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**COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN
PARLIAMENT AND THE COUNCIL**

A new era for aviation

**Opening the aviation market to the civil use of remotely piloted aircraft systems in a safe
and sustainable manner**

Civil aviation contributes to an integrated logistical transport chain that aims to better serve citizens and society. It adds value through offering fast, reliable and resilient connections in a global network. By 2050, a number of different aircraft categories are expected to be operating, diverse in size, performance and type, with some still having a pilot on board, but many remotely piloted or fully automated¹. Opening the European market for remotely piloted aircraft systems (RPAS) – or the civilian use of drones - is therefore an important step towards the aviation market of the future.

The European Summit of 19 December 2013 called for action to enable the progressive integration of RPAS into civil airspace from 2016 onwards. This Communication focuses on RPAS for civil use and responds to the call of the European manufacturing and service industry to remove barriers to the introduction of RPAS in the European single market.

RPAS form part of the wider category of Unmanned Aerial Systems (UAS), which also includes aircraft that can be programmed to fly autonomously without the involvement of a pilot. RPAS, as the name suggests, are controlled by a pilot from a distance.

RPAS technology has matured rapidly in past years and, like many other aircraft technologies before it, is ready to make the shift from being purely military equipment to becoming a reliable new technology for civil use. In order to produce their full potential, RPAS should be able to fly like 'normal' air traffic and be integrated among 'normally piloted' aircraft in non-segregated airspace, i.e., airspace open to all civil air transport.²

Member States are beginning to authorise RPAS operations in non-segregated airspace to respond to market demand. In the short term, the most promising market lies in areas such as infrastructure monitoring or photography;³ in a longer term future, it may be the transport of goods and eventually people.

This Communication sets out the Commission's views on how to address RPAS operations in a European level policy framework which will enable the progressive development of the commercial RPAS market while safeguarding the public interest. Understanding the direction for future regulatory developments is important for the European industry when it comes to making decisions on further investments.

The regulatory action and the related research and development efforts will build on existing initiatives involving a number of actors: the European Aviation Safety Agency (EASA), the national Civil Aviation Authorities, the European Organisation for Civil Aviation Equipment EUROCAE, Eurocontrol, the Joint Authorities for Rulemaking on Unmanned Systems JARUS,⁴ the SESAR Joint Undertaking (SJU), the European Defence Agency, the European Space Agency, the RPAS manufacturing industry and operators.

1. RPAS CAN OFFER A MYRIAD OF NEW SERVICES

RPAS are already being used for civil purposes and are expected to increasingly influence our daily lives. Just as the internet technology in the early nineties gave rise to many different applications, RPAS technologies should lead in the coming years to the development of a

¹ European Commission, (2011), "*Flightpath 2050* ", Brussels, p. 28

² Non-segregated airspace requires aircraft to detect other traffic and be able to take mitigating action. If such detection is not possible, operations need to be limited to segregated airspace.

³ Commission Staff Working Document (SWD(2012)259).

⁴ JARUS is an international group of Aviation Authorities, comparable to the former Joint Aviation Authorities. AT, Australia, BE, Brazil, DK, Canada, CH, CZ, DE, ES, FI, FR, EL, Israel, IT, MT, NL, NO, Russian Federation, South Africa, UK, USA are members, together with Eurocontrol and EASA.

wide variety of different services, especially if combined with other technologies, such as precision positioning thanks to Galileo, or to support other technologies, such as telecommunications in disaster relief situations or in dynamically increasing network capacity. While the exact nature and extent of potential RPAS operations are difficult to predict now, the service industry is expected to generate sufficient revenues to drive forward the manufacturing industry itself.⁵

On other continents, RPAS operators support precision farming through more effective and timely application of fertilizers or pesticides. In Europe, RPAS are being used for safety inspections of infrastructure, such as rail tracks, dams, dykes or power grids. National authorities are using them in disaster relief, e.g. to overfly flooded areas or to support fire fighting.

In future RPAS could make it possible to bring giant wind turbines into the air and produce "green" electricity. On the other end of the scale, engineers are working on micro RPAS which could be used to tackle gas or chemical leaks, or which could be programmed to act like bees to pollinate plants.

RPAS include many different types of aircraft to deliver those services, ranging in terms of maximum take-off weight from grams to more than ten tons, in terms of maximum speed from hovering to more than 1,000 km/h, in terms of flight endurance from a few minutes to months and in terms of lift technology from rotor to fixed wing to lighter than air. Beyond manufacturers and system integrators, the RPAS industry also includes a broad supply chain of enabling technologies (flight control, communication, propulsion, energy, sensors, telemetry, etc.), payload developers and operators.

2. RPAS ARE AN EMERGING MARKET TO CREATE JOBS AND GROWTH

Mastering RPAS technology will become a key to the future competitiveness of the European aeronautics industry. Currently, the US and Israel dominate the global RPAS manufacturing sector, building on expertise in the field of large military RPAS. Other non-EU countries, such as Brazil, China, India and Russia, also show potential to become strong competitors. A strong common EU market should offer a solid basis to compete at the global level. An enabling legal framework would not only provide the rules to manufacture the aircraft, but also, even more importantly, gradually allow operations, starting from simple operations and growing in operational complexity. This would put operators in a position to gain valuable practical expertise and progressively develop their businesses.

The precise scale of the potential RPAS market is difficult to predict. According to an industry source, the global budget forecast in terms of R&D and procurement, including military and governmental, is expected to grow from currently \$5.2 bn to about \$11.6 bn per year in 2023.⁶ Currently, there are 1,708 different RPAS referenced worldwide of which 566 in Europe, being developed or produced by 471 manufacturers worldwide of which 176 in Europe.⁷

Experience shows that markets can rapidly develop once an enabling policy framework is adopted. The number of Japanese RPAS operators was multiplied by 18 to about 14,000 between 1993 to 2005, with a spectacular increase after the entry into force of regulations on agricultural use.

⁵ For more details, see Commission Staff Working Document (SWD(2012)259).

⁶ Teal Group Unmanned Aerial Vehicle Systems - Market Profile and Forecast 2013 Edition.

⁷ UVS International Association (2013), "RPAS: The Global Perspective"

In France an initial regulation ⁸ has led to an increase of the number of approved operators from 86 in December 2012 to more than 400 in February 2014. Similar market growth and related job creation has been seen in Sweden and the UK.

The growing RPAS activities will translate into a substantial number of new jobs. A US industry study forecasts that in the first three years of RPAS integration in the national airspace more than 70,000 jobs will be created with an economic impact of more than \$13.6 billion. The number of jobs created through new RPAS activities in the US is estimated to exceed 100,000 by 2025. ⁹ For Europe, about 150,000 jobs by 2050 ¹⁰ are forecast, excluding employment generated through operator services.

The growth potential can only be unleashed if an enabling legal framework is established at the European level. The European industry ¹¹ has been consistently calling for the creation of such rules to allow civil RPAS operations while guaranteeing at the same time the required high levels of safety, security and privacy which are a precondition for public acceptance of RPAS.

3. DEVELOPING THE POTENTIAL OF RPAS

RPAS are, formally speaking, aircraft and have to comply with aviation safety rules. ICAO standards forbid unmanned aircraft to fly unless the national competent authorities issue a specific individual authorization. ¹² Currently the expansion of the RPAS market is inhibited by the absence of an adequate regulatory framework in most Member States and the need to obtain individual authorizations from each Member State where manufacturers would like to sell or where providers would like to operate. A number of Member States have started developing national rules to facilitate this authorization process, ¹³ but in the absence of European standards, to be developed by EASA, a true European Market will not emerge, hampering drastically the development of this sector. Some enabling technologies are also still missing for certain classes of RPAS operations. Finally, the development of civil RPAS applications also requires ensuring that none of them could represent a threat to citizens' privacy of physical integrity. Industry is delaying investments until sufficiently legal certainty on the legal framework is offered. ¹⁴

The core of the European RPAS strategy

The European strategy aims at establishing a single RPAS market to reap the societal benefits of this innovative technology and at dealing with citizens' concerns through public debate and protective action wherever needed. It should also set the conditions for creating a strong and competitive manufacturing and services industry able to compete in the global market.

⁸ Entered into force in April 2012 and governing RPAS less than 25 kg.

⁹ AUVSI, (2013), *"The Economic Impact of Unmanned Aircraft Systems Integration in the US"*, 574p.

¹⁰ Estimate provided by ASD, the AeroSpace and Defence Industries Association of Europe.

¹¹ Industry was involved in the "Roadmap for the integration of Remotely Piloted Aircraft Systems in the European Civil Aviation System" of the European RPAS Steering Group establishes an RPAS strategy with a blend of regulatory initiatives, R&D efforts and coordination. In addition, RPAS associations are being formed to express specific interests, also to press for national and European action.

¹² Article 8 of the 1944 Chicago Convention on International Civil Aviation.

¹³ Including AT, BE, CZ, DK, FR, DE, IT, NL, NO, ES, UK.

¹⁴ Commission Staff Working Document (SWD(2012)259) explains the problems in more detail.

RPAS applications can only develop if the aircraft can fly in non-segregated airspace without affecting the safety and the operation of the wider civil aviation system. To this end, the EU must put in place an enabling regulatory structure to which the major players at the European and national levels can contribute. R&D efforts focussing on integration into civil airspace should also be increased and efficiently coordinated to keep lead times for promising technologies as short as possible.

The progressive integration of RPAS into the airspace from 2016 onwards must be accompanied by adequate public debate on the development of measures which address societal concerns including safety, privacy and data protection, third-party liability and insurance or security.

Finally, existing programmes should support the competitiveness of the European RPAS industry.

This strategy should provide adequate legal certainty and offer a reliable timing, so that industry can take investment decisions and create employment. As the RPAS market is global by its very nature, the EU will also coordinate with international partners.

3.1. Safe operation into non-segregated airspace: the regulatory framework

Safety is the paramount objective of EU aviation policy. The current regulatory system for RPAS based on fragmented rules for ad hoc operational authorizations is an administrative bottleneck and hampers the development of the European RPAS market. National authorizations do not benefit from mutual recognition and do not allow for European wide activities, either to produce or to operate RPAS.

The integration of RPAS into the European aviation system should be based on the principle that safety will not be compromised: RPAS operations should exhibit an equivalent level of safety in comparison to manned aviation.

The regulatory framework should reflect the wide variety of aircraft and operations, keep rules proportionate to the potential risk and contain the administrative burden for industry and for the supervisory authorities. The regulatory framework would first focus on areas where technologies are mature and where there is sufficient confidence. Regulatory measures will be introduced step by step and more complex RPAS operations will be progressively permitted. Where certificates or licenses need to be issued, European rules will effectively deliver a system of mutual recognition within the single market for RPAS manufacturers, operators and other organisations.

The European Aviation Safety Agency (EASA) is best placed to develop common rules, using the proven EASA consultation process. The current division of the RPAS market between the very light and the heavy aircraft is questionable in view of a coherent RPAS safety policy. In this respect, the restricted scope of EASA competence to unmanned aircraft above 150 kg on the basis of traditional airworthiness considerations is an arbitrary cut off point and should be reconsidered.¹⁵

Such rules must be compatible with ICAO standards and should be based on international consensus. JARUS has brought together expertise within Member States and international organisations to produce such a consensus. EASA should take a leading role in the JARUS

¹⁵ 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.

process and build on its deliverables to produce implementing rules or guidance.¹⁶ EASA will also work with EUROCAE, the European Organisation for Civil Aviation Equipment which develops standards.

The challenge will be to keep rules proportionate to risk, taking into account weight, speed, complexity, airspace class and place or specificity of operations, etc. The traditional approach of airworthiness certification, pilot licensing and operator licensing would need to be complemented by forms of light touch regulation. The mere identification of the RPAS operator could in some cases suffice, or only particular subsystems of RPAS could be certified, like the "detect & avoid" system or the data link, and not necessarily the whole system.

Small RPAS operators are pressing for harmonization of operational rules to facilitate commercial expansion. As a first step, notification of draft technical rules adopted by national authorities according to Directive 98/34/EC may contribute to avoiding divergent approaches between Member States. An information tool could be envisaged to give SMEs an easy access to existing national rules. In a later phase, the harmonized rules could be communicated to clarify which national rules are substituted by common European regulations.

Action 1:

The Commission will examine the regulatory preconditions to integrate RPAS into the European airspace from 2016 onwards, covering the necessary basic regulatory issues to ensure a coherent and effective policy, including on the appropriate scope of EASA competence. Any possible legislative action will be preceded by an impact assessment.

The Commission will request EASA to develop the necessary Opinions which could lead to adopting implementing rules, based where possible on international processes, proportionate to risk and subject to effective consultation.

The Commission will ensure that potential manufacturers, operators and other involved organisations have an easy and up to date access to the applicable regulatory initiatives, including through the notification system of Directive 1998/34/EC.

3.2. Safe operation into non-segregated airspace: enabling technologies

Some of the key technologies are not yet available to allow for the safe integration of RPAS. Research and development (R&D) efforts will focus on the validation of these technologies. R&D is carried out by different research programmes managed by various organisations including the European Commission, Eurocontrol, the European Defence Agency and the European Space Agency.¹⁷

The SJU is the R&D platform building the future air traffic management system of the Single European Sky. The SJU is an integral part of the Union policy framework and benefits from the operational and technical expertise of Eurocontrol¹⁸ and its members. So it is uniquely placed to coordinate this R&D and pave the way towards a gradual and smooth integration of RPAS.

¹⁶ As long as the EASA scope is not formally widened beyond 150 kg, EASA could adopt these deliverables as 'guidelines' for lighter systems. These guidelines would then become European rules, if the EASA scope of competence was widened.

¹⁷ The EDA is coordinating MIDCAS, the Mid Air Collision Avoidance System project; the ESA DeSIRE, the Demonstration of Satellites enabling the Insertion of RPAS in Europe.

¹⁸ Eurocontrol is the designated European Network Manager and is to monitor the impact of RPAS integration on the performance of the aviation network.

The technologies which need further development and validation are: ¹⁹

- Command and control, including spectrum allocation and management;
- Detect and avoid technologies;
- Security protection against physical, electronic or cyber-attacks;
- Transparent and harmonized contingency procedures;
- Decision capabilities to ensure standardized and predictable behaviour in all phases of flight; and
- Human factor issues such as piloting.

The SJU will define the actions for RPAS to be integrated in the R&D workflow and will ensure its inclusion in the next revised European ATM Master Plan. The governance structures of the SJU are open and can be adapted to reflect the emerging RPAS industry.

Action 2:

The Commission will ensure, within the limits of available resources, that identified R&D needs for the integration of RPAS in the ATM Master Plan are taken into account in the SESAR2020 Programme as necessary. ²⁰

3.3. Ensure security of RPAS operations

RPAS are not immune to potential unlawful actions. Potentially, RPAS could be used as weapons, the navigation or communication system signals of other RPAS could be jammed or ground control stations hijacked.

The information needed to manage 4D trajectories in the future air traffic management system and to remotely control and aircraft will need to be communicated and shared in real time by different aviation operators to optimize the performance of the system. Addressing security vulnerabilities in information and communication are therefore essential elements of the ATM Master Plan, of which RPAS will become an integral part. The identified security requirements will then need to be translated into legal obligations for all relevant players, such as the air navigation service provider, RPAS operator or telecom service provider, under the oversight of the competent authorities.

Action 3:

The Commission will ensure that security aspects are covered in the operations of RPAS to avoid unlawful interference, so that manufacturers and operators can take the appropriate security mitigating measures.

3.4. Protect citizens' fundamental rights

RPAS operations must not lead to fundamental rights being infringed, including the respect for the right to private and family life, and the protection of personal data. Amongst the wide range of potential civil RPAS applications a number may involve collection of personal data and raise ethical, privacy or data protection concerns, in particular in the area of surveillance, monitoring, mapping or video recording.

¹⁹ See ERSG Roadmap, Annex2: A strategic R&D plan.

²⁰ This would include an assessment of the spectrum requirements for appropriate follow-up during the next World Radio Communications Conference.

RPAS operators would need to comply with the applicable data protection provisions, notably those set out in the national measures established pursuant to the Data Protection Directive 95/46/EC²¹ and the Framework Decision 2008/977²². The most commonly identified risks relate to the use of surveillance equipment installed on RPAS. Any processing of personal data will need to be based on a legitimate ground. Consequently, the opening of the aviation market to RPAS would need to involve an assessment of measures necessary to ensure the respect for fundamental rights and the data protection and privacy requirements. The privacy situation would need continuous monitoring by the competent authorities including the national data protection supervisory authorities.

Action 4:

The Commission will assess how to make RPAS applications compliant with data protection rules. It intends to consult experts and relevant stakeholders; to address the measures in its field of competence, possibly including awareness raising actions, to protect fundamental rights; and to promote measures under national competence.

3.5. Guarantee third party liability and insurance

Even with the highest safety standards, accidents may happen and victims need to be compensated for any injury or damage.

This requires that those liable can be easily identified and are able to meet their financial obligations. The current third-party insurance regime²³ has been established in terms of manned aircraft, where mass (starting from 500kg) determines the minimum amount of insurance. The Commission will assess the need to amend the current rules for RPAS specificities – many of which weigh well below the current 500kg threshold - and the way to promote the development of an efficient insurance market where fees correspond to the real financial risk estimated on the basis of acquired evidence through incidents and accident reporting.

Action 5:

The Commission will assess the current liability regime and third-party insurance requirement. It will, subject to the impact assessment, take the appropriate initiatives to ensure that adequate regulatory provisions are in place.

3.6. Support market development and European industries

The Commission will support the emergence of a RPAS market and the competitiveness of the related industrial sectors, which include a large number of SMEs and start-ups.

Making use of EU instruments such as the Horizon 2020 and COSME programmes, it will promote the development of RPAS applications in a wide range of sectors, stimulate user-driven innovation and foster the creation of cross-sectoral industrial value chains, appropriate support infrastructures and clusters. It will also identify in its own programmes and policies opportunities to promote the utilisation of this innovative technology. For instance, RPAS may play a role in Copernicus, the EU's Earth Observation Programme, where they could

²¹ Directive 95/46/EC on the protection of individuals with regard to the processing of personal data and on the free movement of such data, OJ L 281, 23.11.1995, p. 31–50.

²² Council Framework Decision 2008/977/JHA of 27 November 2008 on the protection of personal data processed in the framework of police and judicial cooperation in criminal matters.

²³ Regulation (EC) 785/2004 on insurance requirements for air carriers and aircraft operators.

effectively complement space-borne and in-situ sensors for some monitoring and surveillance services.

Action 6:

The Commission will define specific actions under Horizon 2020 and COSME to support the development of the RPAS market and will ensure that the actors involved, in particular SMEs, have a comprehensive view of these tools. It will establish the necessary cooperation mechanisms with the work undertaken by the SESAR Joint Undertaking to avoid overlapping and leverage on the available resources.

4. CONCLUSIONS

RPAS are becoming a reality and will soon be commercially available on a European scale. The RPAS market poses a real opportunity to foster job creation and a source for innovation and economic growth for the years to come. It also poses new challenges related to safety, security and respect of citizens' rights which must be tackled before RPAS can be used on any serious scale in a civilian environment. The lack of harmonized regulations across Europe and of validated technologies forms the main obstacle to open the RPAS market and to integrate RPAS in European non-segregated airspace. Industry is urging rapid steps towards the establishment of an enabling RPAS regulatory framework.

It is now the right time to unlock the EU RPAS market with a combination of new and existing regulatory action at the European level dealing with all relevant issues, including the insertion of safety, security, privacy and data protection requirements within existing EU rules in these areas. Also R&D efforts are needed to ensure the progressive integration of RPAS into civil aviation from 2016 onwards.

The European Commission will use the Horizon 2020 programme for supportive R&D actions. In addition, the challenge is to make smart use of existing industrial programmes to bolster the competitiveness of RPAS industry and operators. The European Commission also intends to bring forward, where appropriate, legislative proposals to remove legal uncertainties that hinder the development of the European market and to give European citizens confidence that high levels of protection in terms of safety, security and privacy will be assured.