

# Drones in European Airspace

## Initial regulatory steps by the EU

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- ▶ The planned EU legislation on the design, production, maintenance and operation of remote controlled drones will contribute to aviation safety.
- ▶ It will increase legal certainty and thereby also planning certainty.
- ▶ Early uniform EU legislation provides a positive impetus for growth and employment because it improves the chances for European companies to take a leading role in the burgeoning market for drones.
- ▶ The European Commission should shortly also make proposals for autonomous aerial drones.

## Table of Contents

<b>1</b>	<b>Introduction</b> .....	<b>3</b>
<b>2</b>	<b>Types of Drones and their Uses</b> .....	<b>4</b>
<b>3</b>	<b>"Risk based approach" of the EASA</b> .....	<b>5</b>
3.1	"Open category" for "low risk" .....	6
3.2	"Specific category" for "medium risk" .....	6
3.3	"Certified category" for "higher risk" .....	6
<b>4</b>	<b>Proposed Regulation by the European Commission</b> .....	<b>7</b>
4.1	"Risk-based approach" .....	7
4.2	"Essential requirements" for drones and drone operators.....	8
4.3	Airworthiness requirements for drones .....	8
4.4	Requirements for drone manufacturers and operators .....	8
4.5	Certification or Declaration.....	9
<b>5</b>	<b>Assessment</b> .....	<b>9</b>
5.1	Legal Assessment: Competence and Subsidiarity.....	9
5.2	Economic Assessment .....	10

## 1 Introduction

The sky above Europe is becoming appreciably busier. In the future, passenger and cargo planes, light aircraft and helicopters will be sharing European airspace to an increasing extent with drones. "Drone" is the common term for unmanned aerial vehicles or flight systems (Unmanned Aircraft Systems – UAS)<sup>1</sup>, which either fly autonomously without a pilot<sup>2</sup> or are controlled remotely by pilots (Remotely Piloted Aircraft Systems – RPAS).<sup>3</sup>

Having been developed primarily for military purposes, remote controlled drones are increasingly being put to civilian use both in the leisure and service sectors. Amazon<sup>4</sup> and DHL<sup>5</sup> recently caused a sensation for example with trial projects to deliver goods by drone directly to the customer. In future, Facebook is going to provide internet access in remote regions of the world, independently of conventional cable and wireless networks, by using drones ("telecommunications relay").<sup>6</sup> The increased use of drones, however, gives rise to additional risks and challenges. There are currently no comprehensive EU provisions on the deployment of drones in European airspace. Only drones weighing more than 150kg are subject to similar provisions as those for manned aircraft.<sup>7</sup>

In 2014, the European Commission spoke out in favour of opening airspace up to civil drones as from 2016.<sup>8</sup> This aim was reinforced in March 2015 by the Commission, EU Member States and the aviation industry, by way of the "Riga Declaration".<sup>9</sup> In October 2015, the European Parliament emphasised the need for EU legislation on aviation safety, the development of a European market for drones and the protection of privacy and data.<sup>10</sup> The European Aviation Safety Agency (EASA) was commissioned by the European Commission to develop "basic principles" for regulating the operation of drones. The EASA developed a "risk-based" approach which it presented in December 2015.<sup>11</sup> In parallel, the Commission proposed a new version of the EASA Regulation (No. 216/2008)<sup>12</sup> <sup>13</sup> containing the initial regulatory steps to be taken in the EU in relation to civil drones.

<sup>1</sup> International Civil Aviation Organization (2011), ICAO Circular 328-AN/190, Unmanned Aircraft Systems (UAS), p. x: "Unmanned aircraft system: An aircraft and its associated elements which are operated with no pilot on board".

<sup>2</sup> Ibid., p. ix: "An unmanned aircraft that does not allow pilot intervention in the management of the flight".

<sup>3</sup> Ibid., p. x: "Remotely-piloted aircraft system. A set of configurable elements consisting of a remotely-piloted aircraft, its associated remote pilot station(s), the required command and control links and any other system elements as may be required, at any point during flight operation".

<sup>4</sup> Amazon Prime Air, <http://www.amazon.com/b?node=8037720011>, last accessed on 25 February 2016.

<sup>5</sup> DHL parcelcopter launches initial operations for research purposes, DHL Press Release of 24 September 2014, [http://www.dhl.com/en/press/releases/releases\\_2014/group/dhl\\_parcelcopter\\_launches\\_initial\\_operations\\_for\\_research\\_purposes.html](http://www.dhl.com/en/press/releases/releases_2014/group/dhl_parcelcopter_launches_initial_operations_for_research_purposes.html), last accessed on 25 February 2016.

<sup>6</sup> Facebook builds drone for internet access, BBC report of 30 July 2015, <http://www.bbc.com/news/technology-33728704>, last accessed on 25 February 2016.

<sup>7</sup> Regulation (EC) No. 216/2008 of 20 February 2008 on common rules in the field of civil aviation and establishing a European Aviation Safety Agency, Annex II.

<sup>8</sup> EU Commission, Communication COM(2014) 207 of 8 April 2014, Opening the aviation market to the civil use of remotely piloted aircraft systems in a safe and sustainable manner; see [cepAnalyse No. 42/2014](#).

<sup>9</sup> Riga Declaration on RPAS of 6 March 2015, <http://ec.europa.eu/transport/modes/air/news/doc/2015-03-06-drones/2015-03-06-riga-declaration-drones.pdf>, last accessed on 25 February 2016.

<sup>10</sup> European Parliament, Resolution of 29 October 2015 on safe use of remotely piloted aircraft systems (RPAS), commonly known as unmanned aerial vehicles (UAVs), in the field of civil aviation (2014/2243(INI)).

<sup>11</sup> EASA (2015): Technical Opinion – Introduction of a Regulatory Framework for the Operation of Unmanned Aircraft, <http://easa.europa.eu/system/files/dfu/Introduction%20of%20a%20regulatory%20framework%20for%20the%20operation%20of%20unmanned%20aircraft.pdf>, last accessed on 25 February 2016.

<sup>12</sup> Regulation (EC) No. 216/2008 of 20 February 2008 on common rules in the field of civil aviation and establishing a European Aviation Safety Agency.

<sup>13</sup> EU Commission, Proposal for a Regulation COM(2015) 613 of 7 December 2016 on common rules in the field of civil aviation and establishing a European Union Aviation Safety Agency, and repealing Regulation (EC) No 216/2008 of the European Parliament and of the Council.

In the context of the incipient regulation of drones at EU level, this ceplInput provides an overview of the multifarious types and uses of drones (Section 2). It clarifies the "basic principles" developed by the EASA and the "risk-based approach" for regulating the operation of drones in the EU (Section 3) as well as the regulatory proposals of the European Commission for the design, production, maintenance and operation of drones (Section 4). The proposals are then assessed from a legal and economic point of view (Section 5). Since the current regulatory proposals in the EU only relate to remote controlled RPAS, the following analysis will not consider autonomous drones in any detail.

## 2 Types of Drones and their Uses

Buoyed up by technical progress and the falling costs of production, the various types and uses of drones are multiplying. The different types of drone can be distinguished, inter alia, according to the following characteristics:<sup>14</sup>

- Weight: from just a few grams to over ten tonnes;
- Flight technology: rotors or fixed-wing;
- Power source: fossil fuels or solar
- Control: autonomous or via remote control, within or outside visual range;
- Speed: from hovering up to over 1,000 km/h;
- Flight duration: a few minutes up to several months;
- Range: a few hundred metres up to over 500 km;
- Altitude: a few metres up to 20 km;
- Equipment: e.g. cameras, measuring devices or cargo space.

With technical innovations and additional flight capabilities, the possibilities for using drones for private, commercial, government or scientific purposes are also multiplying. Civilian uses of drones include

- as toys;
- transporting goods;
- precision application of fertilisers and pesticides in agriculture;
- safety inspections of infrastructure, particularly rail tracks, bridges, pipelines, power grids, dams and power plants;
- disaster relief in inaccessible areas e.g. in mountainous and flooded areas or in dangerous situations such as forest fires or gas leaks;<sup>15</sup>
- surveillance, e.g. at borders, for traffic and where there is a risk of forest fire;<sup>16</sup>
- exploring the atmosphere,<sup>17</sup> climate change and volcanoes.<sup>18</sup>

<sup>14</sup> European Parliament (2015), Privacy and Data Protection Implications of the Civil Use of Drones – In-depth Analysis for the LIBE Committee, p. 12.

<sup>15</sup> EU Commission, Communication COM(2014) 207 of 8 April 2014, A new era of aviation. Opening the aviation market to the civil use of remotely piloted aircraft systems in a safe and sustainable manner, p. 3; see [cepPolicyBriefNo. 2014-42](#).

<sup>16</sup> Ibid., p. 34.

<sup>17</sup> Spiegel online 14 April 2010: "Atmosphärenforschung: US-Forscher setzen auf Spionagedrohnen", <http://www.spiegel.de/wissenschaft/natur/atmosphaerenforschung-us-forscher-setzen-auf-spionagedrohnen-a-688911.html>, last accessed on 25 February 2016.

<sup>18</sup> Kornmeier, Claudia (2012): Der Einsatz von Drohnen zur Bildaufnahme, Lit Verlag, Berlin, p. 30 et seq.

### Illustration: Potential uses and altitudes of drones



Drones = coloured; conventional aircraft and aerial devices = white (Source: © European Union, 1995–2016<sup>19</sup>)

### 3 "Risk based approach" of the EASA

In a "Technical Opinion" of December 2015<sup>20</sup>, the EASA presented "basic principles" for a "risk-based approach" upon which the regulation of the civilian use of drones will be based. It sets out three categories of operating regulations, increasing progressively in severity and no longer based primarily on the weight of the drones, as has been the case until now, but on the risk typically posed to "third parties" – people and property – on the ground or in the air, from the use of drones. This approach has been taken due to the diverse possibilities for using different types of drone in situations involving various levels of risk. Thus the deployment of a large drone over the open sea poses a lower risk for third parties than a mini-drone over the crowd in a football stadium. The EASA proposes the following three categories for risk-based regulations on the operation of drones<sup>21</sup>:

- an "open category" for "low risk",
- a "specific category" for "medium risk" and
- a "certified category" for "higher risk".

<sup>19</sup> European Commission, Drone infographics: A look into the aviation of the future,

[http://ec.europa.eu/transport/modes/air/drones-infographics\\_en.htm](http://ec.europa.eu/transport/modes/air/drones-infographics_en.htm), last accessed on 25 February 2016.

<sup>20</sup> EASA (2015): Technical Opinion – Introduction of a Regulatory Framework for the Operation of Unmanned Aircraft, <http://easa.europa.eu/system/files/dfu/Introduction%20of%20a%20regulatory%20framework%20for%20the%20operation%20of%20unmanned%20aircraft.pdf>, last accesses on 25 Februar 2016.

<sup>21</sup> Ibid., p. 1 and 9 et seq.

### 3.1 "Open category" for "low risk"

The regulatory principles of the "open category"<sup>22</sup> apply to small drones, including those operated by private individuals, with an operating weight of max. 25 kg. These are assumed to pose a comparatively low risk to third parties. The rules in this category will ensure the safety of all third parties without representing a regulatory burden or obstructing innovation. This will be guaranteed by the following regulatory principles:

- In order to protect third parties both on the ground and in the air, authorities are permitted to set up zones in certain areas – e.g. where there is high population density or over airports or nuclear power plants – with operating restrictions or flight bans.
- The drones must be designed in such a way as to restrict the maximum possible flying altitude to 150 m.
- Flights over "crowds" are not permitted and a minimum safe distance of 50 m must be maintained from them.
- The pilot must keep the drone within his direct visual line of sight at all times.
- The police authorities of the Member States will be responsible for monitoring and enforcing these rules.

### 3.2 "Specific category" for "medium risk"

Operating drones outside one or more of the limitations of the "open category" will be (at least) subject to the regulatory principles of the "specific category"<sup>23</sup> in which stricter requirements apply:

- Operating a drone requires an operation authorisation which only applies to "specific" types of operation. It is issued by the aviation authority of a Member State which sets out the actual requirements necessary to minimise the risk associated with the operation of the drone.
- In order to obtain an operation authorisation, the operator must carry out a specific operation risk assessment to identify all the risks to third parties on the ground and in the air arising from the operation of the drone.
- The operator must propose measures to mitigate the risk. These may be e.g. technical features of the drone such as sensors which recognise obstacles and enable automatic avoidance manoeuvres ("detect and avoid").
- The operator must provide an operations manual containing all the information, descriptions, conditions and limitations necessary for operation of the drone.
- The operator must ensure that the pilot is sufficiently qualified and trained in the operation of the drone.

### 3.3 "Certified category" for "higher risk"

Insofar as the risks associated with the operation of drones correspond to those of manned aviation, the regulatory principles in the "certified category" apply<sup>24</sup>. They typically relate to large drones used e.g. for international cargo transport or the transport of persons:

- The EASA must certify in a "type certificate" that the drone-type in question is generally air-worthy and complies with the environmental standards applicable to manned aviation.

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<sup>22</sup> Ibid., p. 19 et seq.

<sup>23</sup> Ibid., p. 23 et seq.

<sup>24</sup> Ibid., p. 27 et seq.

- In addition, the competent national aviation authorities must issue a "certificate of airworthiness" for each individual drone.
- The operation of drones must, in principle, be authorised by the national aviation authorities.
- Operators of drones must be certified by the national aviation authorities. Certification may generally entitle the operator to operate drones without any additional approval.
- Pilots must have a licence from the national aviation authority.
- Design, production and maintenance facilities require an approval from the national aviation authority for their operations and for the training of staff.

## 4 Proposed Regulation by the European Commission

In December 2015, the European Commission published a proposal to recast the EASA Regulation (No. 216/2008)<sup>25</sup>, allowing inter alia for the initial EU regulatory steps to be taken to open up European airspace for civil drones. It contains a regulatory framework for the design, production, maintenance and operation of drones with particular reference to aviation safety (Art. 45–47, Annex IX).

The regulatory framework takes a "risk-based approach" (4.1) and includes "essential requirements" for drones and drone operators (4.2) as well as special requirements for the airworthiness of drones (4.3) and for drone manufacturers and operators (4.4). The proposal for a Regulation empowers the Commission (Art. 47) to consolidate these three categories of regulation in delegated acts (Art. 290 TFEU). Proof that the respective requirements have been met must be provided either by way of "certification" or in a "declaration" (4.5). The Commission is also empowered to consolidate this in delegated acts (Art. 47).

### 4.1 "Risk-based approach"

The proposed rules are based – in accordance with the regulatory principles established by the EASA – not on operating weight but on the risk associated with operating drones. Consequently, all measures taken by the Member States, Commission and EASA under the EASA Regulation must reflect the "type and risk" of a specific drone operation. In this regard, the following points must be taken into account (Art. 4 (2)):<sup>26</sup>

- risk to persons being transported,
- risk to third parties or property on the ground,
- complexity and performance capability of the drone,
- purpose of drone operation,
- area of operation (highly populated, open sea etc.).

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<sup>25</sup> Regulation (EC) No. 216/2008 of 20 February 2008 on common rules in the field of civil aviation and establishing a European Aviation Safety Agency.

<sup>26</sup> Unless otherwise indicated, all references to Articles in Section 4 refer to the proposal for a Regulation COM(2015) 613 of 7 December 2015.

## 4.2 "Essential requirements" for drones and drone operators

The European Commission proposes the following "essential requirements" for the design, production, maintenance and operation of drones (Art. 45, Annex IX. 1.):

- Drones must be designed so that they can be operated and maintained without putting persons at risk.
- Operators must ensure safety of operation and "safe separation" of drones from people on the ground and from other airspace users.
- Operators must be familiar with the operating instructions provided by the drone manufacturer and with "all relevant functionalities" of the drone and the applicable rules of the air.
- Easy identification of the drone must be assured.

The Commission is empowered to lay down detailed rules on this by way of delegated acts (Art. 47).

## 4.3 Airworthiness requirements for drones

Drones must have design features that "experience has shown" to be safe for both the operator and for third parties on the ground and in the air (Art. 45, Annex IX. 2.1.).

- Drones must be safely controllable and manoeuvrable under all anticipated operating conditions and "due" account must be taken of "human-factor considerations".
- Drones and their associated equipment such as the remote controls, must be designed such that the probability of a failure and the severity of its effect on people on the ground and other airspace users are proportionate to the risk of the operation.
- Drones and their associated equipment such as the remote controls must be designed so as to minimize the hazards arising from "conditions, both internal and external to the drone". This includes protection against interference by electronic means ("cyber attacks").

The Commission is empowered to lay down detailed rules on this by way of delegated acts (Art. 47).

## 4.4 Requirements for drone manufacturers and operators

Organisations that design, produce, maintain and operate drones must comply with the following requirements (Art. 45, Annex IX. 2.2.):

- They must ensure compliance with both the requirements under the Regulation (Art. 45, Annex IX) and those in the delegated acts (Art. 47). For this they must implement an internal system with which to manage "safety risks" and which must be subject to continuous improvement.
- They must establish an internal reporting system for "occurrences" – e.g. collisions with other aircraft.

In addition, drone operators must comply with the following requirements (Art. 45, Annex IX. 2.3. and 2.4.):

- They must possess the required knowledge and skills to ensure the safety of the operation.



- They must ensure that the drone has the necessary navigation, communication, surveillance and detect and avoid equipment.
- They must ensure that the drone maintains an appropriate separation distance from third parties on the ground and in the air during all phases of the flight.

The Commission is empowered to lay down detailed rules on this by way of delegated acts (Art. 47).

#### 4.5 Certification or Declaration

Whether the requirements for the design, production, maintenance or operation of drones have been complied with must be proven – depending on the respective level of risk – either by way of "certification" (Art. 46 (1)) or simply by "declaration" (Art. 46 (2)).

- "Certification" requires "recognition" based on an appropriate assessment by a third party that an organisation, person or drone complies with the requirements of the EASA Regulation and of the delegated acts adopted on the basis thereof (Art. 3 (6)). A certification is issued on application in the form of e.g. a certificate, approval, licence, authorisation or attestation (Art. 3 (9)). It specifies the safety-related limitations, operating conditions and privileges (Art. 46 (1)).
- By way of a declaration, an organisation or person confirms compliance with certain requirements of the EASA Regulation and the implementing acts adopted on the basis thereof, without any assessment by a third party (Art. 3 (7)).

The Commission will adopt delegated acts (Art. 47 (1) in conjunction with Art. 290 TFEU) specifying when a certification is necessary or whether a declaration is sufficient and what conditions apply for issuing, maintaining, amending, suspending, or revoking the certificates. In addition, it will comprehensively specify in delegated acts the rights and duties of both the holders of certifications and of drone operators who submit declarations.

## 5 Assessment

The "Technical Opinion" of the EASA and the European Commission's proposal for a Regulation based thereon, represent the initial steps in the progressive regulation of drones in the EU. The main focus is on the protection of innocent bystanders and technical personnel as well as other flying objects. Crucial for the effectiveness of the EU Regulation in this area will be its consolidation by way of delegated acts. When it comes to assessing the already recognisable regulatory approach the following legal and economic aspects are of particular relevance for this phase of the legislation.

### 5.1 Legal Assessment: Competence and Subsidiarity

The EU is permitted to adopt "appropriate provisions" for air transport (Art. 100 (2) TFEU). These basically include provisions on the design, production, maintenance and operation of civil drones.

Here too, under the principle of subsidiarity (Art. 5 (3) TEU), the EU is only permitted to take action if and so far as the objectives of the measures cannot be sufficiently achieved by the Member States but, due to their scale or effects, are better achieved at EU level. Thus, in view of the various

types of civil drones and the possibilities for using them (Section 2), a more sophisticated assessment is required.

Starkly diverging national requirements relating to the technical features of civil drones can noticeably damage cross-border trade in the EU internal market. This can be combated - other than through mutual recognition of the relevant provisions by the Member States - by EU-wide minimum requirements.

In any case, EU legislation on the cross-border provision of services by drones - such as for the inspection of infrastructure or transport of goods - is compatible with the principle of subsidiarity. The same also applies to (minimum) safety requirements which - irrespective of local conditions - are generally necessary on objective grounds therefore applicable EU wide. Conversely, the operation of small, low-range drones, which does not take place on a cross-border basis, should be regulated by the Member States insofar as local peculiarities e.g. particular topographical requirements, justify this.

The proposed consolidation of the regulatory framework by way of delegated acts by the Commission is appropriate in order to adapt the rules to experience, technical developments and new findings. As the transfer of powers for the adoption of delegated acts relates to technical rather than essential provisions, it is compatible with EU law (Art. 290 TFEU).

## 5.2 Economic Assessment

The proposed standard EU rules on drones are in many respects advantageous from an economic point of view. They contribute to air traffic safety as they impose requirements on both the design and the operation of drones which must be complied with. These requirements ensure that people on the ground and other air traffic users are not put at excessive risk due to the operation of drones which is likely to increase substantially. In addition to aviation safety, EU rules also increase legal certainty and thereby also planning safety. In future, drone manufacturers will know how their drones have to be designed to be permitted to be sold not only in one Member State but in the entire EU. In future, drone operators will know where and how they can use drones. Planning certainty also helps to increase innovation as it reduces the risk to companies of investing in the research and development of drones which due to changing national requirements are no longer permitted in the Member State(s) in question. It is important, therefore, that the EU does not change its regulations at short notice and is committed to reliable and consistent legislation.

The drone sector is still relatively young and has potential for growth. New markets may be developed for the production of drones as well as for their maintenance and use which provides positive impetus for employment in this sector. Uniform standards in the EU, implemented at an early stage, will give European companies the chance to take on a leading role in this sector worldwide. Since drones, like many other modes of transport, can be used across borders, it is especially important that the rules are harmonised across the EU in order to prevent a "patchwork" of varying national provisions. The country-of-origin principle<sup>27</sup> does not help in this regard because it does not allow for minimum standards of safety relating to innocent bystanders to be taken into account. The country-of-destination principle<sup>28</sup> is completely inappropriate for the production, sale and operation of drones in the EU internal market because it would result in

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<sup>27</sup> Under the "country-of-origin" principle, goods which have been produced and brought onto the market, in accordance with the requirements of a Member State, are basically permitted to be sold throughout the EU. See authoritative case: ECJ Case No. 120/78, ECR 179, 650 - *Cassis de Dijon*.

<sup>28</sup> Under the "country-of-destination principle", the provisions of the Member State apply in which the goods were brought onto the market.

companies being faced with a confusing array of regulations and possibly to the partitioning of national markets. In contrast, the proposed EU-wide rules guarantee a minimum level of safety and reduce the costs of compliance with legislation for the drone manufacturers and users thereby strengthening the internal market.

In the medium to long term, the EU should work towards global safety standards, in line with the EASA standards, to be developed by the International Civil Aviation Organisation (ICAO). With a defined safety level, this may further reduce the costs for manufacturers and users of drones which are also used in non-EU countries.

The "risk-based approach" chosen by the EASA and the European Commission, for classifying and regulating drones, rightly differs from the regulation of other modes of transport which is frequently based on size and weight. Whilst e.g. in the case of road vehicles there is a clear link between size, weight and speed on the one hand, and the resulting potential for risk on the other, these criteria alone are insufficient for adequately regulating drones. In the case of drones, design features, flight characteristics, possibilities for use, location of use and the associated risks are highly disparate. The factors to be considered when it comes to regulation are correspondingly varied.

The EASA's proposal that drones in the "open category" be prohibited from flying over crowds of people (Section 3.1) means that, without a prior safety assessment, their use in a busy town centre or at a public sporting event is ruled out. This is justified in the interests of safety because the potential danger posed even by small drones in a crowded area is particularly high. However, when it comes to the use of camera drones at sporting events, this represents a change to what has been not uncommon practice up to now. Thus it is apparent that the new rules should be accompanied by corresponding awareness campaigns to bring the rules to the attention of drone users, including amateur enthusiasts.

The European Commission's proposals relate exclusively to drones controlled remotely by pilots (Remotely Piloted Aircraft Systems– RPAS). As in the case of today's individual road transport, it is also conceivable that technical progress and the commercial applications which it produces, will give rise to a demand for autonomous aerial drones. The Commission should also actively accompany this development and communicate without delay how EU rules on the opening up of civil airspace for autonomous aerial drones are to be developed so that manufacturers and users have planning certainty at an early stage.

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