.4.5. Workshop Conclusions/Recommendations

The responsibility for accidents, liability claims and the obligation to take insurance for a RPAS falls generally on the operator of the system. *Regulation (EC) No. 785/2004 on insurance requirements for air carriers and aircraft operators* need to be adapted to better take into account RPAS specificities.

An insurance market for (large) RPAS is emerging. Today, the insurance framework is very much based on the framework for manned aircraft. This might cause obstacles for the insurance of light RPAS. An insurance scheme for light RPAS should therefore be developed.

The *Data protection Directive 95/46/EC* also applies to commercial RPAS services. It was concluded that no regulatory changes would be necessary to ensure adequate privacy and data protection. However, this Directive does not cover the use of state RPAS (police, border surveillance). Here, national rules apply. If Member States agree, adoption of the Police and Criminal Justice Data Protection Directive would be a good step in this direction, it could be considered to aim for a certain harmonised level of data protection, because this could increase the confidence of citizens regarding the operation of state or governmental RPAS.

There was full agreement that any European RPAS initiative would need to be carried out in full transparency and with consultation of interested stakeholders.

2.5. RPAS Research and Development

The 5th and last workshop of the "*UAS Panel Process*" debated the need for further R&D for RPAS and took place on 9 February 2012.

2.5.1. RPAS related research in the EU

The workshop presented an overview of the many past and current R&(T)D initiatives related to RPAS, carried out by industry, Member States, the European Defence Agency, the European Space Agency, Frontex, EASA and the European Commission.

A considerable number of projects related to RPAS were funded in the past and are funded today under the 7th Framework Programme for R&(T)D. These projects are included in many different research areas, such as security, ICT/robotics, aeronautics & air transport, Galileo, GMES, environment, etc., and focus on both, technology

development and concrete civil RPAS applications. Little has however been funded in the field of safe air traffic insertion.

On the other hand, EDA with Member States have funded a number of R&D activities specifically intended to identify, develop, test and validate standards and procedures for the safe air traffic insertion of RPAS: a roadmap for the seamless insertion of RPAS, the prioritization of research and development topics for RPAS air traffic insertion, the SIGAT study, MIDCAS detect & avoid demonstrator, and on-going common EDA/ESA demonstrator on command and control through satellites links

It is expected that RPAS related research will continue to be funded at EU level in the future:

- In Aeronautics & Air Transport, R&(T)D on the safe insertion of RPAS into airspace should be reinforced to address the objective of "FlightPath 2050", the high level report which provides a long term vision for research and innovation in the aviation sector[37]. Regarding insertion of small RPA (< 150 kg) a FP7 support action named ULTRA has already started to assist with planning activities until end of 2013 and to analyse and highlight "early harvest" civil use cases. This will require close coordination with the regulatory roadmap to allow an efficient exploitation of this study. In addition, further RPAS research could be useful, for instance, to provide flying test-beds or technology demonstrators for the benefit of civil air transport.
- Security research could be useful to test RPAS applications for governmental purposes (for example border surveillance).
- The SESAR JU provides the link between ATM regulation, standardisation frameworks and technology development. It would therefore be advisable that SESAR plays a role in research aiming at RPAS airspace insertion. Although airspace insertion of RPAS is not yet included in the ATM Master Plan being updated by the SESAR JU, SESAR acknowledges the maturity of RPAS technology and included a work item in its Annual Work programme 2012 with the objective to develop a consolidated concept of operations for the full spectrum of potential RPAS activities, and to identify and develop current and further RPAS to operate in non-segregated airspace. The outcome of this work item might pave the way for the inclusion of RPAS ATM research in the next annual and global (3 year-) work programme and in the next review of the European ATM Master Plan[38].
- ESA and ICT/robotics research could be instrumental to support further research on the capability and reliability of the data link (incl. cyber-security).
- EDA Joint Investment Programme on RPAS on consolidated topics of common interest, key areas for needed technology innovation and development and applicable to any Unmanned Aircraft, expected to be launched in 2012.

[37] "Ensuring safety and security goals: 3. The European air transport system operates seamlessly through fully interoperable and networked systems allowing manned and unmanned air vehicles to safely operate in the same airspace."

[38] Master Plan Edition 1 was published on 30 March 2009

- Given that the military was the first to use RPAS technology (as is the case with many other emerging technologies), it is important for the development of civil RPAS to avoid duplication and to exploit the knowledge and progress already achieved in the defence sector. EDA and ESA are determined to advance RPAS research and demonstration in the future.

This clearly indicates the usefulness of a streamlining of RPAS R&(T)D at European level to accelerate progress towards the objective of RPAS air traffic insertion. This could be done with the development of a Research Roadmap for RPAS. This Roadmap would ensure an overall co-ordination and bundle RPAS research and demonstration while ensuring the development of standards and regulation carried out under the Regulatory Roadmap in a comprehensive approach.

2.5.2. Research areas to be covered in the future

The increased R&D effort at national and European levels experienced over the past few years should be maintained in the future. This effort mainly focusses on the development of RPAS applications and specific technologies.

However, until full RPAS integration (meaning also the integration of RPAS into the 'Single European Sky' concept) is achieved, the potential of Unmanned Technology will remain underexploited and the applications will remain constrained by operating restrictions or limited to line of sight operations.

The workshop highlighted that further technology developments are required in some areas to support the safe insertion of RPAS in air traffic and that the related R&D effort should be reinforced notably in the context of the new Horizon 2020 EU research programme. This however must be done in close connection with the development of the safety regulation. The uncertainty on the level of safety expected from RPAS is today the main industry's showstopper for further progress in this area. No EU Member State can address the full range of Air Traffic Insertion activities and even so it would generate a fragmented approach leading to inefficiency. An European initiative would therefore be preferred.

The workshop identified the main technology developments required to support air traffic insertion, which are:

- Development of a methodology for the justification and validation of RPAS safety objectives (to be executed with participation of EASA and in coordination with the SESAR JU and US FAA);
- Secure command & control / datalinks / bandwidth allocation;
- Insertion of RPAS into the air traffic management system, detect & avoid (air and ground) and situational awareness (including for small RPAS), weather awareness;
- Cyber security / Information management / risk of third party intrusion;
- Safe automated monitoring and decision making: standardise and establish predictability of behaviour (today, each company develops its own emergency recovery procedures);
- Aerodrome operations – automated take-off and landing.

Industry's main priority lies in the "D" of R&D: given that capable RPAS ready to fly are available at national level, EU development efforts should focus on technology demonstration in order to prove concepts for RPAS airspace insertion and allow the achievement of air traffic insertion.

The technology readiness levels of isolated technologies are high. The problem is the integration of these technologies into a functioning system meeting the requirements for air traffic insertion (= horizontal integration). Here progress is still not sufficient and thus the RPAS domain experiences development fragmentation problems as was the case with air traffic management some years ago.

A European demonstration programme would help to integrate the technologies and to adopt a system approach. The U.S. government has recognised this and will move ahead towards the objective to achieve RPAS airspace insertion in 2015 and address similar identified challenges with a pragmatic national approach. The fragmentation of RPAS research in the EU increases the risk that U.S. technology standards would be ready before the EU has achieved a similar level of technology maturity.

In order to coordinate the R&D and demonstration efforts necessary to develop the technologies enabling RPAS air traffic insertion (ATI), the required R&D and demonstration activities must be clearly defined in the Roadmap for the development of civil applications of RPAS and their insertion into air traffic of RPAS by 2016 (RPAS Roadmap) and linked with the other activities, in particular the regulatory ones.

The definition of the necessary R&D activities needs to be based on industry and user inputs and on the work already performed and delivered by EDA through many studies like AIR4ALL and EREA4UAS. The European Commission could, for example, lead this task supported by the SESAR JU, EDA, ESA and Eurocontrol. In relation to the timing of Horizon 2020 it is clear that the work to streamline and focus RPAS research needs to be launched without delay. According to industry views, the development of the required technologies for RPAS ATI should include two phases: a definition phase (including the definition of the RPAS Roadmap and the definition of the most appropriate instrument to implement the necessary research programme) followed by a large scale investment RPAS ATI programme.

2.5.3. Workshop Conclusions/Recommendations:

Although RPAS are already capable of flying today, the validation of the technologies at system level for their safe insertion into airspace has not been achieved yet.

A lot of research has been carried out by industry, Member States, the European Defence Agency, the European Space Agency and the European Commission. However, research has been fragmented and several gaps persist (mainly detect and avoid and the development of robust data links).

Demonstration projects would be needed to test different system configurations, establish acceptable levels of safety and develop the technology needed to achieve the required safety levels.

The greatest progress could probably be achieved by streamlining the R&D needed to achieve air traffic insertion through a detailed definition of R&D and demonstration needs in the RPAS Roadmap and their coordination with regulatory developments.

3. A WAY FORWARD

The "*UAS Panel Process*" highlighted the potential of civil RPAS to support the development of a wide range of commercial and governmental applications, thus creating a large market of innovative services boosting growth and jobs. The "*UAS Panel Process*" also found that the main barrier which would need to be removed to enable the development of this market concerns the insertion of RPAS into non-segregated airspace.

Europe is now at a crucial moment with regard to tapping the potential of RPAS services[39].

RPA are flying today in segregated airspace or in Visual Line of Sight. Neither common nor harmonized rules exist for the pilots and the RPAS operators. Only the European Union can lay down the basis for the safe insertion of RPA into the aviation system and into shared air space within the EU to provide uniform protection for citizens and a level playing field for industry across the continent. Important national and intergovernmental efforts have already been made and time is ripe for a better coordination at European level to avoid a fragmented approach and to make best use of scarce public funding.

In consequence, the "*UAS Panel Process*" called for an initiative led by the European Commission to reinforce cooperation between all European actors concerned and foster the RPAS market and its many useful applications.

The "*UAS Panel Process*" also highlighted the need to develop quickly a comprehensive Roadmap for the development of non-military applications of RPAS in Europe and their insertion into air traffic by 2016 (RPAS Roadmap). Such a Roadmap should be based on three pillars: a regulatory pillar, a research pillar and pillar comprising various complementary measures to inform citizens about the features of RPAS, ensure that legal issues are addressed, for example with view to data protection and insurance requirements, and to foster the emergence and uptake of civil RPAS applications. The complexity and fragmentation of the European landscape and the current difficult budgetary situation call for pragmatic solutions making the best use of the existing instruments. The roadmap should therefore streamline and complement all actions planned or already in place, making the best use of the available resources. A sound approach suggests also starting from achievable quick wins and progress towards more ambitious tasks. The importance of EASA in leading the regulatory work needed to achieve RPA ATI in Europe has been recognised and its regulatory work should start as soon as possible.

In order to help developing and monitoring the implementation of the RPAS Roadmap, the Commission could set-up a "*RPAS Steering Group*" composed of representatives from the main stakeholders involved. The Roadmap will be based on the commitment of each party involved to co-ordinate and implement RPAS relevant actions according to the proposed planning. In order to contribute to a quick delivery of the RPAS roadmap, participants would be expected to commit the necessary

[39] The United States plan to insert RPA in civil airspace. If these plans are not matched by similar European ambitions, it will be US who will capture most of the potential of new markets related to RPAS.

resources to the work of the Steering Group. Participation to thee Steering Group would be on a voluntary basis.

ANNEX : List of acronyms used in the text

ATI : Air Traffic Insertion

ATM : Air Traffic Management

C2 : Command and Control

D&A : Detect and Avoid

EASA : European Aviation Safety Agency

EDA : European Defence Agency

ESA : European Space Agency

FAA : Federal Aviation Authority

FCL : Flight Crew Licensing

GMES : Global Monitoring for Environment and Security

ICAO : International Civil Aviation Organisation

ITU : International Telecommunication Union

JARUS : Joint Authorities for Rulemaking on Unmanned Systems

LIBE : Civil Liberties, Justice and Home Affairs Committee of the European Parliament

MIDCAS : Mid Air Collision Avoidance System

OPS : Air Operations

RPAS : Remotely Piloted Aircraft Systems

SARPs : Standards and Recommended Practices

SES : Single European Sky

UAPO : Unmanned Aircraft Program Office

UAS : Unmanned Aerial Systems

UAV : Unmanned Air Vehicles

VLOS : Visual Line of Sight