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Privacy and Data Protection implications of the civil use of drones

In-depth analysis for the LIBE Committee





DIRECTORATE GENERAL FOR INTERNAL POLICIES
POLICY DEPARTMENT C: CITIZENS' RIGHTS AND
CONSTITUTIONAL AFFAIRS

CIVIL LIBERTIES, JUSTICE AND HOME AFFAIRS

Privacy and Data Protection Implications of the Civil Use of Drones

IN-DEPTH ANALYSIS

Abstract

At the request of the LIBE Committee, this research addresses the implications of the integration of drones for civilian use into the European civil aviation system. It notably looks into the EU policy on drones and the potential impacts on citizens' right to privacy and data protection, as well as on security and safety. The research concludes that a series of important pre-conditions still need to be addressed and met in order to ensure that drones do not pose serious risks for citizens' fundamental rights to privacy and data protection, to security and to safety.

**DOCUMENT REQUESTED BY THE
COMMITTEE ON CIVIL LIBERTIES, JUSTICE AND HOME AFFAIRS**

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LINGUISTIC VERSIONS

Original: EN

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Policy Departments provide in-house and external expertise to support EP committees and other parliamentary bodies in shaping legislation and exercising democratic scrutiny.

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European Parliament, manuscript completed in June 2015.
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LIST OF ABBREVIATIONS

ASD	AeroSpace and Defence Industries Association of Europe
ATM	Air Traffic Management
B-VLOS	Beyond the Visual Line of Sight
C2	Command, Control and Communication (data-link)
CAA	Civil Aviation Authority
D&A	Detect and Avoid
DP	Data Protection
DPA	Data Protection Authority
DPAs	Data Protection Authorities
EASA	European Aviation Safety Agency
EC	European Commission
ECA	European Cockpit Association
ECAC	European Civil Aviation Conference
EDA	European Defence Agency
EDPS	European Data Protection Supervisor
EREA	European Research Establishments in Aeronautics
ERSG	European RPAS Steering Group
ESA	European Space Agency
EU	European Union
EUROCAE	European Organisation for Civil Aviation Equipment
EUROCONTROL	European Organisation for the Safety of Air Navigation
E-VLOS	Extended Visual Line of Sight

- FAA** Federal Aviation Administration (USA)
- GDPR** General Data Protection Regulation
- ICAO** International Civil Aviation Organisation
- JARUS** Joint Authorities for Rulemaking Unmanned Systems
- MTOM** Maximum Take-Off Mass, or operating mass
- RPA** Remotely Piloted Aircraft
- RPAS** Remotely Piloted Aircraft System
- SESAR** Single European Sky ATM Research
- SESAR JU** Single European Sky Air Traffic Management Research Joint undertaking
- UAV** Unmanned Aerial Vehicle
- UVSI** Unmanned Vehicle Systems International
- VLOS** Visual Line of Sight
- WP 29** Working Party Article 29

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EXECUTIVE SUMMARY

Drones (also called RPAS, Remotely Piloted Aircraft Systems, or UAV, unmanned aerial vehicles) are aircraft without a human pilot on board, which are guided by a remote pilot.

Drones have been developed for **military** use but are now increasingly used for **civil** purposes. Currently drones are employed for critical infrastructure and civil protection, disaster management and search and rescue, environmental protection, law enforcement and surveillance, journalism, commercial activities and leisure, while it is foreseen that in the future they will also be employed for other missions, such as agriculture, energy, transport of goods and cargo - and even of people.

States plan to increase their use of drones, while **industry, small and medium enterprises and private companies** have a growing interest in the manufacturing, selling and use of drones to monitor their activities or provide goods and services to clients. Being currently available on the market at affordable prices, their use by **private individuals** has increased exponentially.

The current and prospective development of drones has a series of **positive impacts**, notably for **employment, SMEs and industrial development**, and has a potential to generate growth and jobs. Drones can carry out **operations in emergency situations**, where human intervention is either impossible or difficult (drones could help save lives in operations of humanitarian relief, search and rescue at sea, when nuclear accidents or natural disasters occur, etc).

As with any technology, there are also risks to be taken into serious account by stakeholders, regulators, institutions and citizens in order to prevent, minimize and counter the potential **negative impacts** of some applications of drone technology. This is especially the case in the absence of proper regulation or/and when drones are used in illegal, unsafe or irresponsible ways.

In terms of **risks for privacy and data protection**, drones normally carry video-cameras to allow pilots to fly them. These images can be easily recorded and stored, and are often uploaded onto the internet. The privacy of private life and property can be interfered with and violated when drones capture images of people in their houses or gardens. A series of other applications and payloads can also be installed on drones, allowing the gathering and processing of personal data and seriously interfering with and potentially violating citizens' rights to privacy and data protection¹.

In terms of **security and safety**, drones pose a series of considerable and serious risks. As reported by the media, drones have been spotted over airports or close to them, disrupting or/and threatening civil aviation; have crashed on the ground; have been flown over critical infrastructure, embassies or tourist attractions; have injured people. The prospective **increase in the number of drones flying** at different heights (including in the space currently reserved for civil aviation), in different directions (drones normally change direction multiple times, on the basis of pilots' orders) and areas, with different

¹ For instance: high power zoom, facial recognition, behaviour profiling, movement detection, number plate recognition, thermal sensors, night vision, radar, see-through imaging, Wi-fi sensors, microphones and audio-recording systems, biometric sensors to process biometric data, GPS systems processing the location of the persons filmed, systems to read IP addresses and track RFID devices, systems to intercept electronic communications.

weights and speeds, over people and private properties, poses serious challenges. The **technological environment** to ensure the secure and safe integration of drones in the civil aviation system **does not yet seem ripe**, as communications can be easily lost or hijacked, the detect and avoid systems are not by default installed on drones and systems to block their access into no-fly zones (geo-fencing) are not in place. Responsibility and liability for drones' use is not yet guaranteed, as identification of the owners or pilots is not required in most EU MS, making transparency or law enforcement action almost impossible.

Potentially, the positive applications of drones (e.g. for fire-fighting; or nuclear plant inspection) can be nullified by negative applications (e.g. private drones flying around and impeding quick fire-fighter intervention, as happened in Norway; or private drones flying over the nuclear power plant, or even crashing on it). These elements show that **drones pose a series of challenges and concrete risks for safety, security and the fundamental rights of persons, which are to be addressed seriously.**

The exponential development and spread of drones challenges policy makers to **regulate** them and their use by balancing the will to support drones' positive potential for the economy while preventing, minimizing and countering the negative impacts and the risks illustrated above. A series of initiatives at international, European and national level are currently underway to respond to this challenge.

The **European Commission** has worked in recent years to promote RPAS integration into the European civil aviation airspace ("non-segregated air traffic management environments"). The next steps in the process will be the development of safety rules by **EASA** during 2015. Based on this, the **Commission** will issue a package containing a revision of the basic European Civil Aviation Safety Regulation (currently under impact assessment) possibly in 2015 to allow the integration of drones from 2016 onwards.

The **Commission** has identified priority areas where the **EU could play a leading or coordinating role**, notably by developing a regulatory framework to guarantee safety; fostering enabling technologies; security; protecting citizens' fundamental rights (privacy and data protection); guaranteeing third party liability and insurance; supporting market development and emergence and promoting the European RPAS industry and its competitiveness. EASA and the Council, as well as MS regulations, seem to go broadly in the same direction.

This research finds that:

- In order to ensure that the EU can regulate drones regardless of their weight, it is necessary to **modify EC Regulation 216/2008 and notably its Annex 2**, which currently limits the scope of EU action to RPAS weighting more than 150 kg. Once this has been done, the current regulations and laws adopted at **national level will have to be modified** on the basis of the future EU regulatory regime, which might be based on a new "proportionate to the risk" approach;
- Notwithstanding the fact that interferences to privacy and data protection can be particularly serious when drones are used to collect personal data for law enforcement purposes and surveillance activities, **EU data protection law** does not currently cover this area (except when such data is exchanged amongst Member States). Activities by private individuals are excluded from the application of the DP Directive due to the "household" exception, but it seems likely that the capturing and processing of personal data carried out by drones in public spaces could be subject to EU data protection law,

following the ECJ jurisprudence on CCTV. In these areas, **it is primarily for Member States to ensure that privacy and data protection guarantees apply**; looking forward, the approval of the Data Protection Regulation and Directive will bring a positive contribution in terms of **impact assessments, privacy by design and privacy by default**, as these will become mandatory;

- Citizens' right to **security and safety** of citizens does not seem to be fully guaranteed across the EU and by all MS in relation to drones and their use, while enabling technologies are still in development; law enforcement action is virtually impossible as rules on identification of drones and of their operations, responsibility and liability are not yet in place everywhere;
- The whole "drones' chain" should be more closely examined in terms of current and future EU and/or MS regulation needed to minimize or counter risks for citizens and to their rights, from **manufacturing and trade** (production, selling, buying, internal and international trade, notice for buyers on risks and hazards and applicable rules or legislation for flying drones), to **safety** (airworthiness, pilot licences, operation authorisation, identification and monitoring of drones and of their flights, establishment of no-fly zones such as critical infrastructures, airports, cities and villages, gatherings, rules that should be followed when operating a drone, for instance visual line of sight, private properties, etc), **privacy and data protection rules**, as well as laws related to **criminal behaviour, intellectual property, aviation, environmental law** that are to be respected by drones, **security** (regulations and measures to ensure that law enforcement action against illegal and unsafe use of drones is possible, responsibility and liability for damage to persons or property as a result of an incident caused by an RPA).
- The **debate on the future regulatory regime for drones**, which has been mainly carried out up to now between industry, stakeholders, technical regulators and working groups (be it at the national, European and international level), **should involve more closely both citizens and legislators. Consultations** on future options should be carried out, so to take into account citizens' views and concerns, while **legislators** should be the ones to take decisions on regulation, given the risks posed by drones. This is the only way to ensure that "public acceptance" of, or "societal concerns" in relation to, drones are addressed and resolved, though the open and democratic debate and scrutiny.
- In order to achieve these objectives at the EU level and ensure a more transparent and democratic debate on the future policy on drones, the EP could ask the Commission **report in detail** and in straightforward terms, for instance in its **upcoming impact assessment**, about which actions it plans to undertake in the "drones' chain" to ensure that the objectives of safety, security, respect of fundamental rights, namely privacy and data protection, environment, responsibility and liability, law enforcement action, insurance, identification and transparency, technological development, can be achieved, with recommendations for MS and/or EU action, and possible options. A description of the regulatory approaches in MS should also be provided, so to allow a comparison and to identify best practices. It should also report about the past, present and future use of EU funds for drones development, and on how funds for civilian uses and military/defence uses of drones interact. A yearly reporting mechanism would also be useful, and could also address the causes and possible remedies to deal with drones' incidents.

1. DRONES: DEFINITIONS, USES, CLASSIFICATIONS

"Drones" are commonly understood as **aircraft without a human pilot on board**, in line with the definition provided by the International Civil Aviation Organisation (ICAO) in its reference document "Cir 328/AN/190 on Unmanned Aircraft Systems (UAS)" that describes **unmanned aerial vehicles (UAVs)** as an aircraft which is operated with no pilot on board. UAVs can be broken down into two categories: those that are remotely piloted by a human and consequently defined as **Remotely Piloted Aircraft Systems (RPAS)**; and those that are "autonomous".² These definitions are followed at international and EU level, including by the Commission and EASA.

Drones were developed at first mainly for **military and defence** uses. They became widely known to the general public when the US started to use so-called "killer drones" to hit targets in third countries, such as in Afghanistan, Pakistan, as well as in other countries - raising an international and human rights debate on the legality of such a policy. In recent decades, technological developments in the field of UAVs (lower costs, easier operation, and lighter craft) have created an interest in exploiting their application **for civil (non-military) uses**³.

In recent years, the use of drones for civil purposes has consequently received increasing attention⁴. The table below summarizes the information provided by different sources in relation to the **current uses of drones**, with the types of operators involved and the targets of the operations carried out⁵:

² See ICAO, Cir 328/AN/190 on Unmanned Aircraft Systems (UAS), http://www.icao.int/Meetings/UAS/Documents/Circular%20328_en.pdf ; "autonomous" aircrafts are defined "an unmanned aircraft that does not allow pilot intervention in the management of the flight".

³ Drones can be used both for military and for civilian uses, so the developments in one field of activity produce consequences on the other one - hence the development of "enhancing technologies", as proposed by the Commission in the framework of civilian uses of drones through investment of EU funds, will necessarily benefit also the military uses of drones, as they are in substance "dual-use" instruments.

⁴ The Amazon plans and efforts to get authorisation to use drones for products delivery has notably received widespread public and media attention, as well as recent (failed) tests by Google of "solar energy drones".

⁵ The Table is based on:

the study commissioned by the Commission on "Privacy, data protection and ethical risks in civil RPAS operations - Final Report", authored by Rachel L. Finn and David Wright, Trilateral Research & Consulting, LLP Laura Jacques and Paul De Hert, Vrije Universiteit Brussel, November 2014, available at <http://ec.europa.eu/DocsRoom/documents/8550>;

information provided by the Commission in its 2014 communication on "A new era for aviation Opening the aviation market to the civil use of remotely piloted aircraft systems in a safe and sustainable manner", Brussels, 8.4.2014, COM(2014) 207 final, available at <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52014DC0207>;

the House of Lords report on "the Civilian Use of Drones", 5 March 2015, available at <http://www.publications.parliament.uk/pa/ld201415/ldselect/ldcom/122/122.pdf>.

The Commission, in its 2014 Communication states: "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".

Table 1: Drones civil uses, operators, targets and examples of use

Uses	Type of operator	Targets, examples
Infrastructure protection, monitoring and safety / security inspections	Commercial State	Objects: - Transport (rail tracks, highways, bridges, traffic) - Energy (nuclear plants, dams, dykes, power grids, wind turbines, pipeline and power lines inspection) - Communications (mobile phone towers) - Industry (industrial installations) People: - monitoring unauthorised entry
Geo-spatial mapping	Commercial State	Objects: Mapping and surveying exploration, planning and crisis management
Environment monitoring	Commercial State	Objects: Air, water and other natural resources: pollution monitoring, hazardous material sensing, air/water quality testing, weather monitoring
Precision agriculture	Commercial Private individuals	Crop, animals: Crop and herd inspection, crop spraying to apply pesticides
Law enforcement, surveillance and monitoring of individuals and of people and of electronic communications	State (law enforcement) Commercial (sub-contractors)	Persons: Infrastructure protection against threats and illegal actions, targeted criminal investigation, crowd and public event monitoring, border control/protection, anti-social behaviour, supporting police response Geo-location, interception of communications and of electronic devices, profiling
Civil protection	State (law enforcement, civil protection authorities)	Objects, persons: Infrastructure monitoring, disaster relief and response, search and rescue, firefighting, hazard detection, crisis response
Regulatory enforcement	State (law enforcement, other authorities)	Pollution monitoring, fisheries monitoring, monitoring for illegal logging, wildlife protection and hunting regulations, etc
Journalism, media, film-makers	Journalists, camera-crews, film-makers	People and objects: Live journalistic reporting, investigative reporting, documentary filmmaking, promotional videos, fictional filmmaking
Electronic communications providers	Commercial (service providers)	Objects: Telecommunication and computing devices
Hobby, leisure	Private individuals	Objects and persons

Commercial = companies, professionals

In terms of **categories of drones**, there are many different types of drones with different weights, control systems (remote pilot controlling the drone via a communication link from a ground station, which can include a smart phone or tablet software, or satellite communication; or autonomous flight or systems), speed (from hovering to more than 1,000 km/h), range (in terms of distance and height), flight endurance (from few minutes to “months”, states the COM communication) and power unit (the potential of solar energy is being exploited for drones), lift technology (fixed wing drones take off in the same way as airplanes and can be launched through a rocket or catapult or by hand; multi-rotor and helicopter-style drones take off vertically; the COM communication also talks of “lighter than air”). The table below illustrates the different types of drones on the basis of weight.

Table 2: Different categories of drones on the basis of weight

Type on the basis of weight (MTOM)	Current uses and future potential uses	Description; Types; Price and diffusion	Regulation
Small (0-20 / 25 KG)	- Leisure use and commercial use (surveillance and inspection, photography)	- drones below 2 kg are also called micro-drones and are quickly developing - hundreds of different types; normally multi-rotor or fixed wing aircrafts, guided by GPS, live video streaming camera, - Price: 140 - 28.000 Euro Some available in shops (below 1 kg) - Take-up: those below 2 kg are very widespread	- Falls under MSs regulations
Light (20/25 - 150KG)	- geospatial surveying, wide-area surveillance - Potential to inspect pipelines/power cables, spray crops, search and rescue, border surveillance; forest fire monitoring	- Typically longer range, fixed-wing, B-VLOS, reaches altitudes of 3000 meters - ex: Luna, Hermes 90 - Price: 55.000 - 420.000 Euro	- Falls under MSs regulations
Large (>150KG)	- used by the military and defence - Potential for future cargo (and passenger) transport	NATO classifications: - Class II (150-600 kg): Sperwer, Hermes 450, Watchkeeper; - Class III (>600 KG): MALE - medium altitude, long endurance: Predator, Heron, Hermes 900 ⁶ HALE - high altitude, long endurance: Global Hawk UACVs - strike or combat UAVs: MQ9-Reaper/Predator B Price: 670.000 Euro and above	- Falls under Regulation 216/2008/EC (EASA Regulation): EASA airworthiness certificate, unless operated by a State agency

NB: based on the House of Lords report Table 1 and the Commission study on privacy, data protection and ethical risks in civil RPAS operations.

⁶ The Commission study and Statewatch report that the EU funds projects for the application of MALE drones for law enforcement and surveillance purposes (such as PERSEUS, SEABILL, OPARUS, CLOSEYE).

2. EU POLICY ON DRONES

The Commission has been **developing the European policy on drones** over the last decade and intensified regulatory planning and supporting measures in recent years, with the aim of ensuring the safe integration of drones into the non-segregated European airspace from 2016 onwards. EU action has notably been called for by industry and Small and Medium Enterprises, as well as by operators and civil aviation stakeholders, to ensure that common and harmonised European rules apply to drones and therefore to allow the development of the market and the planning of investments. The drones sector also has an internal market dimension, a potential for growth and jobs, and is closely connected to the Single European Sky policy. As the EU already has Regulations on Civil Aviation Safety and on Security, it is reasonable for the EU to develop a common regulatory policy in the field.

In **2007** a "study analysing the current activities in the field of UAV" was launched by the European Commission, which was followed by a series of consultations that took place between 2009 and 2012 on the future of RPAS in Europe and then by a **2012** Staff Working Document "Towards a European strategy for the development of civil applications of Remotely Piloted Aircraft Systems (RPAS)". These were followed by a series of further documents that are particularly relevant for the current debate on the regulatory regime in preparation for drones and which are described below.

a) The Roadmap for the integration of civil RPAS into the European Aviation System, by the European RPAS steering group (ERSG), June 2013⁷

The ERSG was created by the Commission (DG MOVE and DG Enterprise) in July 2012 in the form of "stakeholders gathering the main organisations and experts interested in the integration of RPAS into the European aviation system: EASA, EUROCONTROL, EUROCAE, SESAR JU, JARUS, ECAC, EDA, ESA, ASD, UVSI, EREA and ECA"⁸. It received the "mandate to establish a Roadmap for the safe integration of civil RPAS into the European aviation system, aiming at an initial RPAS integration by 2016", which it published in June 2013.

The Roadmap identifies the issues to be addressed and proposes a step-by-step approach. It is composed of a Final report and 3 annexes dealing with the main issues at stake in relation to RPAS: the regulatory approach; the strategic research plan; the societal impact. The Roadmap, which is a very complete and thoughtful document, based on a strict approach in relation to safety, highlights important issues such as:

- **RPAS should be treated as manned aircraft** whilst duly considering their specific character, as foreseen by ICAO principles; they should comply with aviation rules guaranteeing the total aviation safety system and consequently they must be approved by a competent authority, the operator shall have a valid RPAS operator certificate, the remote pilot must hold a valid licence; the legislator shall set the safety requirements in relation to the risk, size and type of operation;

⁷ Available at: http://ec.europa.eu/growth/sectors/aeronautics/rpas/index_en.htm

⁸ The "Eurodrones, Inc" report by Statewatch and TNI describes the group in the Executive Summary as following: "housed within the European Commission and primarily made up of Commission officials and representatives of the major European defence and security contractors, aerospace institutes and lobbyists such as UVS International, whose representatives have been present in discussion in drone policy in numerous European and international fora".

- since **not all the technologies required are mature, the integration of RPAS should initially foresee restricted access under specified conditions. Safety regulations** should then be developed in the areas that are pre-requisites for the safe integration of RPAS into non-segregated airspace: airworthiness (fitness of an aircraft to fly by meeting certain minimum conditions), flight crew licensing and air operations.
- it suggests scrapping the distinction made in Annex 2 of the Regulation 216/2008 between RPAs with a Maximum Take-off Mass (MTOM) above 150 kg falling into EASA competence and those below falling into the competence of Civil Aviation Authorities. In turn, it proposes to **grant an EU and EASA competence** regardless of the MTOM to develop rules on RPAS.
- the Roadmap develops a plan of actions for regulatory improvement until 2028
- it identifies a series of necessary **technology developments** for safe integration of RPAS, as currently there are gaps in the areas of: integration into the Air Traffic Management and airspace environments; verification and validation; data communication links and spectrum issues; detect and avoid systems and operational procedures; security issues; operational contingency procedures and systems; surface operations including take-off and landing.
- in terms of societal impact, the Roadmap acknowledges that RPAS may cause accidents and casualties and identifies as key areas: third party liability and insurance (identification of the liable third party responsible for the harm and insurance), security and privacy and data protection (ensuring application of legislation and addressing new issues that might not be adequately addressed; the inclusion in a possible EU regulation on drones of provisions on any required approval by national DPA, court, etc with regard to operator certification). The Roadmap annexes also refer to the "public acceptance of RPAS applications: benefits, acceptable risks/safety, end-user forum, demonstrations, etc".
- the integration of drones into civil airspace should be carried out progressively, and the Roadmap proposes a scenario based on initial operations, integration and evolution, with proposed timeframes (2013; 2014-2018; 2019-2023; 2024-2028).

b) 2014 Commission Communication "A new era for aviation - Opening the aviation market to the civil use of remotely piloted aircraft systems in a safe and sustainable manner"⁹

The Commission communication insists on the social and economic benefits ("RPAS can offer a myriad of new services...are an emerging market to create jobs and growth") of supporting drones development and integrating them into the EU civil airspace from 2016 onwards and into the European single market, while safeguarding the public interest. It responds to the call from the European drones manufacturing and services sectors to remove barriers through the setting of common European rules.

⁹COM 2014 207 final, 8.4.2014, available at: [http://ec.europa.eu/transport/modes/air/doc/com\(2014\)207_en.pdf](http://ec.europa.eu/transport/modes/air/doc/com(2014)207_en.pdf)

After examining the future developments in the civil aviation market and exploring the present and forecasted services that drones can offer, it describes the market situation (with Israel and the US in the lead in the manufacturing sector) and the perspectives for further development. The Communication **makes the case for the setting of a common European enabling legal and policy environment for drones**, which would have a positive impact on the sector, as operators and operations would be progressively allowed and authorised. At the same time, only European harmonised rules would create a true European market and manufacturing industry and services' sector, which can compete internationally, thereby developing the full potential of RPAS.

The regulatory framework proposed by the COM aiming at the integration of drones into the shared civil aviation airspace would be based on the requirement that drones show "an **equivalent** level of safety in comparison to manned aviation". The COM proposes that rules "reflect the variety of aircraft and operations", are "**proportionate** to the potential risk" (taking into account weight, speed, complexity, airspace class and place or specificity of operation) and do not impose administrative burdens on industry and authorities, through "light touch" regulation (in this sense, the COM approach seems less stringent than the one proposed in the Roadmap, as the traditional civil aviation approach of airworthiness certification, pilot and operator licensing would apparently be derogated from). The COM also states that EU rules will create a system of mutual recognition for drones' manufacturers, operators and other organisations. A possible 2-step scenario to ensure European regulatory consistency is proposed by the COM: in a first phase, technical rules adopted under MS authority are notified¹⁰, and in a second phase harmonised EU rules substitute national rules.

The Communication states that "some of the key **technologies** are not yet available to allow for the same integration of RPAS" into the airspace. It consequently supports the use of EU funds for the research and development of "enabling technologies" for drones, together with other organisations such as Eurocontrol, EDA, ESA and programmes such as SESAR JU.

In terms of **security**, the COM states that "potentially, RPAS could be used as weapons", including through hacking and jamming, and it affirms that it "will ensure that security aspects are covered...to avoid unlawful interference".

The protection of citizens' fundamental rights and notably of **privacy and data protection** will be promoted by assessing how to ensure that drones' applications are compliant with data protection legislation. The Commission pledges to promote measures in its field of its competence and at national level.

The issue of **third party liability and insurance** will be assessed and potentially actions will be taken to modify the current regime and ensure that victims of accidents caused by drones are also covered. Actions to **support the drones' market** and its development, as well as EU industries, will be taken under the Horizon 2020 and Cosme programmes.

¹⁰ as foreseen by Directive 98/34/EC of 22 June 1998 laying down a procedure for the provision of information in the field of technical standards and regulations <http://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX:31998L0034>

c) Riga Declaration on Remotely Piloted Aircraft (drones) "Framing the future of aviation", 6 March 2015¹¹

The Declaration, issued for the European aviation community, highlights the positive potential of drones for the economy (new opportunities, jobs, growth, industry) and society as a whole, as well as the need to set the "how, and under which conditions" for this to happen, including by dealing with "citizen's concerns". It establishes 5 principles for the regulatory framework in Europe (and the 4th and 5th principles are of particular relevance for this research) upon which the European aviation community commits to work together to allow drones to operate "everywhere in Europe as from 2016 onwards":

1. Drones shall not reduce the safety of civil aviation, **shall be treated as a new type of aircraft and regulated proportionally to the risk of each operation**: "minimal rules...with light-touch risk-based (safety) regulations" for low risk situations; "more stringent regulations or operational limitations" for higher risk operations; "strict standards on the design, manufacturing, maintenance and operation of drones, as well as on the training of drone pilots and maintenance personnel" for high risk operations;
2. EU rules for safety shall be developed urgently: EASA shall develop safety rules, including on remote pilot and operator qualifications, building upon JARUS and ICAO work; EASA shall consult stakeholders by mid-2015 on the regulatory framework for low risk operations and by the end of 2015, make a proposal. **The Commission revision of the basic European Civil Aviation Safety Regulation, announced for 2015, should integrate the progressive-risk-based regulation of drones.**
3. **EU funds** shall be mobilised for the development of technologies and standards to allow full integration in the EU airspace: "investment" and "financial effort" shall be put into developing and validating "key missing technologies and the ensuing required standards": SESAR programme and CleanSky and other initiatives shall provide further **investments**.
4. **"Public acceptance"** is key for the growth of drone services: the protection of citizens' fundamental rights, such as privacy and protection of personal data, must be guaranteed; Data Protection Authorities shall develop guidelines and monitoring mechanisms. Nuisances, such as noise, shall be also addressed, possibly at local level. Potential security risks of "malicious use of drones" should be taken into account and prevented by design (cyber-defence; "geo-fencing" technology to block drones' access to "no-fly areas") or through operational restrictions, but it is the task of national police and justice systems to address those security risks.
5. The operator or owner responsible for the use shall be identifiable and held accountable for instance, an electronic identity chip ("IDrones") or standardised web-portals for the registration of operators and operations could be formalised through a safety rule, at MS and at EU level. "Drone accidents will happen" states the Riga declaration and the identification of the person responsible for any unsafe or illegal use can allow law enforcement authorities to carry out their work. Insurance and 3rd party liability regime, as well as the establishment compensation funds, shall be clarified or ensured. "Reporting on drone incidents should be integrated into the overall incident reporting requirements", to improve safety and assist insurance companies.

¹¹ Available at: http://ec.europa.eu/transport/modes/air/sign-up/index_en.htm

The Declaration also underlines the need to **monitor** the development of drone operations and technologies/innovation, so as to allow informed decisions, priorities, learning from experience and review of the rules where necessary, to ensure “full respect of the required high levels of safety, security, privacy, environmental protection”. It also calls for the publication of an annual progress report.

d) EASA Concept of Operations for Drones: A risk based approach to regulation of unmanned aircraft - 12 March 2015¹²

A few days after the Riga Declaration, EASA issued a document¹³ outlining its perspective in relation to drones and their regulation to promote their safe and proportionate “acceptance” and integration into the aviation system, and thereby foster the European drone industry. The Concept document is based on a **risk based approach** and outlines **3 categories of operations and correlated regulatory regime: open, specific and certified**. A summary of the respective regulatory regime is illustrated in the table below. The issues discussed are important, as they will form the basis of the upcoming EASO proposals to the Commission for the regulation of drones¹⁴:

Table 3: on the EASA Concept of Operations for Drones

Categories of operations Regulatory regime	1st category: Open	2nd category: Specific	3rd category: Certified
Safety risks and risk level? taking “into account: mid-air collision with manned aircraft ¹⁵ ; harm to people; and damage to property in particular critical and sensitive infrastructure”	Lower risk (Minimal aviation regulatory system, defining limits for operations, to be overseen by the police, “as for cars for instance”) ¹⁶	Medium risk	Higher risk (similar to normal manned aviation)
Operation authorisation by a Civil Aviation Authority for the flight?	No (Even commercial operations)	Yes - operator to perform a safety risk assessment with mitigation measures, addressing the airworthiness, operating procedures and environment, competence of personnel and organisations, airspace issues - to be reviewed and approved by the CAA through an “Operations Authorisation”, with the support of the Qualified Entities as defined in the EASA	Yes - for the moment, for drones of 150 kg or more, but in the future kinetic energy, type of operation and complexity of the drone (notably autonomy), should be examined/defined - Certification required: Type Certificate (environmental, airworthiness, noise), design and production approvals,

¹² <http://easa.europa.eu/system/files/dfu/EASA%20Concept%20of%20Operations%2012-03-2015.pdf>

¹³ This is not yet the stakeholders’ consultation document requested by the Riga Declaration.

¹⁴ Some questions and issues which seem unclear are raised in the footnotes to the table.

¹⁵ The document does not seem to take into account the possibility of collision between RPAS.

¹⁶ NB: cars are subject to safety manufacturing and marketing and traffic requirements, as well to a driving licences for pilots, with clear traffic rules; cars can be monitored easily; they are identifiable and the liability can be established; insurance is compulsory. This is not the case for drones currently.

		<p>Regulation or body</p> <ul style="list-style-type: none"> - specific conditions and limitations shall for the operation shall be clearly specified - authorisation can be for a single operation or a series of operations - some flexibility: if there is compliance to acceptable industry standards; or require certification of the drone - closely linked to the operational environment and procedures 	<p>Certifications Specifications including on the control station, Command and Control (C2) and Detect and Avoid (D&A).</p> <ul style="list-style-type: none"> - Possibility for organisations providing services to apply voluntarily¹⁷ - CAA shall make a safety assessment before allowing the drone in the non-restricted airspace
Airworthiness approval?	No Industry standards could apply ¹⁸ (see below)	See above	See above
Approval or licence for operators and pilots?	No	<ul style="list-style-type: none"> - risk assessment shall establish the required competence of staff (from training to EASA licence), standards could be developed for pilots and staff assessment of "basic" competence; operations manual will be required 	<p>Yes</p> <ul style="list-style-type: none"> - pilots to be licensed - operator to have an organisation approval
Specific limitations?	<p>Separation from civil aviation Stay within limitations for the operation:</p> <ul style="list-style-type: none"> - direct visual line of sight (VLOS): 500 m - altitude max 150 m - outside of specific reserved areas (airport, environmental, security) - mitigate security through the use of low energy aircraft and establishing min distances with respect to the people on the ground; - ban on flying above crowds, but flights above people not related to the operation in cities or populated areas is allowed¹⁹, if they comply with acceptable Industry Standards on safety measures and with a max mass limit²⁰ 		<p>("State" services are excluded for the moment, as well as drones for research, experimental and scientific purposes)</p>

¹⁷ Not very clear, as the example made is that of equipment such as detect and avoid technologies or remote piloting

¹⁸ This reference is unclear, as there is no further specification on which standards should apply exactly and why airworthiness approval should not be given at least in the transitory period until such standards are set and approved by industry and authorities. The document states that some drones have safety features, but not all of them.

¹⁹ The difference between the 2 provisions seems unclear.

²⁰ Toys under 500 g used by children under 14 years would be excluded from industry standards.

	<ul style="list-style-type: none"> - max mass limit for operations in populated areas, mass to be defined after stakeholder consultation²¹ - EASA could support MS with actions such as: develop a "do's and don'ts" leaflet; video campaigns; information and manual for police and LEAs. 		
<p>Privacy and Security? Other issues to be solved</p>	<ul style="list-style-type: none"> - Privacy, DP and security risks are to be assessed together with safety risks, at national level²²; - the regulatory framework might mitigate such risks, for instance if it will provide for a registration and information webpage or through chips or install Sim-cards in drones, so to deal with some security, privacy and enforcement issues. - Spectrum - Third party liability insurance - Detect & Avoid; Airspace and airports access, C2, human factors, contingency, security, autonomy: further research needs to be done through SESAR and EDA 		

e) Remarks on the development of EU policy on drones and its timetable

In terms of development of the policy on drones, it seems that the **European approach has evolved from a strict one** insisting on the need to apply civil aviation rules and principles to drones as proposed in the Roadmap, **to a more flexible one, that is "risk-based and proportionate"** to the specific risk posed by the operation, as detailed by the EASA Concept of Operations document. Drones are not anymore addressed as an aircraft to which standard aviation rules and guarantees apply, but as a specific and different object of regulation, necessitating a different approach and regulation. The typical classification based on weight - which is the basis of the previous international, European and national regulations²³ - is also substituted by a classification based on risk. The conciliation, or merging, of the two approaches and consequent regulation of drones and drones' operations should be further and better detailed, as it might lead to confusion and difficulties - including that of potentially requiring a completely new regulatory regime in most MS and at EU level. Furthermore, such approach should be illustrated through examples and tested against real-case scenarios: for instance, the classification of a drone overfly over a city as a "low risk operation" could raise concerns in a situation where CAA authorisation, or airworthiness approval, or basic pilot licence are not required by regulations (and other conditions are still to be discussed and agreed). It will be important to make sure that the upcoming Commission proposal on drones is clear and understandable, including in relation to the concrete implications and risks posed by a regulation that might be either too lax, or even too strict, for drones' operations.

The announced next steps in the EU policy on drones will be the development of safety rules by **EASA** during 2015 (consultation of stakeholders in mid-2015 on the general regulatory framework and on a concrete regulatory proposal for low risk operations; before the end of 2015 proposal for a draft regulatory framework and for a concrete regulatory framework for low risk operations in December 2015) whereupon the **Commission** will issue a package containing a revision of the basic European Civil Aviation Safety Regulation - currently under impact assessment - in 2015 to allow the integration of drones from 2016 onwards.

²¹ EASA does not indicate a clear proposal on this, which leaves the issue open.

²² Unclear which role the EU might play here.

²³ For an interesting comparison and illustration of MS regulations on drones, see the Commission study on privacy, data protection and ethical risks, Annex B.

The EP could ask to the Commission to report in detail and in a clear, accessible way in its **upcoming impact assessment** about which actions it plans to undertake to ensure that the objectives of safety, security, privacy and data protection, environment, responsibility and liability, law enforcement action, insurance, identification and transparency, technological development, can be achieved, with recommendations for MS and/or EU action, and possible options. A description of the regulatory approaches in MS should also be provided, so to allow a comparison and to identify best practices. It should also report about the past, present and future use of EU funds for drones development, and on how funds for civilian uses and military/defence uses of drones interact²⁴. A yearly reporting mechanism, as suggested by the Riga Declaration, would also be useful, and could also address the causes and possible remedies to deal with drones' incidents.

Such a document could also allow for a wider **debate** on the future regulatory regime for drones, which has been mainly carried out up to now between industry, stakeholders, technical regulators and working groups (be it at the national, European and international level). The Commission had stated in its 2012 Staff Working Document "Towards a European strategy for the development of civil applications of Remotely Piloted Aircraft Systems (RPAS)" that "the 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 Agency for Fundamental Rights** and Data Protection Supervisor", but the LIBE committee has not been consulted, exception made for the opinion given to the TRAN committee on its own-initiative report on RPAS based on the 2014 Commission communication. The debate should now involve more closely both citizens and legislators. Consultations on future options should be carried out, so to take into account citizens' views and concerns, while legislators should be the ones to take decisions on regulation, given the risks posed by drones. This is the only way to ensure that "public acceptance" of, or "societal concerns" in relation to, drones are addressed and resolved, though the open and democratic debate and scrutiny.

The fact that the synchronization of the EASA and of the Commission planning could lead to a delay from the end of 2015 to the beginning of 2016 in the issuing of concrete legislative proposals on drones could be the occasion to open a window for a wider debate on the best way to ensure that the drones' regulation achieves its objectives, which could in the end be an opportunity for better and more carefully considered regulation.

²⁴ The issue of research funding mobilised for the drones' industry has been examined by the report by Statewatch and TNI in detail. The report identifies "at least 315 million Euros of EU research funding directed at drone-based projects; of this almost 120 million Euros has gone towards major security research projects". Funding of research on drones, as they are dual use and can be used both for civilian and military uses, is also provided by the EDA, supporting initiatives by MS (NL, FR, DE, EL, IT, PL and ES) for the development of MALE drones for reconnaissance and surveillance use in military missions. Recently DE, IT and FR signed a European drone project, which is for military and civilian use, see <http://www.reuters.com/article/2015/05/18/eu-drones-idUSL5N0Y928920150518>. The Statewatch report also affirms that the Commission is in substance "subsidizing the defence sector...(giving) a blank cheque to Europe's military corporations". It also states that the EU and the US have signed a formal agreement committing them to cooperate on the integration of drones into civil airspace and to harmonise air traffic management systems, upon which the Commission could report in its impact assessment to the EP.

3. PRIVACY AND DATA PROTECTION ISSUES

A series of concerns have been raised in relation to drones and the devices and applications they might carry. Drones are often equipped with a video camera and other payloads can be installed to allow the collection and processing of personal data, which can create a serious risk for the right to private and family life, privacy and data protection. Ensuring that privacy and data protection are respected and enforced is mentioned as an objective in all documents related to drones, from the Roadmap to the EASA Concept of Operation Paper. These policy papers also acknowledge that the respect of privacy and data protection is a condition for public acceptance of drones in society. The main documents analysing the impact of drones on these fundamental rights are the **Article 29 Data Protection Working Party** response to the Commission questionnaire²⁵, the **European Data Protection Supervisor (EDPS)** opinion²⁶ and the **Commission study** on Privacy, data protection and ethical risks in civil RPAS operations, which have formed the basis for the considerations made below.

3.1. Potential impact of drones and of their applications on privacy and data protection

To allow them to be operated, drones are normally combined with **applications** such as cameras or video-cameras (as the remote pilot has to see or detect what is in front of the drone to avoid a collision). They might also record the images, through software to process the video images, which might have further applications (including high power zoom, facial recognition, behaviour profiling, movement detection, number plate recognition, thermal sensors, night vision, radar, see-through imaging, Wi-fi sensors, microphones and audio-recording systems, biometric sensors to process biometric data, GPS systems processing the location of the persons filmed, systems to read IP addresses and track RFID devices, etc).

Drones and their applications consequently imply the collection, processing, recording, organisation, storing, use and combination of data allowing the **identification** of persons, directly or indirectly. These activities consequently imply an interference with the right to private and family life and data protection.

Furthermore, the WP 29, the EDPS and the COM study underline that drones pose **new challenges** in relation to privacy and data protection. RPAS capabilities, when combined with technologies and applications, change and transform the nature of surveillance, magnifying it, when compared to other similar tools (satellites, aircrafts, helicopters, CCTV): drones can be non-detectable (they are not always visible or heard, like aircrafts, helicopters, CCTV, notably as small and micro-drones are being developed); they allow for a mobile view, including in 3D (not like the bird's-eye view from satellites or aircraft, or the fixed view of CCTVs); they can access more locations (such as private properties, across

²⁵ 16 December 2013, available at http://ec.europa.eu/justice/data-protection/article-29/documentation/other-document/files/2013/20131216_reply_to_rpas_questionnaire.pdf. The WP 29 is working on a new and more comprehensive document on drones (the answer to the questionnaire provides useful suggestions that have then been developed in depth and more widely in the EDPS opinion and in the Commission study on privacy, which are consequently more often referred to in this research).

²⁶ Opinion of the European Data Protection Supervisor on the Communication from the Commission to the European Parliament and the Council on "A new era for aviation - Opening the aviation market to the civil use of remotely piloted aircraft systems in a safe and sustainable manner", 26 November 2014, available at https://secure.edps.europa.eu/EDPSWEB/webdav/site/mySite/shared/Documents/Consultation/Opinions/2014/14-11-26_Opinion_RPAS_EN.pdf

fences or through windows); can observe in detail (more than the naked eye, through zooms) and follow persons easily; they are cheap (not like satellites, airplanes or helicopters), and persistent (they can fly or follow a person for a certain time). All these specificities simplify and improve covert and overt surveillance and tracking of individuals or groups (including during demonstrations).

The COM study applied a **privacy, data protection and ethical risk analysis** to a series of RPAS operators and missions to suggest risk reduction practices. The risks examined in the study comprise risks to privacy, such as: the chilling effect of being watched, dehumanisation of those under surveillance, transparency and visibility, accountability and voyeurism, function creep, bodily privacy, privacy of location and space, privacy and association²⁷; risks for data protection principles, such as transparency, data minimization, proportionality, purpose limitation, consent, accountability, data security, rights of access, rights of correction, 3rd country transfers, rights of erasure; and ethical issues, such as safety, public dissatisfaction, discrimination.

Given the high degree of potential interference and intrusion in the right to private life and data protection of citizens (but also of public figures such as politicians and institutional representatives, personalities or enterprises, etc), it is important that drones and related applications are properly regulated to ensure the respect of fundamental rights, in particular of privacy and of the data collected and processed, across the whole drones' chain (from manufacturing to law enforcement action in the event of illegal use), as should be done for safety and security.

3.2. Applicable law and gaps

The use of RPAS for civil uses must comply with the fundamental rights to private life and data protection. The **applicable European, EU and national law** in the field consists of:

- Article 8 of the Council of Europe Convention on Human Rights and related jurisprudence
- The ECHR and related jurisprudence guarantees apply to any drones' use in relation to privacy and the related data protection implications
- Council of Europe Convention 108, Recommendation R(87)15 of the Committee of Ministers of the Council of Europe on the use of personal data in the police sector, Recommendation CM/Rec(2010)13 of the Committee of Ministers to member states on the protection of individuals with regard to automatic processing of personal data in the context of profiling
- Article 7 (privacy) and 8 (data protection) of the Charter on Fundamental Rights of the EU
- 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
- 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

²⁷ Privacy of communications is particularly important in this regard, as it could be threatened seriously by drones' applications.

- Regulation (EC) 45/2001 of 18 December 2000 on the protection of individuals with regard to the processing of personal data by the Community institutions and bodies and on the free movement of such data
- Directive 2002/58/EC of 12 July 2002 concerning the processing of personal data and the protection of privacy in the electronic communications sector (Directive on privacy and electronic communications)
- National Constitutions, laws and regulations implementing EU law, notably the Data Protection Directive, which apply as far as they cover drones activities and on the basis of national jurisprudence.

Directive 95/46/EC is applicable to processing of personal data via drones, either by private entities or public authorities for purposes other than law enforcement. The guarantees provided by the Directive apply with certain **derogations (exceptions)**, for instance in relation to:

- Activities by private individuals (such as hobbyists or private users) on the basis of the household exception. The latter exception covers purely personal, family life-related, domestic or household activities (Article 3(2) and recital 12). The Lindquist judgment clarifies that should such data be shared through a social network or published on the internet, the exception would not be applicable and the full guarantees provided by the Directive would apply. Furthermore, it is likely that the capturing and processing of personal data carried out by drones in public spaces would not be covered by the "household exemption" and hence such processing would be subject to EU DP law²⁸.
- Law enforcement activities (by the police or other law enforcement bodies) that collect and process personal data at national level via drones fall outside EU law, except when such data are exchanged between MS: in this case Framework Decision 2008/977/JHA applies. At the same time, such activities must be based on clear and accessible national laws, serve a legitimate goal and be necessary in a democratic society and proportionate to the purpose pursued, following the ECHR and related jurisprudence.
- Article 4(2) TEU states that "national security remains the sole responsibility of each Member State", so activities by intelligence services fall outside of the EU competences, including when these imply the collection of data through drones. The EDPS nonetheless underlines that this exception must be interpreted strictly and that such activities as regulated in domestic law have to comply with the proportionality and necessity principles and with the ECHR and ECJ jurisprudence²⁹.
- Media and journalists' activities fall under the exception provided in Article 9 and Recital 17 of Directive 95/46/EC, which allows MS to provide for derogations to some parts of the Directive only if they are necessary to reconcile the right to privacy with the rules governing freedom of expression" when such processing is "carried out

²⁸ The ECJ jurisprudence guarantees the application of the right to privacy and data protection to private and public spaces, which implies that EU law applies regardless of the location of the person contesting the drone-related interference. It also stated in a preliminary ruling related to CCTV that the "household exception" does not apply when the personal data is gathered in public spaces. See case Case C-212/13 on CCTV: <http://curia.europa.eu/juris/document/document.jsf?text=95%252F46%252FEC&docid=160561&pageIndex=0&doclang=en&mode=req&dir=&occ=first&part=1&cid=300923#ctx1>

²⁹ The absence of any references and recommendations in the Commission communication and in other policy documents in relation to the risks posed by the use of drones to carry out law enforcement and secret services' activities - which can seriously interfere and violate fundamental rights - should be noted and the issue addressed in future policy initiatives.

solely for journalistic purposes or the purpose of artistic or literary expression". Such activities will consequently fall under national laws implementing this article.

Data processed via RPAS for **commercial or professional purposes fall under EU law and notably Directive 95/46/EC and the national laws implementing it.**³⁰ **The draft text of the General Data Protection Regulation that will replace Directive 95/46/EC contains rules on privacy by design, privacy by default and impact assessments** that will allow clearer rules for manufacturers and a screening of the operations carried out by controllers for which drones will be flown. Once they will be approved and come into force, they will improve considerably the prevention of possible breaches of privacy and data protection rights.

To sum up, **gaps** exist in relation to EU privacy and data protection guarantees on activities by private individuals, law enforcement, secret services and media and journalists activities. In order to overcome such gaps, a series of **remedies** have been proposed.

3.3. Recommendations

The **EDPS** has made the following recommendations:

- the EU should play a leading role (including by ensuring that the EU is competent for drones regulation, regardless of their weight) in clarifying and raising awareness of among manufacturers, controllers, processors, users and data subjects on the existing data protection framework and obligations, and include these elements in its policy measures on RPAS,
- encourage manufacturers to implement privacy by design and by default and embed data protection requirements to ensure compliance from the outset (see EDPS opinion with more specific recommendations, notably points 60-61); a notice should accompany RPAS sold in the EU including in relation to privacy and data protection, recalling applicable law and rules (see point 62 of the opinion);
- ensure that users and data controllers carry out a data protection impact assessment notably where there are risks for DP and other issues (defining the purpose of the use; choosing the right tool for the job; using the most privacy-friendly approach; ensuring the security of the data collected)
- generate a public debate by raising awareness of the privacy implications of the use of RPAS, which will support and increase compliance;
- draw the attention on the fact that even where there might be gaps in data protection regulation, intrusions into privacy or illegitimate use of RPAS might be prohibited under criminal law, intellectual property, aviation, environmental law, etc.

The **Commission study** underlined the importance of adopting risk reduction practices such as providing the public with information, data minimization, anonymisation of collected data, purpose limitation, data erasure, data securization. It concluded that the European and Member States' regulatory frameworks are largely adequate to address the privacy, data protection and ethical impacts of RPAS due to their technological neutrality and that, notwithstanding the remaining gaps, **the real problem is educating the RPAS**

³⁰ Provided that the controller is established on the EU territory or is making use of equipment or means situated on the territory of an EU Member State, which is normally the case.

industry about their obligations and enforcing the regulatory mechanisms that are in place, while highlighting the importance of the General Data Protection Directive to make sure that data protection impact assessments and privacy by design are provided by within EU law and mandatory. The study **does not support the need for an overarching European regulation** and cites a number of arguments (risk of inadequacy, obsolescence, different interpretation and views on DP and privacy, cost for industry, regulators, the public). Instead, it prefers actions and soft law measures to minimize risks, contrary to other policy documents that seem to take the opposite stance. The study includes a series of **policy recommendations** addressed to industry, stakeholders, public authorities, and notably:

- Industry should reduce privacy risks by minimizing the amount of personal data collected and processed;
- awareness-raising actions should be developed in relation to privacy and data protection obligations, for the industry, operators and the general public; workshops, working groups, training courses and information materials, published on an online portal, could be useful for this aim; the Commission, Member States, CAAs, DPAs, RPAS industry and associations, should all work at their respective level for this aim; RPAS manufacturers and operators should also be able to receive advice on DP and privacy issues;
- information and transparency protocols, both on the missions and the operators, should be devised and implemented; an information resource (database and website, for instance) to allow for the identification and tracking (for instance via GPS) of RPAS, operations and missions (as well as owners) should be created, so as to ensure that privacy and data protection rights and obligations – as well as other legal obligations – are respected; signposts and/or information sheets, or leaflets, could allow citizens to know about the drone operation, data collected and contact details and thereby enable them to be in a position to exercise data protection and privacy rights. The Commission, EU and MS policy makers, EASA, industry associations, RPAS manufacturers, CAAs should work to achieve this objective and legal obligation, notably when personal data is collected and processed.
- soft law measures such as impact assessments on privacy, as well as on measures to minimize risks to it, should be done for each drone operation, on a case-by-case basis (the GDPR will make PIAs an obligation); a DPIA (data protection impact assessment) template should be developed by the Commission, DPAs, industry and Article 29 Working Party (as it has been done for RFID and smart meters). CAAs should grant aerial work permits upon certification by operators that a DPIA has been done properly. Codes of conduct and privacy certification schemes should also be developed by industry, together with DPAs.
- monitoring and promotion of good practices should be fostered, such as ensuring that CAAs, which are the natural gatekeepers for RPAS operators to access airspace, are responsible for checking that DP and privacy aspects (such as through DPIAs) are respected and a precondition for permits, in collaboration with DPAs; the Commission should work in this direction with JARUS, EASA and other organisations; the Commission could furthermore incorporate this aspect in its future possible regulations.
- the study insists that the GDPR is adopted as amended by the EP, so as to ensure that preventive measures minimize the risks related to commercial operations (through mandatory DPIAs, privacy by design, privacy by default); RPAS manufacturers should provide guidance on responsible use for private use (for

instance through a notice) in relation to privacy, data protection, but more in general on laws to be respected and possible legal consequences for non-respect), as this is a high-risk group; in relation to RPAS operations by the police, the study insists that these should take place on the basis of a warrant by judicial authorities, with appropriate oversight, while the proposed Data Protection Directive should be reviewed to make sure it also covers also RPAS surveillance technologies.

- the study also proposes that the Commission develops a privacy Impact Assessment framework for drones that can be evaluated by the Article 29 Working Party; that DPAs and industry establish an on-going dialogue, with the support of the Commission; that CAAs ensure that aerial work permits are issued if DP, privacy and transparency requirements are respected.

4. SAFETY, SECURITY AND TECHNOLOGICAL PRE-CONDITIONS

Safety, security, technological issues, as well as identification, liability, insurance aspects related to drones have been already addressed within the general EU drone policy documents illustrated above. In the present chapter, some further issues are explored and considered.

4.1. Accident reporting, exploring the causes and addressing them to ensure better safety and security

In order to gain a picture of the **risks posed by drones to security and safety**, it would be necessary to have clear **data** on drones' accidents and incidents, but such information is not provided by official EU documents. Having said this, the media have reported on a series of events that have attracted citizens' and public authorities' attention to the risks and threats that drones can pose.

Just to cite a few: drones have been spotted over **airports** or close to them, **disrupting or/and threatening civil aviation**, notably in the UK³¹ and in the US³²; have flown or crashed on the ground in the White House area³³; have come very **close to Prime Ministers**, such as Angela Merkel³⁴, and have been found on the office of the Japanese prime minister, carrying radioactive material³⁵; have been flown **over critical infrastructure such as nuclear power stations³⁶ or embassies and tourist attractions** in France³⁷; have **impeded quick intervention** by law enforcement authorities and fire-fighters³⁸; have **injured** people on the ground³⁹.

³¹ 7 December 2014, The Guardian, Drone 'near miss' with passenger plane close to Heathrow airport investigated <http://www.theguardian.com/world/2014/dec/07/drone-near-miss-passenger-plane-heathrow>

20 April 2015, The Telegraph, Flights diverted at Manchester airport as drone sighted over runway, <http://www.telegraph.co.uk/news/aviation/11549760/Flights-diverted-at-Manchester-airport-as-drone-sighted-over-runway.html>

³² 22 March 2014, reported by the Wall Street Journal, FAA: U.S. Airliner Nearly Collided With Drone in March <http://www.wsj.com/articles/faa-u-s-airliner-nearly-collided-with-drone-in-march-1399659956>

29 May 2014, drones around planes landing in NYC and in Los Angeles airports: 23 June 2014, Washington Post, Close encounters on rise as small drones gain in popularity, <http://www.washingtonpost.com/sf/investigative/2014/06/23/close-encounters-with-small-drones-on-rise/>

29 May 2015, Fox News, NY-bound passenger jet reports near-miss with drone, <http://www.foxnews.com/us/2015/05/29/ny-bound-pilot-swerves-to-avoid-collision-with-drone/>

³³ drones in Capital Hill area on 3 and 7 July, 19 and 29 August: 26 January 2015, Washington Post, Small drones near the White House and Capitol: A short recent history, <http://www.washingtonpost.com/news/post-nation/wp/2015/01/26/small-drones-near-the-white-house-and-capitol-a-short-recent-history/>

26 January 2015, Washington Post, Drone operator says he accidentally crashed device on White House grounds, http://www.washingtonpost.com/politics/device-found-on-white-house-grounds-but-officials-say-it-posed-no-threat/2015/01/26/7accc156-a547-11e4-a2b2-776095f393b2_story.html ; the article reports also on previous drones flights in the Capital

14 May 2015, The Washington Post, Drone operator detained in front of White House, http://www.washingtonpost.com/local/drone-operator-detained-in-front-of-white-house/2015/05/14/8094dbd2-fa6a-11e4-9030-b4732caefe81_story.html

³⁴ 20 September 2013, Mini-Drone Incident Shows Security Failings (Merkel), <http://www.spiegel.de/international/germany/federal-police-report-explains-inaction-despite-mini-drone-attack-a-923509.html>

³⁵ 22 April 2015, New York Times, Drone, Possibly Radioactive, Is Found at Office of Japan's Prime Minister, <http://www.nytimes.com/2015/04/23/world/asia/drone-possibly-radioactive-is-found-at-office-of-japans-prime-minister.html>

³⁶ 30 October 2014, France 24, France on alert after mystery drones spotted over nuclear plants <http://www.france24.com/en/20141030-france-alert-after-mystery-drones-spotted-over-nuclear-plants/>

³⁷ 25 February 2015, France 24, Al-Jazeera journalists arrested for flying drone in Paris <http://www.france24.com/en/20150225-drone-paris-al-jazeera-journalists-arrested/>

In terms of accident data, US Army officials reported in June 2013 that drones had crashed **at 10 times the rate of manned Army aircraft** over the previous nine months⁴⁰.

The **Washington Post** has published a series of articles on **drone accidents**, both used for military and civil purposes, on the **types and on the causes**. The articles underline that accidents reported by the US administration following Freedom of Information Act requests (418 major drone crashes around the world between September 2001 and the end of 2013, excluding CIA drones) reveal that there are a series of major safety issues that are yet to be overcome, notably **persistent mechanical or electrical defects, pilot errors, unreliable communication links and a limited ability to detect and avoid troubles** (cameras and sensors cannot replace a pilot and radars and anti-collision systems to prevent mid-air disasters are not installed by default on drones). Reports also highlighted that **weather elements such as lightning, high winds and icing can be fatal for drones**.⁴¹ Another article reveals that the FAA has registered 15 cases in 2013 and 2014 of drones flying close to airports or passenger aircraft, putting civil aviation aircraft and passengers in serious danger: in some cases pilots reported **near-collisions**. **Mid-air encounters seem to be common**, as a NASA database of confidential complaints filed voluntarily by pilots and air-traffic controllers has recorded 50 close calls or improper flight operations involving drones over the past decade. The FAA has also recorded **23 accidents and 236 unsafe incidents since November 2009 involving civilian drones** flown with the FAA's permission and under its scrutiny⁴². In substance, the inquiry challenges "the US federal government's assurances that drones will be able to fly safely over populated areas and in the same airspace as passenger planes". The FAA also released information on 194 cases of misbehaviour in the US in 2014 related to drones, including near-miss incidents with planes and helicopters⁴³.

The recommendation made by the Riga Declaration on reporting on drones' incidents seems **essential** to ensure that MS regulatory regimes, as well as the **EU regulatory regime under preparation, can address, prevent, minimize and counter these risks and challenges and resolve them.**

4 March 2015, 'A dozen' drones fly over Paris in latest mystery sighting <http://www.france24.com/en/20150304-dozen-drones-fly-over-paris-latest-sighting-france>

24 February 2015, France 24, Mystery drones fly over US embassy, Paris landmarks, <http://www.france24.com/en/20150224-five-drones-spotted-over-paris-landmarks-overnight-france/>

³⁸ 20 January 2014, BBC, Norway fire chars wooden village of Laerdalstry, <http://www.bbc.com/news/world-europe-25799491> (a fire-fighting helicopter was delayed due to a drone, possibly operated by a journalist)

³⁹ 7 April 2014, The Sydney Morning Herald, 'River of blood' after drone 'hits' Australian athlete, <http://www.smh.com.au/technology/technology-news/river-of-blood-after-drone-hits-australian-athlete-20140407-zgruh.html>

9 December 2014, TGI Friday drone crashes into woman's face and cuts it open in restaurant, The Independent, <http://www.independent.co.uk/life-style/gadgets-and-tech/news/tgi-friday-drone-crashes-into-womans-face-and-cuts-it-open-in-restaurant-9911934.html>

3 June 2015, The Guardian, Drone injury grounds Enrique Iglesias for longer than expected <http://www.theguardian.com/music/2015/jun/03/drone-injury-grounds-enrique-iglesias-for-longer-than-expected>

⁴⁰ <http://www.washingtonpost.com/sf/investigative/2014/06/20/when-drones-fall-from-the-sky/>

⁴¹ <http://www.washingtonpost.com/sf/investigative/2014/06/20/when-drones-fall-from-the-sky/>

⁴² <http://www.washingtonpost.com/sf/investigative/2014/06/23/close-encounters-with-small-drones-on-rise/>

⁴³ <http://mobile.nytimes.com/blogs/bits/2014/11/26/new-f-a-a-report-tallies-drone-sightings-highlighting-safety-issues/?action=click&contentCollection=Technology&module=RelatedCoverage®ion=Marginalia&pqtype=article&r=0&referrer=>

4.2. Current availability of technologies ensuring safety and security

EU documents on drones state that technologies to ensure their safe and secure integration in the civil aviation system are **still absent** and consequently raise the need of their further development (notably through EU funding of so-called “enabling technologies”). They highlight, for instance:

- the Detect and Avoid technology, so as to ensure that drones don’t collide with other objects in the sky, such as airplanes or other drones, or on the ground, such as buildings, critical infrastructure like energy wires, or persons, for instance in the landing or take-off phases;
- the security of the communication link – so-called command and control (C2) - between the pilot station and the drone, so as to impede hacking, jamming and spoofing, for instance through encryption, or to ensure that it goes back to base in such cases; ensuring the availability, allocation and management of the radio spectrum;
- geo-fencing, so as to deny access to drones to certain no-fly areas, such as airports, critical infrastructure, embassies, cities, monuments, military bases or even private property;
- security protection against physical, electronic or cyber-attacks;
- transport and harmonized contingency procedures;
- decision capabilities to ensure standardized and predictable behaviour in all phases of flight;
- human factor issues such as piloting;

Further issues that should be better explored are the development of technologies to ensure the **neutralization** of drones in certain situations, such as in the case of illegal, unlawful, unsafe or criminal activities, including terrorist attacks.

Since such technologies are either not available, not legally required or not installed by default into drones, **one of the main preconditions announced by the COM for the integration of drones into the civil airspace is clearly lacking.**

5. CONCLUSIONS

The **present research** addressed the implications of the integration of drones for civilian use into the European civil aviation system. It notably looked into EU policy on drones and the potential impacts on citizens' right to privacy and data protection, as well as on security and safety. The research underlines that a series of important pre-conditions still need to be addressed and met in order to ensure that drones do not pose serious risks for citizens' fundamental rights, and notably for privacy and data protection, security and safety. These issues could be resolved through a clear and complete regulatory framework, addressing the whole "drones' chain" and guaranteeing safety, security, privacy and data protection, environmental protection, responsibility and liability, law enforcement action, insurance, identification and transparency. A "proportionate risk-based approach" is currently being explored, while national regulations are currently based on weight considerations. The technological developments and a clear plan for regulatory and legislative action that could allow the safe and secure integration of RPAS into the civil aviation system still seem to be lacking.

Proposals for improvement of the regulatory regime for drones are illustrated in the research⁴⁴ and could be taken into consideration by the EP to influence the shaping of future policy on drones, both at the EU and at MS level. Further research could be conducted on specific subjects (for instance on the development of enabling technology, funding, national developments in drone regulations, data on drone security and safety, planning and monitoring of the "drones' chain" necessary actions to ensure the safe integration into civil aviation).

The **EP is in a unique position to steer public discussion** and open up the debate on drone policy and regulation. To date, discussion has mainly involved industry, the Commission, working groups and other aviation-related agencies and authorities, but should be broadened to **include citizens, civil society, NGOs, as well as the Fundamental Rights Agency, the European Data Protection Supervisor, the Working Party Article 29, Data Protection Authorities**. Such discussions would allow legislators, such as the EP and national parliaments, to gather further information and opinions and elaborate its position, including on the future proposals on drones.

Looking forward, **the EU and notably its Agencies, such as Frontex, might take direct responsibility for or be involved in drone operations** for border surveillance and rescue at sea, for instance in the framework of Eurosur. When this happens, it will be important that the fundamental rights to privacy and fundamental rights, safety and security are fully protected.

⁴⁴ They are underlined in the text of the research, while the main subjects and concepts of each paragraph are in **bold**.

DIRECTORATE-GENERAL FOR INTERNAL POLICIES

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ISBN: 978-92-823-7295-1
doi:10.2861/28162