



Opinion No 01/2018

Introduction of a regulatory framework for the operation of unmanned aircraft systems in the ‘open’ and ‘specific’ categories

RELATED NPA/CRD: 2017-05 — RMT.0230

EXECUTIVE SUMMARY

In accordance with the proposed new Basic Regulation, for which a political agreement between the Council, the European Commission and the European Parliament was reached on 22 December 2017, the competence of the EU has been extended to cover the regulation of all civil unmanned aircraft systems (UAS), regardless of their maximum take-off masses (MTOMs).

The objective of this Opinion is to create a new regulatory framework that defines measures to mitigate the risk of operations in the:

- ‘open’ category, through a combination of limitations, operational rules, requirements for the competency of the remote pilot, as well as technical requirements for UAS, such that the UAS operator may conduct the operation without prior authorisation by the competent authority, or without submitting a declaration; and
- ‘specific’ category, through a system that includes a risk assessment being conducted by the UAS operator before starting an operation, or an operator complying with a standard scenario, or an operator holding a certificate with privileges.

Moreover, this Opinion is intended to:

- implement an operation-centric, proportionate, risk- and performance-based regulatory framework for all UAS operations conducted in the ‘open’ and ‘specific’ categories;
- ensure a high and uniform level of safety for UAS operations;
- foster the development of the UAS market; and
- contribute to addressing citizens’ concerns regarding security, privacy, data protection, and environmental protection.

The proposed regulations will provide flexibility to Member States (MSs), mainly by allowing them to create zones within their territories where the use of UAS would be prohibited, limited or, in contrast, facilitated.

Pursuant to the new Basic Regulation, market product legislation (CE marking) ensures compliance with the technical requirements for mass-produced UAS operated in the ‘open’ category. Two acts are proposed that follow different adoption procedures, as defined by the new Basic Regulation: a delegated act that defines the conditions for making UAS available on the market and the conditions for UAS operations conducted by a third-country operator, and an implementing rule that defines the conditions to operate UAS and the conditions for registration.

The proposed regulatory framework is expected to increase the level of safety of UAS operations, to harmonise legislation among the EU MSs, and to create an EU market that will reduce the cost of UAS and allow cross-border operations.

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|-------------------------------|---|------------------------------|----------------------|
| Action area: | Civil drones (unmanned aircraft systems (UAS)) | | |
| Affected rules: | n/a | | |
| Affected stakeholders: | Operators (private and commercial); competent authorities; MSs; flight crews; remote pilots; maintenance staff; UAS manufacturers; other airspace users (manned aircraft); service providers of air traffic management (ATM)/air navigation services (ANS) and other ATM network functions; air traffic services (ATS) personnel; aerodromes; general public; model aircraft associations and clubs | | |
| Driver: | Efficiency/proportionality; safety | Rulemaking group: | No, but expert group |
| Impact assessment: | Full | Rulemaking Procedure: | Standard |

• EASA rulemaking process milestones

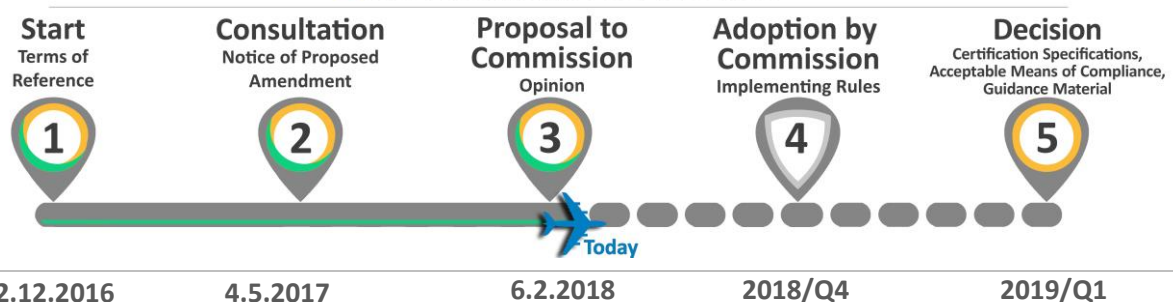


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1. About this Opinion

1.1. How this Opinion was developed

The European Aviation Safety Agency (EASA) developed this Opinion in line with revised Basic Regulation as described in the Executive Summary (hereinafter referred to as the ‘new Basic Regulation’) and the Rulemaking Procedure¹.

This rulemaking activity is included in the EASA 5-year Rulemaking Programme² under rulemaking task RMT.0230. The scope and timescales³ of the task were defined in the related ToR³.

The draft text of this Opinion has been developed by EASA, assisted by a UAS expert group. All interested parties were consulted through NPA 2017-05^{4,5}. More than 3 700 comments were received from around 215 stakeholders, including industry, national aviation authorities (NAAs), UAS operators, the manned aircraft community, ATM, qualified entities, security agencies, insurance companies, individual model aircraft pilots, model aircraft associations and clubs, and individuals. Figure 1 shows the distribution of the commenters.

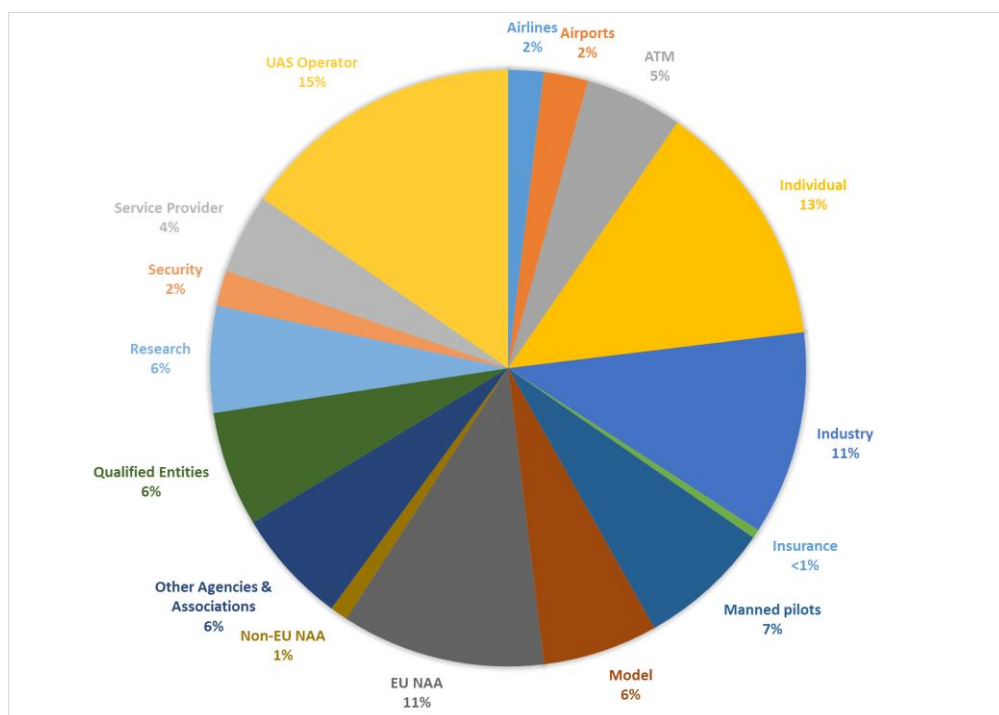


Figure 1 — Distribution of comments received according to the type of commenter

¹ EASA is bound to follow a structured rulemaking process as required by Article 52(1) of Regulation (EC) No 216/2008. Such a process has been adopted by the EASA Management Board (MB) and is referred to as the ‘Rulemaking Procedure’. See MB Decision No 18-2015 of 15 December 2015 replacing Decision 01/2012 concerning the procedure to be applied by EASA for the issuing of opinions, certification specifications and guidance material (<http://www.easa.europa.eu/the-agency/management-board/decisions/easa-mb-decision-18-2015-rulemaking-procedure>).

² <http://easa.europa.eu/rulemaking/annual-programme-and-planning.php>

³ <https://www.easa.europa.eu/document-library/terms-of-reference-and-group-compositions/tor-rmt0230>

⁴ In accordance with Article 52 of Regulation (EC) No 216/2008, and Articles 6(3) and 7 of the Rulemaking Procedure.

⁵ <https://www.easa.europa.eu/document-library/notices-of-proposed-amendment/npa-2017-05>

EASA has addressed and analysed all the comments received on the NPA. Due to the large number of comments, individual answers will not be provided. However, all the comments have been organised according to their topics and for each of them, a summary of the comments and of the related answers is presented in Comment-Response Document (CRD) 2017-05⁶ (planned to be published in 2018/Q1).

The final text of this Opinion, including the two draft regulations, has been developed by EASA and published on the EASA website⁷.

The major milestones of this rulemaking activity are presented on the title page.

1.2. The next steps

This Opinion contains the two proposed draft regulations: an implementing rule (draft Commission Regulation (EU) .../... [IR]), and a delegated act (draft Commission Delegated Regulation (EU) .../... [DA]) and their potential impacts. The Opinion is submitted to the European Commission to be used as a technical basis in order to prepare EU regulations.

The related draft acceptable means of compliance (AMCs) and guidance material (GM) will be published on the EASA website⁸, for information only, in week 07 of 2018. The final version will be published by EASA when the related regulations are adopted by the European Commission.

⁶ <http://easa.europa.eu/document-library/comment-response-documents>

⁷ <http://easa.europa.eu/document-library/opinions>

⁸ <https://www.easa.europa.eu/document-library/agency-decisions>



2. In summary — why and what

2.1. Why we need to change the rules — issue/rationale

In recent years, the development of small unmanned aircraft (UA) with MTOMs of less than 25 kg has been extremely fast and has challenged traditional aviation. In accordance with Regulation (EC) No 216/2008 (the Basic Regulation), the regulation of civil UAS with MTOMs of less than 150 kg falls within the competence of the EU MSs. On 22 December 2017, the 28 EU MSs endorsed an agreement reached with the European Parliament for the revision of the Basic Regulation⁹, extending the competence of the EU to all UAS, except those used for ‘state’ operations (e.g. military, customs, police, firefighting, etc.), and defining the essential requirements to ensure the safety of UAS. In addition, the said Regulation includes the possibility of ‘opting in’ for MSs wishing to place ‘state’ UAS under EU regulation.

In order to harmonise the implementation of UAS regulation across the EU and to foster a European market for UAS, EASA has developed the proposed two draft regulations for the ‘open’ and ‘specific’ categories included in this Opinion.

Safety issues

The two main types of risks addressed are the following:

- air risks (collision with a manned aircraft or another UA); and
- ground risks (collision with persons or critical infrastructure).

A safety risk evaluation is contained in the impact assessment (IA) (see NPA 2017-05 (B)¹⁰), including a safety risk portfolio. In this context, it should be noted that since reports on UAS occurrences are mostly made by pilots of manned aircraft, the reporting data for air risks is much more extensive compared to the data for ground risks, where only anecdotal evidence exists. In general, the number of reported occurrences has increased considerably in recent years. The risk evaluation has identified three key risk areas:

- airborne conflicts;
- aircraft upsets (UAS out of control); and
- failures of other systems.

These risk areas are reflected, where appropriate, in the requirements for the ‘open’ and ‘specific’ categories. For example, airborne conflict in the ‘open’ category is mitigated by laying down requirements for:

- a maximum flying height;
- operations to take place in visual line of sight (VLOS);
- remote pilot competency;
- for some UAS classes, a geo-awareness function and a maximum height limitation; and

⁹ https://ec.europa.eu/transport/modes/air/news/2017-12-22-aviation-strategy-eu-agrees-safer-skies-and-eu-wide-rules-drones_en

¹⁰ <https://www.easa.europa.eu/system/files/dfu/NPA%202017-05%20%28B%29.pdf>

- the possible introduction of zones forbidding or limiting the use of UA close to aerodromes.

The EASA concept of UAS operations is largely based on the Joint Authorities for Rulemaking on Unmanned Systems (JARUS)¹¹ concept that identifies three categories (i.e. A, B, and C) related respectively to the ‘open’, ‘specific’ and ‘certified’ categories. The draft JARUS rules for categories A and B are based on the EASA ‘Prototype’ Commission Regulation on Unmanned Aircraft Operations, published on 22 August 2016¹².

Finally, EASA will incorporate, in a future rulemaking activity planned for 2018, additional AMCs to the proposed regulation that will introduce a methodology developed by JARUS for the risk assessment required for UAS operations in the ‘specific’ category, which is called ‘specific operations risk assessment’ (SORA).

2.2. What we want to achieve — objectives

The overall objectives of the EASA system are defined in Article 1 of the new Basic Regulation. This proposal will contribute to the achievement of the overall objectives by addressing the issues outlined in NPA 2017-05 (B).

The specific objectives of this Opinion related to UAS are to:

- implement an operation-centric, proportionate, risk- and performance-based regulatory framework for all UAS operations conducted in the ‘open’ and ‘specific’ categories;
- ensure a high and uniform level of safety for UAS;
- foster the development of the UAS market; and
- contribute to addressing citizens’ concerns regarding security, privacy, data protection, and environmental protection.

2.3. How we want to achieve it — overview of the proposals

This paragraph provides a summary of the proposal as presented in NPA 2017-05, while the next paragraph offers an overview of the main changes, based on the feedback received during the consultation. For additional details on the initial proposal, please refer to NPA 2017-05.

The proposed new regulations are a follow-up to the concept of UAS operations shown in A-NPA 2015-10 ‘Introduction of a regulatory framework for the operation of drones’¹³, as well as to the Opinion of a technical nature (published on 18 December 2015) and the ‘Prototype’ Commission Regulation on Unmanned Aircraft Operations published in August 2016. They take into account all comments and inputs received from the involved stakeholders, including a UAS expert group put in place by EASA and made up of representatives of the EC, EU MSs, the UAS industry (both for large and small UAS), UAS operators, the manned aviation community, and model aircraft associations and clubs.

¹¹ See also <http://jarus-rpas.org/>.

¹² <http://www.easa.europa.eu/easa-and-you/civil-drones-rpas>

¹³ <https://www.easa.europa.eu/document-library/notices-of-proposed-amendment/npa-2015-10>



Moreover, the information contained in two reports (the Study and Recommendations regarding Unmanned Aircraft System Geo-Limitations¹⁴ and the ‘Drone Collision’ Task Force¹⁵) drafted by two EASA task forces was taken into consideration.

According to the concept defined in A-NPA 2015-10, UAS operations are classified into three categories:

- “open” category’ means a category of UAS operation that, considering the risks involved, requires neither a prior authorisation by the competent authority, nor a declaration by the UAS operator before the operation takes place;
- “specific” category’ means a category of UAS operation that considering the risks involved, requires an authorisation by the competent authority before the operation takes place, taking into account the mitigation measures identified in an operational risk assessment, except for certain standard scenarios for which a declaration by the UAS operator is sufficient, or when the operator holds a light UAS operator certificate (LUC) with the appropriate privileges.
- “certified” category’ means a category of UAS operation that, considering the risks involved, requires the certification of the UA and its operator, as well as licensing of the flight crew.

This Opinion addresses UAS operations in the ‘open’ and ‘specific’ categories only and it introduces:

- an operation-centric approach (the consequences of an accident or incident with a UAS that does not carry people on board are highly dependent on the environment where the accident or incident takes place);
- a risk-based approach (in the ‘open’ category, this is exemplified by introducing subcategories, and in the ‘specific’ category, by laying down the general principle for a risk assessment to be conducted by the operator before starting an operation); and
- a performance-based approach (the main requirements in the draft regulation identify the requested performance, and related AMC/GM and standards describe acceptable ways to comply with the rules).

In addition to the above, and in order to address the strong request for flexibility made by certain MSs, several tools were introduced:

- MSs can define airspace restrictions in zones where UAS operations are prohibited or limited, and other zones where certain requirements defined in the proposed regulation are alleviated. In order to ensure standardisation, the related information must be published in a manner and format established by EASA.

The first type of zone may be established for safety, security, privacy or environmental reasons, while the second type is for different purposes, for example, to facilitate the flight testing of new designs or UAS operations, or to reduce the operational limitations for leisure activities.

- the concept of alternative means of compliance (AltMoCs) is also used in the proposed regulation to allow UAS operators to propose to the MSs alternative means to demonstrate compliance with the requirements defined to obtain an LUC and to operate in the ‘specific’

¹⁴ <https://www.easa.europa.eu/document-library/general-publications/study-and-recommendations-regarding-unmanned-aircraft-system>

¹⁵ <https://www.easa.europa.eu/document-library/general-publications/%E2%80%98drone-collision%E2%80%99-task-force>

category, and especially to propose standard scenarios as alternatives to those published by EASA.

The main topic of this Opinion is the definition of requirements for conducting safe operations in the 'open' and 'specific' categories. The challenge was to reach a good balance between technical requirements, pilot competency and operational limitations, enabling safe and secure UAS operations, while respecting people's privacy, protecting the environment and at the same time enabling the development of the market for UAS.

As a general rule, the 'open' category has been defined as operations conducted:

- with a UAS with an MTOM of less than 25 kg;
- below a height of 120 m; and
- in VLOS.

These conditions above already provide some initial mitigation, especially for air risks, complemented by the competency of the remote pilot.

It was decided to further subdivide operations in the 'open' category into three subcategories to allow different types of operations without the need for an authorisation. The subcategories were defined according to the risks posed to persons and objects on the ground, keeping in mind that the operations would all be below 120 m in height and far from aerodromes. These subcategories are:

- A1: flights over people but not over open-air assemblies of persons;
- A2: flights close to people, while keeping a safe distance from them;
- A3: flights far from people.

An extensive evaluation was carried out with a UAS expert group on how to set the balance between technical requirements, remote pilot competency and operational limitations. Details on the final conditions set for the 'open' category, resulting from the NPA consultation, are provided in paragraph 2.4.

The 'specific' category is applicable to all operations that do not comply with the limits of the 'open' category. It basically requires the UAS operator to perform a risk assessment and to propose mitigation measures that the competent authority will analyse and approve through an authorisation.

To limit the administrative burden for both UAS operators and the competent authorities, a system of standard scenarios has been proposed. A standard scenario involves a pre-established risk assessment and includes mitigation measures. It may be followed by a declaration submitted by the UAS operator (if the implementation of the mitigation measures is considered to be simple), or by an authorisation issued by the competent authority (when the implementation of the mitigation measures is considered to be more complex). Furthermore, an optional light UAS operator certificate (LUC) has been proposed, which allows the competent authority to issue privileges to UAS operators. This implies a significant investment from the operator's side, which should yield benefits in the medium/long term. Indeed, the LUC privileges can ultimately allow an operator to approve their own operations.

The methodology suggested for performing the risk assessment and for identifying the related mitigation measures is called a 'specific operations risk assessment' (SORA). This JARUS methodology is currently under consultation by JARUS, and the final version of it should be available towards the end



of 2018. SORA will be proposed as an AMC to UAS.SPEC.020 ‘Operational risk assessment’. The SORA mitigation measures become binding for the operator when included in its declaration or in the authorisation issued by the competent authority.

The mutual recognition of authorisations by the authorities is a particular point that needs to be highlighted. The general EU principle is that an authorisation granted in accordance with an EU regulation is recognised by all competent authorities without them having to provide any additional documentation. However, it is recognised that an authorisation granted by the competent authority of the operator’s principal place of business may need to be adapted to the local conditions that may exist in another MS. The rules have been adapted to reflect this point, and an AMC will be proposed to that effect, based on the AMC for aerial work performed in cross-border operations.

The requirements proposed in the Opinion also contribute to addressing security threats, protecting the environment and to enforcing privacy and data protection rights in order to ensure the social acceptability of an EU market for UAS. For example, conditions for the applicability of UAS operator registration, electronic identification and geo-awareness have been drafted not only to address safety issues, but also to consider other risks posed by UAS. The definition of zones described above can also be based on security and/or privacy reasons. Finally, the remote pilot competency requirements also include knowledge of the relevant EU and national security and privacy/data protection regulations.

Model aircraft are within the scope of this Opinion since, pursuant to the definition of a UA in the new Basic Regulation, a model aircraft is a UA. It is, however, recognised that activities conducted within model aircraft clubs and associations have good safety records due to their high levels of organisation, their procedures and their safety culture.

For this reason, the proposed regulation allows competent authorities to issue an operational authorisation to model aircraft clubs and associations, in which they may define deviations from it. In addition, this proposal offers two other possibilities to model aircraft pilots who do not intend to join a model aircraft club or association. They may:

- operate in specific zones designated by MSs, in which MSs can alleviate the requirements of the rules proposed in this Opinion; or
- operate in subcategory A3 of the ‘open’ category.

Operations in subcategory A3 may be conducted with privately built UAS, or UAS in class C3 or C4. This last class was specifically developed to address model aircraft available on the market, imposing a minimum set of technical requirements and focusing mainly on providing the remote pilot with operational instructions issued by the UAS manufacturer, as well as on raising the remote pilot’s awareness of the EU regulations through consumer information. This approach will create a negligible additional burden for UAS manufacturers.

All model aircraft in use before the date of entry into force of this proposed regulation will also be able to be operated afterwards, still using one of the three options explained above (i.e. to be member of a model aircraft club or association, to operate in designated areas, or to follow the operational limitations for subcategory A3), without the need for any modification to the model aircraft.

The applicability of the proposed regulation has also been extended to third-country UAS operators. Since no ICAO Standards are yet available for this category of UAS operations, third-country UAS operators are required to comply with the full set of the proposed regulations. First of all, they are



required to register themselves in a similar manner to an EU UAS operator. In this case, the competent authority will be the one of the MS where they conduct their first operation in the EU, since this authority is best acquainted with the area of operation. The possibility to recognise certain certificates has been introduced (i.e. the certificate of the remote pilot or of the UAS operator) after EASA has analysed the regulations in place in the third country and has concluded that they provide a level of safety equivalent to that ensured by the requirements included in this Opinion. EASA will conduct this analysis at the request of the third-country authority. It was decided to propose that EASA will perform this analysis once and for all in order to avoid multiple reviews by MSs to accept certificates issued by the third country. For this purpose, EASA will involve experts from the MSs in the team performing this analysis.

In accordance with the new Basic Regulation, market product legislation (CE marking) ensures compliance with the technical requirements for UAS operated in the 'open' category. Therefore, this Opinion also defines the new EU market harmonisation legislation that UAS operated in the 'open' category will have to comply with. Compliance is shown by affixing the CE marking and the UAS class to the UAS when it meets the essential technical requirements defined in this proposed regulation.

The UAS harmonisation legislation has been drafted in accordance with the reference requirements of Decision No 768/2008/EC¹⁶ and calls upon the market surveillance activities defined in Regulation (EC) No 765/2008¹⁷.

2.4. What are the stakeholders' views — outcome of the consultation

NPA 2017-05 was consulted from 5 May to 15 September 2017 and more than 3 700 comments from around 215 commenters were received. Figure 2 provides the distribution of comments according to their topics.

¹⁶ Decision No 768/2008/EC of the European Parliament and of the Council of 9 July 2008 on a common framework for the marketing of products, and repealing Council Decision 93/465/EEC (OJ L 218, 13.8.2008, p. 82) (<http://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1493654386469&uri=CELEX:02008D0768-20080709>).

¹⁷ Regulation (EC) No 765/2008 of the European Parliament and of the Council of 9 July 2008 setting out the requirements for accreditation and market surveillance relating to the marketing of products and repealing Regulation (EEC) No 339/93 (OJ L 218, 13.8.2008, p. 30) (<http://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1493654158057&uri=CELEX:02008R0765-20080813>).



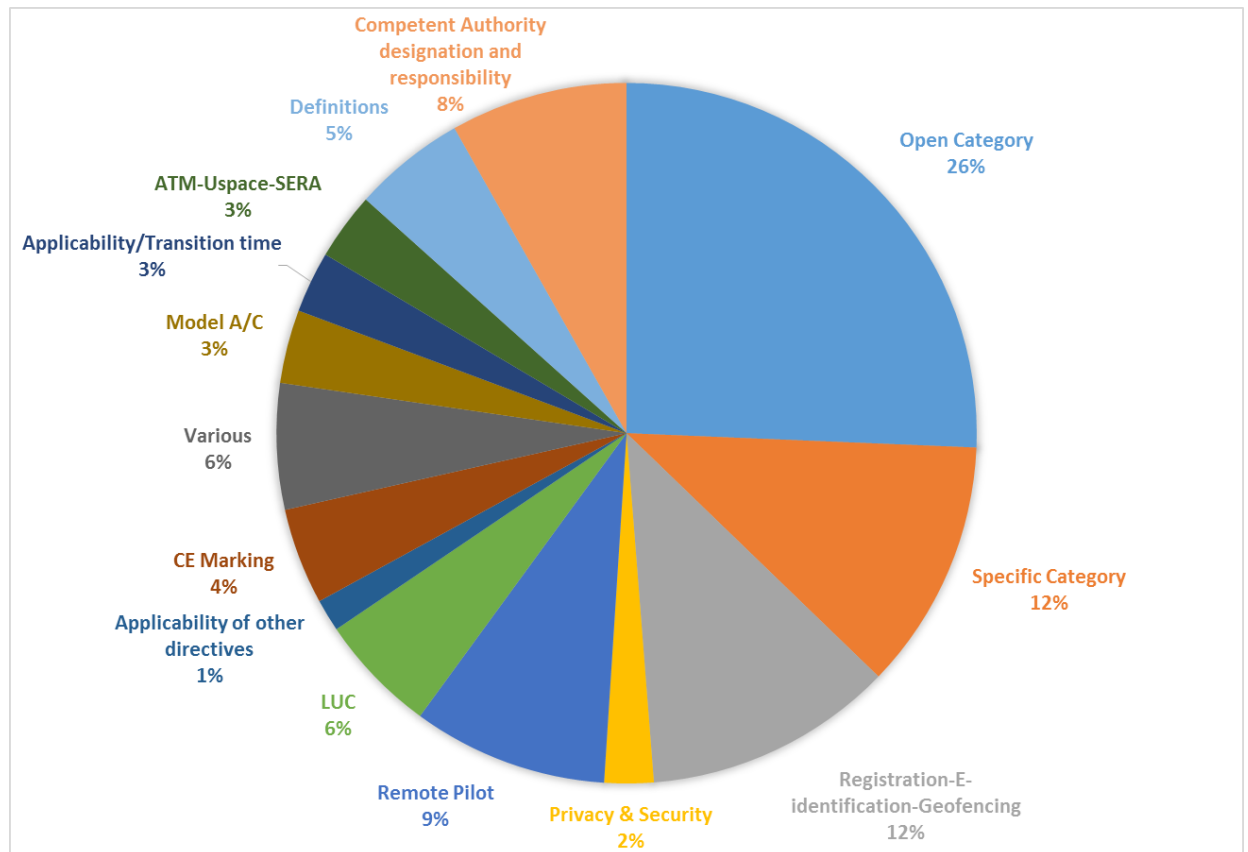


Figure 2 — Distribution of the comments received according to the topic

Some of the comments conflicted with each other due to the variety of the stakeholders. There was general support regarding the approach to UAS operations that was defined in the proposed regulation and the level of flexibility granted to the MSs. The majority of the comments received were on operations in the ‘open’ category, together with a general request for simplification of the proposed regulation. The other subparts (‘specific’ category operations, LUC and market regulation) were also commented on, even if, most of the time, commenters asked EASA to provide additional clarifications, resulting in an improvement in the related AMC and GM.

The comments were classified according to their topics and were carefully analysed. For details, please refer to CRD to NPA 2017-05 (planned to be published in 2018/Q1).

In addition to this formal public consultation, EASA took into account the following elements:

- input from the ‘Article 29 Data Protection Working Party’;
- comments received during a meeting of national security experts on unmanned aircraft, organised by DG GROW on 14 and 15 December 2017, when the ‘state of play’ of the Opinion was presented;
- the political agreement on the new Basic Regulation (i.e. changes to the registration requirements and the need to present two rules: one implementing act for UAS operations and registration, and one delegated act for UA technical requirements and third-country UAS operators);
- comments received during a meeting of the UAS Expert Working Group on 23 and 24 November 2017;

- comments received during several meetings with industry, model aircraft associations and clubs, UAS operators, etc.

2.4.1. Structure of the draft regulations

The new Basic Regulation identifies which process should be carried out by the European Commission to adopt a new regulation. The process depends on the topic covered by the regulation, and for UAS it mandates the following:

- regulations concerning the design, production and maintenance of UA and their engines, propellers, parts, non-installed equipment and equipment to control the aircraft remotely, and concerning third-country operators, are adopted as delegated acts;
- regulations concerning the operation and registration of UA are adopted as implementing rules.

Consequently, the text proposed in NPA 2017-05 has been split into two regulations.

The NPA was developed with an operation-centric concept; therefore, most of the requirements included in the articles of the draft Cover Regulation and in draft Annex I (Part-UAS) may be traced back to UAS operation and registration, while the appendices to draft Annex I (technical specifications for UAS) and the requirements in draft Annex II (Part-MRK) may be traced to design and production.

This led to splitting the original text of the NPA into two regulations, following the above principles:

- a proposed delegated act, containing the requirement to make products available on the European Union market, including the technical requirements applicable to UAS and the article on third-country UAS operators;
- an implementing rule containing the remaining provisions.

The two regulations are heavily dependent on each other since, in order to enable the operation-centric approach chosen for UAS operations, a balance between limitations, pilot competency and technical requirements was established. It will, therefore, be very important for the two acts to evolve in a consistent manner. EASA will carefully monitor this point in the future.

2.4.2. Delegated act on product requirements and third-country operators

As described in the previous paragraph, the proposed delegated act is made up of the articles included in Annex II of NPA 2017-05, the article on third-country operators (Article 10 in NPA) and the technical requirements for the UAS classes and e-identification (Appendices 1–6 to Annex I in the NPA). Very minor changes have been made to the articles, using essentially the same text already presented in the NPA. Some changes were made to the technical requirements, as described below.

The article on third-country operators has been amended to specify that EASA will only start the assessment on the level of safety provided by the third-country regulatory framework upon the request of the national authority of the third country.

2.4.2.1. Technical requirements for UAS classes

The technical requirements for the UAS classes have been slightly amended, as follows.

- For all classes, the manufacturer is required to include an information notice in the UAS package. This is an essential element to promote safety, which provides UAS operators with



basic information on what they can and cannot do, and a link to websites where they can register, receive the online training, and obtain additional information. This requirement was already included in the NPA, and it has been only slightly reworded. Originally, the idea was to use leaflets, but the concept has now been broadened to also allow electronic means such as QR codes. The name of this item has, therefore, been modified to 'information notice' to reflect this change. In the NPA, the content of this document was included in the AMCs. Since product legislation does not allow the possibility to develop AMCs, a different approach had to be identified. It was, therefore, decided to require manufacturers to include in each UAS package an 'information notice defined by EASA'. This document will be made available on the EASA website.

- For UAS in class C0, a maximum speed of 19 m/s has been added for UAS that do not comply with Directive 2009/48/EC on the safety of toys¹⁸. This avoids fast UA, which are typically used for races, being classified as class C0 and operated over people. These UA will be classified as class C3 and will be operated in accordance with subcategory A3 only. Another possibility will be the use of a standard scenario, yet to be drafted.
- For UAS in classes C1, C2 and C3:
 - a new requirement has been added to mandate a smooth transition in the event of the activation of an automatic flight mode. This will apply to those manufacturers who voluntarily decide to implement functionality that automatically limits the access of the UA to certain airspace areas or volumes. It will ensure that the safety of the flight is maintained and that the remote pilot is provided with sufficient information when such automatic functionality is about to be engaged. This will prevent UA from suddenly demonstrating unexpected behaviour during the transition to an automatic flight mode;
 - requirements related to the use of an electronic identification system have been introduced directly into each appendix, requiring the following information to be broadcast:
 - the UAS operator registration number;
 - the unique serial number (SN) of the UA or, if the e-identification is provided by a separate module to be added to the UA, the SN of that module;
 - the geographical position of the UA and its height;
 - the geographical position of the point from which the UA took off; and
 - the timestamp of the data;
 - it has been clarified that the information in the UA user's manual shall at least include the mass of the UA, its MTOM, the frequency of its electronic identification emissions, the general characteristics of allowed payloads in terms of their masses and dimensions, and a description of the behaviour of the UA in the event of a loss of the data link;
 - a new requirement has been introduced to mandate manufacturers to assign to each UA a unique SN according to a standard to be developed. Such SN will be fed to the e-

¹⁸ Directive 2009/48/EC of the European Parliament and of the Council of 18 June 2009 on the safety of toys (OJ L 170, 30.6.2009, p. 1).



identification systems to be broadcast, together with the UAS operator registration number.

- For UAS in class C1:
 - based on the large number of negative comments, the reference to the maximum resolution of a camera being 5 MP has been removed, and the requirement for e-identification and geo-awareness has been made mandatory for all UAS in this class;
 - it has been clarified that the requirements for lights are linked to the controllability of the UA in daylight conditions and during the night, if the UA is designed for night operations; if the manufacturer decides to install lights, their design shall be different from the design of the navigation lights of a manned aircraft so that these two types of aircraft cannot be confused.
- For UAS in class C2, a new requirement has been introduced for a low-speed mode that is selectable by the operator and limits the maximum cruising speed of the UA to a maximum of 3 m/s if the UA is intended to be operated in close proximity to people. This requirement will enhance the controllability of the UA, and allow UAS operators to fly their UA as close to uninvolved persons as 3 m.
- For UAS in class C4, a new requirement has been added to forbid automatic control modes. The rationale is to separate UA that are mostly used for leisure purposes or for pleasure flights (what we mostly know as model aircraft) from those that allow more automatic functions, where the payload (usually the camera) is the centre of interest. It is recognised that imposing functions such as lost link management or height limitation on model aircraft would require the UA to be equipped with sophisticated flight control systems that most of time would alter the nature of model aircraft. Therefore, forbidding automatic control modes will allow class C4 UAS to deal with model aircraft and limit the technical requirements imposed on them (Appendix 5, containing the technical requirements for UAS in class C4, only requires manufacturers to provide documentation). All other UA will be classified as class C3, on which additional technical requirements are imposed.
- For UA in classes C1 and C2, the noise level requirement has been maintained at the same level; however, its expression has been corrected. The term ‘sound power level’ has been changed to ‘sound pressure level’ since it refers to the sound pressure measured at a certain distance from an object. Under certain standard conditions, a sound power level of 80 dB approximately equals a sound pressure level of 60 dB(A) measured at a distance of 3 m from the source. Moreover, A-weighting of the sound level has been introduced, as this is commonly used when describing the level of noise that is perceived by humans. While the technical basis for this (or any other) limit, as well as the details of the underlying measurement procedure for small UA, remain undefined at present, it was decided to keep a discrete noise limit.
- For UA in classes C2 and C3:
 - lights are made mandatory for the purpose of controllability or visibility; their design shall be different from the design of the navigation lights of a manned aircraft so that these two types of aircraft cannot be confused;

- a new requirement has been introduced to mandate protection of the data link so as to prevent unauthorised access to the command and control functions of a UA;
- following the extension of the EU competence to tethered aircraft with propulsion systems and with masses greater than 1 kg, as defined by the new Basic Regulation, all the requirements have been reviewed to extend the applicability to those aircraft.

2.4.2.2. Conformity assessment modules for CE marking

Decision No 768/2008/EC, on a common framework for the marketing of products, provides a template for the establishment of new product harmonisation legislation. Among other things, it defines the conformity assessment procedures that the manufacturer has to carry out in order to demonstrate that a product, before it is placed on the market, conforms to these legislative requirements.

In fact, Decision No 768/2008/EC provides a menu of conformity assessment procedures (called ‘modules’), from which the legislator can select the most appropriate one(s) in order to address the specific needs of the sector involved. The least onerous modules should be selected, taking into account the type of the product and the safety risks involved, the impact on the protection of public interests, the economic infrastructure of the given sector, the methods of production, etc., and where possible, a choice of inspection, certification, and/or quality assurance (QA) modules should be provided.

These conformity assessment procedures are equivalent to each other from a legal point of view, but they are not technically identical in terms of the methods used. Their application in the sectorial legislation aims at providing a high level of confidence regarding the conformity of products to the relevant essential requirements.

A number of accreditation bodies and qualified entities who have broad experience in testing consumer products have stressed that experience shows that module A (self-declaration of conformity by the manufacturer) often leads to a low conformity rate. They considered that higher risk products should require the involvement of a third party in the conformity assessment procedure, and they claimed that the approach should be more proportionate to the risk related to the different classes.

In the ‘open’ category, the operational risks are mitigated by a combination of the UA technical requirements, operational restrictions and pilot competency (for instance, a higher mass is compensated by a greater distance to people). The operation-centric approach used to analyse the risks leads to the conclusion that all classes present a rather similar level of risks, which was the approach adopted in the NPA. However, when considering a possible misuse of the UA or a technical failure, this conclusion would be altered and UA of class C2 and C3 should be considered as presenting a higher risk than the other classes.

After consultation with manufacturers’ representatives, it was decided to remove module A from the procedures provided to demonstrate the conformity of UA of class C2 and C3, as these classes may indeed represent a higher risk in the ‘open’ category.

EASA carried out a delta impact assessment, which is summarised in paragraph 2.6, and the resulting preferred option for each of the classes is shown as follows:



| Class | Module(s) |
|-------|---------------|
| C0 | A, B + C or H |
| C1 | A, B + C or H |
| C2 | B + C or H |
| C3 | B + C or H |
| C4 | A, B + C or H |

2.4.3. Implementing rule on UAS operations and registration requirements

The text in the draft Cover Regulation has been simplified, and the requirements related to product regulation have been removed, while keeping references that were still needed. However, the concepts expressed in the articles remained unchanged.

Several definitions have been slightly updated following the comments received, and some new definitions were added, such as those for ‘dangerous goods’, ‘certificate of airworthiness (CofA)’ and ‘single European sky airspace’.

2.4.3.1. Registration

The new Basic Regulation mandates the registration of UAS operators who conduct operations with a UA:

- that is able to transfer ‘80 J’ of terminal kinetic energy¹⁹ in an impact with a person;
- that poses a security, privacy or environmental risk; or
- that is certified.

It is only mandatory to register a UA that is certified, which means that the UA has been provided with a certificate of airworthiness (CofA) attesting that it conforms to a type certificate issued in accordance with Annex I (Part 21) to Regulation EU (No) 748/2012²⁰. The use of a certified UA is not required for operations in the ‘open’ category, while for operations in the ‘specific’ category, a CofA for a UA may be required in some situations in order to mitigate the risks identified by the risk assessment.

The text proposed in the NPA has, therefore, been updated accordingly, removing the requirement for registration of the UA in the ‘open’ category and limiting the requirement to register UA in the ‘specific’ category to only when a CofA is required.

The first condition defined in the new Basic Regulation for the registration of UAS operators is related to the operation of a UA able to transfer a terminal kinetic energy greater than 80 J in the event of an impact with a person. This value corresponds to the upper weight threshold of UAS in class C1. This condition is, therefore, met when a UAS operator uses a UAS of class C2, C3 or C4.

The second condition for the registration of UAS operators, referring to security, privacy and environmental risks, requires additional consideration.

During the meeting held with national security experts on unmanned aircraft, mentioned in paragraph 2.4, the DG Joint Research Centre (JRC) provided the results of a study on the potential

¹⁹ Kinetic energy transferred to the human body considering the terminal velocity of the UA when falling from an altitude of 120 m.

²⁰ Commission Regulation (EU) No 748/2012 of 3 August 2012 laying down implementing rules for the airworthiness and environmental certification of aircraft and related products, parts and appliances, as well as for the certification of design and production organisations (OJ L 224, 21.8.2012, p. 1).

lethality of explosives carried by a UA²¹. The study showed that a UA with a mass of up to 250 g was not able to carry a payload that posed a significant risk. However, heavier UA may potentially pose a security risk. Therefore, a UA in class C1, even if it does not pose a safety risk, may still pose a security risk.

During the same meeting, the national security authorities proposed to set the registration threshold to 250 g, and this request was found to be consistent with several comments received during the NPA commenting period.

The risks to privacy and data protection are essentially related to the availability on the UA of a camera or another sensor that is able to record personal information. Most of the UA available on the market, even if they are very small, are equipped with cameras. These vary from toys with very limited performance to nano-UAS that are able to carry high-resolution cameras. It was considered that a UA with a mass of less than 250 g is normally small and, therefore, in order to comply with the general requirement set in the 'open' category for the UA to remain in the VLOS, the UA would need to fly close to the remote pilot, and this should allow the pilot to be quickly identified. Operations conducted at a greater distance from the pilot will be classified in the 'specific' category, which requires the UAS operator to be registered.

At this stage, it was decided not to regulate the registration of UAS operators who use UA with masses below 250 g in order to remain proportionate, even if there is a residual risk to privacy. This situation will be monitored in the future to evaluate whether there is a need to change that decision.

These considerations led to the condition being set that UAS operators who use UA with MTOMs greater than 250 g need to be registered.

As required by the new Basic Regulation, the registration of UAS operators will be a national responsibility and each MS may designate a competent authority or another entity for that purpose. It was considered necessary to develop in the aviation regulations a specific article to define the responsibilities of the entity that manages the UA operator database. In order to ensure interoperability between the databases developed in the EU MSs, a requirement for real-time accessibility has been included, and in addition, the format of the registration number will be defined in an AMC, together with the minimum data items to be provided, including the insurance number.

As requested by several commenters, the 3-year validity of a registration proposed in the NPA has been deleted and transformed into a requirement for the MSs to keep the operator database accurate. GM will suggest a 3-year validity period, based on the considerations that the average lifetime of a small UAS is in the order of 2 years and the small UAS market is very dynamic.

Moreover, a requirement has been added to equip UA with a fire-resistant placard displaying registration information. Deviations are possible for very small UA and for model aircraft.

Finally, it was considered that in the future, the U-Space may require a unique identification of each UA for flight deconfliction purposes. This unique identification will be provided by mandating the standardisation of the SN of UA in the UAS technical requirements for classes C1, C2 and C3. In this

²¹ JRC Science for Policy Report. Scenario study: drones carrying explosives. Implications for consumer product regulation on drones. Larcher M., Karlos V., Valsamos G., Solomos G. JRC 110662, 2018. The study is not publicly available. The following is an extract of the conclusions. 'It can be concluded that drones of class C1 has the capability of causing casualties in a limited range, while explosive attacks with drones of classes C2 - C4 can have a significant impact at soft targets/public spaces resulting in a potential high number of casualties.'

way, the e-identification system of each UA will broadcast both the UAS operator registration number and the UA's unique SN.

2.4.3.2. 'Open' category

As mentioned above, the subpart on which the most comments were received was the 'open' category. The main request was for a general simplification of the table that summarised the operational limitations. Following these comments, including inputs from model aircraft clubs and associations and additional inputs from 21 MSs during the development of the NPA, a counterproposal has been developed, and as a result, the 'open' categorisation in Table 1 has been modified.

The main changes are as follows.

- The maximum height has been aligned at 120 m for all subcategories, removing the limit of 50 m for UA with an MTOM below 250 g. The change was made to simplify the table and was based on the consideration that the VLOS requirement is anyway applicable. The proposed regulation has been amended to clarify the responsibility of the remote pilot to keep the UA at a height such that it always remains in VLOS. The small size of a UA with an MTOM below 250 g will not allow the remote pilot to see the UA at a distance of more than a few tens of meters. Still, the possibility exists to exceed this limit in close proximity to an object taller than 120 m, on request from the responsible entity. In addition, it has been clarified that the remote pilot should maintain the UA at least 50 m from the perimeter of the object.
- The definition of the minimum age to operate a UA has been removed from the Opinion and left to the discretion of the MSs. This decision was made based on the consideration that harmonising the minimum age would not be commensurate with the expected safety benefits. A lack of harmonisation in this field would have a very minor impact, in particular, for commercial operators that would have to comply with the legislation to provide commercial services, which may define minimum age limits, but which EASA has no power to regulate.
- The minimum distance from uninvolved people to be maintained when conducting a UAS operation in subcategory A2 has been reduced to 5 m when a low-speed mode function is installed on the UA. The remote pilot needs to activate this functionality when operating close to people, so that the remote pilot will have enough time to react and alter the trajectory of the UA if it is heading towards people. In addition, the concept of the 1:1 rule (keeping the UA at a distance from uninvolved people that is no less than the height of the UA) has been introduced.
- As proposed by the vast majority of the MSs, the operational limitations in subcategory A3 have been simplified by merging the previous two limitations when conducting an operation with a UA in class C3 or C4 that is privately built. For all operations in subcategory A3, the operational limitation now states: 'Fly in an area where it is reasonably expected that no uninvolved person will be endangered and keep a safety distance from the boundaries of congested areas of cities, towns or settlements.' It should be noticed that the previous condition 'no uninvolved person will be present' has been replaced with 'no uninvolved person will be endangered'. This text is more consistent with the concept agreed during the discussion with the UAS experts and was summarised in the related AMC, already proposed in the NPA, requiring that when 'a person incidentally enters the visual range of the remote pilot, the remote pilot should avoid overflying the person, and discontinue the operation when the safety of the UAS operation is not ensured'.

In order to better reflect the operation-centric approach, the structure of Part-UAS has been modified, moving the operational requirements of the subcategory to the front.

Several commenters asked EASA to clarify some areas. The following changes to the text of the regulation and/or to the AMCs and GM have, therefore, been made; however, they do not alter the concept proposed in the NPA:

- The point on the responsibilities of a UAS operator has been amended to:
 - remove the requirement for a UAS operator to develop policies, since it was considered over-demanding for the ‘open’ category; a UAS operator who employs more than one remote pilot is still required to develop procedures;
 - include the responsibility for a UAS operator to make their personnel aware of any information about operations promulgated by the relevant authorities.
- The point on the responsibilities of a remote pilot has been amended to:
 - consider that, when using a free-flight UA, the remote pilot does not have the possibility to directly control the UA; in addition, free-flight UA operations will be defined in upcoming GM;
 - add, as an additional responsibility of the remote pilot, the requirement to ensure that the mass of the UA, including its payload, does not exceed the MTOM defined by the manufacturer and the limit of its class;
 - replace the requirement to give way to manned aircraft with ‘maintain a thorough visual scan of the airspace surrounding the UA in order to observe and not create a hazard to other aircraft’; the text was changed because it gave the impression that a UA may be operated in the ‘open’ category close to a manned aircraft as long as precedence is given; the new text better reflects the spirit of the requirement, which is to always be aware of the activities going on in the surrounding airspace, and to keep the UA at a safe distance from any other aircraft;
 - include the possibility in the ‘open’ category to carry dangerous goods, but only for operations that involve dropping them in connection with agricultural, horticultural, or forestry work when the carriage of those goods does not contravene any other applicable regulations;
 - add, in addition to respecting the privacy of people, the requirement to avoid harming animals or the environment;
 - be clarified in an upcoming AMC that a UA may be operated by a pilot on a moving ground vehicle or a boat, on the condition that the speed of the vehicle is slow enough for the remote pilot to maintain VLOS and maintain control of the UA at all times.
- The references to the availability of a 5-MP camera on the UA has been removed. The e-identification and geo-awareness requirements have been made mandatory for all UA in classes C1, C2 and C3, while for C4 and privately built UA, they will be mandatory when required for the area of operation.



- The AMCs that describe the competency to be demonstrated by a remote pilot in order to obtain a certificate of pilot competency required to operate in subcategory A2 will be amended to specify that the remote pilot is required to firstly pass the online test (as required for operating a UA in subcategory A3) and to conduct some familiarisation flights in areas where no risk is posed. This will be added in order to address some concerns about the level of practical experience of remote pilots. It was considered that a practical test would have been expensive and disproportionate, considering that remote pilots may conduct self-training in remote areas and that the technical requirement mandate on the UA, including the slow-speed mode, will already provide some mitigation.
- The point describing subcategory A3 has been amended to clarify that a class C2 UA may also be operated in this subcategory on the condition that the remote pilot has passed the online test and that the remote pilot complies with the subcategory A3 operational limitations.



| Operation | | Remote pilot competency (age according to MS legislation) | UAS | | | | UAS operator registration |
|------------------------------|--|--|-----------------|--------------------|---|------------------------------------|------------------------------|
| Subcategory | Area of operation (far from aerodromes, maximum height 120 m) | | class | MTOM/ Joule (J) | Main technical requirements (CE marking) | Electronic ID/ geo awareness | |
| A1 Fly over people | You can fly over uninvolved people (not over crowds) | Read consumer info | Privately built | < 250 g | N/a | No | no |
| | | | C0 | | Consumer information, Toy Directive or <19 m/s, no sharp edges, selectable height limit | | |
| | | <ul style="list-style-type: none"> • Consumer info • online training • online test | C1 | < 80 J or <900 g | Consumer information, <19m/s, kinetic energy, mechanical strength, lost-link management, no sharp edges, selectable height limit. | | |
| A2 Fly close to people | You can fly at a safe distance from uninvolved people | <ul style="list-style-type: none"> • Consumer info • online training • online test • theoretical test in a centre recognised by the aviation authority | C2 | < 4 kg | Consumer information, mechanical strength, no sharp edges, lost-link management, selectable height limit, frangibility, low-speed mode. | Yes + unique SN for identification | yes |
| A3 Fly far from people | You should: <ul style="list-style-type: none"> • fly in an area where it is reasonably expected that no uninvolved people will be endangered • keep a safety distance from urban areas | <ul style="list-style-type: none"> • Consumer info • online training • online test | C3 | < 25 kg | Consumer information, lost-link management, selectable height limit, frangibility. | if required by zone of operations | |
| | | | C4 | | Consumer information, no automatic flight | | |
| | | | Privately built | | N/a | | |



2.4.3.3. 'Specific' category

Commenters expressed their general agreement on the concept defined for operations in the 'specific' category. Some concerns were raised regarding the unavailability of the full documentation explaining the 'specific operations risk assessment' (SORA), which is the methodology established by Joint Authorities for Rulemaking of Unmanned Systems (JARUS) Working Group 6 to assess the risks of UAS operations and determine the corresponding mitigation measures. The main document defining the process of SORA, without the annexes, has been published by JARUS²². The annexes are planned to be published by the end of 2018. Other key elements for the success of the 'specific' category are the standard scenarios; however, none of them has yet been made available. A pragmatic process is being put in place to allow the publication of a first set of standard scenarios as AMCs to the UAS regulation once the latter is adopted in the 3rd quarter of 2018.

Similarly to the approach used for the subpart on the 'open' category, the points in this subpart have been rearranged in line with the operation-centric approach. Other than this, minor changes have been made as follows.

- The requirements for the UAS operator have been amended to:
 - remove the general requirement for the UAS operator to develop policies; when needed, the standard scenario or the operational authorisation issued by the NAA will define the requirement to develop policies;
 - include the responsibility for the UAS operator to make available to their personnel the operations manual, when required by the standard scenario or by the operational authorisation issued by the NAA, and make their personnel aware of any information promulgated by competent authorities that is relevant to the intended operation.
- The point dedicated to the development of the operations manual has been deleted since it was considered that the relevant requirements were already included in other points.
- The point related to the responsibilities of model aircraft clubs and associations has been amended to specify that they should take appropriate actions only when they are informed that one of their members does not comply with the conditions and limitations defined in the operational authorisation; moreover, the responsibility of model aircraft clubs and associations is limited to assisting their members in achieving the minimum competency required by this proposed regulation.
- The point regarding registrations has been amended to reflect the new requirements mandated by the new Basic Regulation, including the necessity to register the UA when, following the risk assessment, a CofA for the UA is required.
- In the operational authorisation section, a new requirement has been added to ensure that the UAS operator develops a procedure for the coordination with the relevant ATC unit(s) if the entire operation or part of it is to be conducted in controlled airspace. Moreover, the competent authority is required to issue 'without undue delay' the operational authorisation when it is satisfied with the documentation submitted by the UAS operator.

²² <http://jarus-rpas.org/publications>

- The requirements on the operational risk assessment have been amended to also include an evaluation of privacy and security risks.
- For operations covered by a standard scenario where a declaration is sufficient, the responsibilities of the competent authority have been clarified. Competent authorities are required to provide to the UAS operator an acknowledgment of the receipt of the request, and then to verify the completeness of the declaration. In order to reduce as much as possible the use of the resources of the competent authorities and reduce any ambiguity for UAS operators, an AMC will clarify that the competent authority should establish an online system (e.g. web-based or by email) for the submission of operational declarations, which provides the submitter with an automatic acknowledgement of receipt when the submission has been successful. Moreover, the template for the declaration or the application for authorisation for operations covered by standard scenarios will be included in the standard scenario itself. The time validity of a declaration will be defined in the related standard scenario, while the competent authority will define in the authorisation its validity.
- The definition of the duration and validity of the operational authorisation is now left to the competent authority.
- A new point has been added to define the process to be applied by a UAS operator who intends to propose an AltMoC. The concept was already introduced in draft Article 11 of NPA 2017-05. To harmonise the requirement with other aviation domains, the text has been split, leaving in Article 11 of the Cover Regulation (now Article 10) the requirement for the competent authority, and in this point, the requirements for the applicant.

2.4.3.4. Light UAS operator certificate (LUC)

The concept of LUCs has also been generally supported by commenters. The majority of comments required some additional clarifications that will be reflected in new or revised AMCs and GM compared to those published in the NPA.

However, the following changes were made:

- The responsibility of an LUC holder has been amended to introduce a requirement for record keeping in support of oversight.
- The management system has been amended to include some missing elements that are typical of a safety management system (SMS), such as the identification of the lines of responsibility and accountability; moreover, the possibility has been introduced to integrate the management system with other systems already operated by the organisation to comply with requirements in other aviation domains. For example, if a UAS operator already holds an air operator certificate (AOC) approval in accordance with Regulation (EU) No 965/2012²³ or a production organisation approval (POA) in accordance with Regulation (EU) No 748/2012, then when they demonstrate compliance in order to obtain an LUC, they are allowed to receive credit for requirements already included in such approvals.

²³ Commission Regulation (EU) No 965/2012 of 5 October 2012 laying down technical requirements and administrative procedures related to air operations pursuant to Regulation (EC) No 216/2008 of the European Parliament and of the Council (OJ L 296, 25.10.2012, p. 1).

- The distinction between complex and non-complex organisations has been removed, making the requirements more proportionate.
- The competent authority is required to specify in the terms of approval the privileges granted to an LUC holder. A new AMC will provide the form to be used for the terms of approval, and will specify that the LUC holder should be able, without prior approval of the competent authority, to authorise one or more of the following types of own operations. Operations that:
 1. are based on a standard scenario;
 2. are based on one or more modifications of a standard scenario (variants), which do not involve changes in the concept of operation, the category of the UAS used or the competencies of remote pilots;
 3. do not correspond to a standard scenario, but fall within a type of activity already performed by the UAS operator.
- In an analogy to the ‘specific’ category, a new point has been added to define the process to be applied by a UAS operator who intends to propose an AltMoC.

2.4.4. Recreational operations

Several comments were provided by model aircraft clubs and associations asking for more defined exemptions for all model aircraft activities, irrespective of whether the operator was a member of a model aircraft club or association. A detailed overview of those comments may be found in the related CRD. The following is a description of the major changes developed to address those comments.

The recognition of the pro-safety environment created by model aircraft clubs and associations has been kept, as this is documented in the positive safety records. Granting credit to all UA leisure pilots was not considered to be justifiable. The draft regulation provides three options for recreational activities, which will be summarised in GM1 to Article 6 of the proposed implementing regulation:

- operate as members of a model aircraft club or association that has received an operational authorisation from the competent authority, as defined in Article 6 of the proposed implementing regulation;
- operate in special zones defined by the MSs in accordance with Article 11 of the proposed implementing regulation, where UAS are exempted from certain requirements, and/or where the operational limitations are extended; the MSs may also define different height limitations for those zones;
- operate according to subcategory A3; in this case, hobbyists are required to comply with the limitations of, and demonstrate the competency defined in, UAS.OPEN.020.

The proposed regulation allows the MSs to postpone for 3 years its applicability to UAS operations conducted within model aircraft clubs and associations in order to give the MSs sufficient time to issue operational authorisations and to define special zones.

Only a minor change has been made to Article 6 of the proposed implementing regulation to clarify that the operational authorisation, to be provided by the competent authority to model aircraft clubs and associations, is the same authorisation defined in UAS.SPEC.040, issued by competent authorities for other operations conducted in the ‘specific’ category.



The point defining the responsibility of model aircraft clubs and associations has also been slightly modified to limit the necessity to take appropriate actions and, if necessary, inform the competent authority, only if they are informed that one of their members has exceeded the conditions and limitations defined in the operational authorisation.

Model aircraft clubs and associations strongly requested the 120-m height limitation to be withdrawn and to leave the definition of the height limitation to the MSs, if such a limitation is necessary. EASA is not in favour of this proposal, since the limitation to 120 m is a key requirement to separate UAS from manned aircraft, and the deletion of this separation would be badly perceived by manned aviation. Article 6 on the establishment of special zones can be used to allow model aircraft flyers to fly their model aircraft higher than 120 m.

2.4.5. Date of entry into force and date of applicability

The applicability timeline has been reviewed to address a request from several stakeholders to anticipate the dates and to even allow the MSs to decide to apply the regulation earlier.

Therefore, a general application date has been defined of 6 months after the publication of the regulation in the *Official Journal of the European Union*.

This means that by that date, MSs should have:

- put in place a registration and authorisation database according to the new regulation;
- defined zones where UAS are not permitted to operate, where they are restricted, or where ‘open’ category limitations are alleviated;
- defined the entity recognised to issue A2 remote pilot competency certificates.

In addition, a derogation of a further 3 months is allowed for operators to register themselves. Authorisations and declarations for UAS operators, as well as certificates of remote pilot competency issued on the basis of national legislation prior to the applicability date of the proposed regulation, may be considered valid until 1 year after the entry into force of the proposed regulation and by that time, the MS should have converted them according the new EU framework.

The proposed delegated act on product regulation mandates that UAS manufacturers, by 2 years after its entry into force, shall only place on the market UAS that are compliant with the new technical requirements.

Lastly, a derogation of 3 years is proposed for the applicability of the regulation to UAS operations conducted within model aircraft clubs and associations. By that time, the MSs should have issued operational authorisations to those model aircraft clubs and associations who had applied for them.

This timeline will enable UAS operations in the ‘open’ category in subcategories A1 and A3 from the first day of applicability, while operations in subcategory A2 would require the availability of UAS that are compliant with the class C2 technical requirements that may only be available after 2 years. The proposed regulation also enables, from the applicability date onwards, operations in the ‘specific’ category. EASA is planning to develop standard scenarios by 2018, and they will be published soon after the proposed UAS regulation is adopted by the European Commission.



2.4.6. Link with the U-Space

A high-level conference on UAS was held in Helsinki on 21 and 22 November 2017²⁴ with the intention that safe and effective use of airspace would be achieved by the delivery of cost-effective U-Space services, and that the investment in demonstrators would systematically help to open up the UAS services market.

During the development of NPA 2017-05, it was considered that the fundamental pillars of U-Space should be included in it: registration, e-identification and geo-awareness.

Several comments on this were received during the NPA commenting period and during the discussion in the expert group. The following two options were proposed:

- wait for a better definition of the U-Space requirements and avoid including in this regulation any requirements that may potentially need to be adapted in the future;
- define in this regulation a minimum set of requirements on registration, e-identification and geo-awareness.

The impact of the two approaches has been extensively discussed in dedicated meetings with industry, UAS operators and security authorities. In those meetings, several MSs clearly stated that registration and e-identification requirements are already essential elements in their national regulations. Without them, enforcement authorities would not have adequate tools, which would make it necessary to impose some limitations on UAS operations, or for specific additional requirements to be added by some MSs.

The development of a detailed safety regulation for U-Space at present would be challenging due to the lack of experience in this field and the lack of a commonly agreed concept of operation (CONOPS). Several effective trial projects have been carried out, and the results have been encouraging. They are all based on the creation of a network, whose features depend on the solution adopted. However, more data is necessary to be able to develop safety performance requirements. EASA will actively monitor the development of further demonstrators either by SJU or by local initiatives in order to gather the necessary information. Moreover, it has not yet been defined whether U-Space will be available throughout the territory of the EU or only in areas where the UAS operations are more concentrated. In any case, in order to define the U-Space requirements, a new NPA is required, following the EASA rulemaking process that requires a new public consultation, and this may, therefore, take several months.

Security agencies provided a clear request to equip UAS with a 'local' e-identification system, broadcasting a minimum set of information directly from the UAS over a short range, independently from the capacity of the U-Space services to provide a network identification. Hence, a second method of e-identification, independent from the network, will anyway be required. Industry also pledged to define a legal framework as soon as possible, enabling UAS operations that will allow them to gain experience. The solution to provide 'local' e-identification is considered the most realistic approach today. Moreover, the proposed regulation allows for demonstrators that may also be covered by standard scenarios dedicated to specific U-Space projects. The resulting experience will support the development of an enforceable regulation.

²⁴ Its outcome was the 'Helsinki Declaration' (see <https://ec.europa.eu/transport/sites/transport/files/2017-drones-declaration-helsinki.pdf>).

This approach is consistent with the recent publication by the FAA, 'UAS Remote Tracking & ID ARC Report'²⁵, proposing a similar plan where the local and network functionality may coexist.

The proposed regulation has been reviewed to identify the presence of any requirements that may impede the future development of U-Space, or whether any additional elements could be added. The conclusions were as follows:

- registration: this is an essential element for enforcement. As explained in paragraph 2.4.3.1., this proposed regulation requires the registration of any UAS operator who conducts an operation using a UA with an MTOM greater than 250 g. Since it is expected that some of the services offered by U-Space will also require the unique identification of the UA, a standardised format for the UA SN has been added in the technical requirements;
- e-identification: this Opinion proposes a 'local' e-identification to be broadcast over a close range for enforcement purposes. The functionality is mandatory for all UAS in classes C1, C2 and C3. For the C4 class, this functionality is required when the UA is operated in an area where e-identification is mandatory. UAS in class C0 have been excluded, consistent with the registration requirements. The characteristics of this 'local' e-identification function corresponds to the security needs. U-Space services may however require the development of a network identification function presenting the appropriate performances;
- geo-awareness: at present, this function is for awareness only, to support the remote pilot in complying with the limitations in the area defined by the MSs. The term 'geo-fencing' has been replaced by 'geo-awareness' to better reflect the nature of the requirement already proposed in the NPA. It is preferable to give to the UAS operator full responsibility for flying the UA in areas away from prohibited or restricted zones.

2.5. Impact assessment

A detailed and quantified impact assessment was published in May 2017 as part of NPA 2017-05 (B)²⁶ and this section includes a brief paragraph that summarises its main results.

No major changes from the proposal or from the respective preferred options included in the NPA have been included in the final text of the Opinion. Furthermore, the comments received on the impact assessment during the public NPA consultation, reflected in the related CRD, were limited in number and did not raise any major criticisms.

The only main aspect included in the proposal that was not detailed in the first impact assessment is related to modules for conformity assessment. This is further analysed in this text.

In addition, this section includes a paragraph that refers to the minor changes introduced by the proposal.

2.5.1. Overview of the regulatory impact assessment already published

The specific issues identified and detailed in the impact assessment (IA) are the following:

- a lack of clarity and non-harmonised definitions of the categories of UAS operation boundaries, including disproportionate rules for special categories;

²⁵ <https://www.faa.gov/news/updates/?newsId=89404>

²⁶ <https://www.easa.europa.eu/system/files/dfu/NPA%202017-05%20%28B%29.pdf>

- a lack of protection for sensitive areas;
- inadequate technical requirements;
- a lack of classification of airspace and of rules for low-level operations;
- inadequate competencies for remote pilots; and
- the need for registration and e-identification.

These issues have been included in a ‘problem tree’ with a view to clarifying their primary causes (drivers) as well as their consequences. The consequences identified are the following:

- ground risks (accidents/incidents involving persons on the ground or sensitive areas);
- air risks (collision risks, air proximity, accidents and incidents with manned aircraft);
- violations of privacy, data protection, and security; and
- barriers to the market, burdens for industry, a lack of potential for innovation and development.

In order to address the risks and to find solutions to the issues identified, three sets of options have been proposed, together with the corresponding analysis of the impacts based on various criteria (social, economic, safety). These sets of options cover the following areas:

- the ‘open’ category;
- registration;
- the ‘specific’ category.

The analysis of the impacts was supported by qualitative and quantitative assessments, making use of the inputs received from a dedicated UAS expert group, as well as the inputs from affected stakeholders including competent authorities, UAS manufacturers, UAS operators, model aircraft clubs and associations, and training schools.

The preferred options identified (for the ‘open’ and ‘specific’ categories and for registration) represent proportionate solutions for all the stakeholders who are most affected. Overall, the preferred options that are proposed would reduce the costs for UAS manufacturers, competent authorities and UAS operators, while at the same time maintaining a high safety level, not only by protecting other airspace users and uninvolved persons from the risk of being injured by a UA, but also by mitigating the privacy and security risks.

2.5.2. New aspects in the proposal

The following paragraph reports the impact of the main changes, described in the previous paragraphs, included in the Opinion, compared with the proposal in the NPA. For each change, a brief analysis has been included.

2.5.2.1. Use of UAS within subcategory A3

When compared with the requirements in the NPA, UAS operations conducted in subcategory A3, using a class C3 UAS, would require operators to comply with slightly more limitations. Indeed, while in the previous proposal, class C3 UAS would need to ‘fly in an area where it is reasonably expected that no uninvolved person will be present’, in the new proposal, they would have to ‘fly in an area where it is reasonably expected that no uninvolved person will be endangered and to keep a safe distance from



boundaries of congested areas of cities, towns or settlements’ (which was previously only applicable to class C4 UAS). According to the research included in the earlier IA (see graph 2 at page 10 of NPA 2017-05(B)), UAS that fall into the class C3 weight range (with MTOMs between 4 and 25 kg) represent only a small part of the market. However, some professional operations are expected to be conducted around the boundaries of cities using UAS with masses greater than 4 kg. These would fall into the ‘specific’ category. Overall, no major impacts are expected, with only a minor economic impact for those professional operators who use class C3 UAS and who would need to submit to the competent authority a declaration or apply for an authorisation. Taking into account the cost of a heavier UA, the cost of obtaining an authorisation may be proportionate.

This approach improves the safety of UAS operations in subcategory A3, as it would positively contribute to the reduction in occurrences in congested areas with UAS heavier than 4 kg.

| Criteria | Impact |
|----------|--------|
| Economic | – |
| Safety | ++ |
| Total | + |

2.5.2.2. Minimum age: no longer defined at EU level

The minimum age required to operate a UAS will be defined at the MS level. This change does not have any effect on safety, since the regulation defines the minimum competency to be demonstrated by the remote pilot and will allow the MSs to set the requirements according to the local conditions and national needs.

However, slight negative impacts in terms of harmonisation are expected.

2.5.2.3. Need to have e-identification and geo-awareness for all UAS in classes C1 and C3

UAS in classes C1 and C3 would need to be equipped with e-identification and geo-awareness equipment, irrespective of the resolution of the camera with which they are equipped or whether they have an audio sensor, or the area of operation.

Therefore, for the affected UAS, additional costs to design and implement geo-awareness and e-identification equipment would be faced by the manufacturers. However, the costs are not expected to be high when compared to those already identified (see graph 27 in NPA 2017-05 (B)). Moreover, many UAS currently available on the market are already equipped with cameras with a resolution higher than 5 MP (as this was the resolution limit identified in the NPA for UAS in class C1), and it is expected that with improvements in technology, very few cameras with low resolutions will be available in the future.

This change would bring positive safety benefits due to the geo-awareness function, and positive security and privacy impacts due to the additional e-identification included.

| Criteria | Impact |
|----------|--------|
| Economic | – |
| Safety | ++ |
| Total | + |

2.5.2.4. Registration for UAS operators only

Registration would only be mandatory for UAS operators who conduct UAS operations using UAS with MTOMs greater than 250 g (classes C1, C2, C3 and C4). Registrations of single UA will no longer be required, unless, following the risk assessment required for operations in the ‘specific’ category, a CofA of the UA is required.

The change would have no impact on safety, since it may still be possible to identify the responsible UAS operator in any case of misconduct.

The economic impacts would be positive for UAS operators who are planning to operate several UAS, given that they would avoid paying a registration fee for each UAS, where applicable. The very minor additional cost that operators would face would be for the fire-resistant placard that they would need to apply to the UA.

This change would, therefore, overall bring positive economic impacts for operators.

| Criteria | Impact |
|----------|--------|
| Economic | ++ |
| Safety | 0 |
| Total | + |

2.5.2.5. Introduction of a low-speed mode for UAS in class C2

UAS in class C2 that are intended to be operated up to a minimum distance of 5 m from people will be required to implement a low-speed mode function to improve the controllability of the UA.

According to the feedback from some manufacturers, the economic impact of this is very low, since it could take around 10–20 man-days to develop a low-speed mode. On the other hand, the minimum distance from uninvolved persons has been reduced from 20 m, as proposed in the NPA, to 5 m as proposed in the new regulation, while maintaining the safety level of UAS operations. This would allow more operations to take place closer to people for class C2 UAS.

| Criteria | Impact |
|----------|--------|
| Economic | -/+ |
| Safety | 0 |
| Total | -/+ |

2.5.2.6. Data link protection for UAS in classes C2 and C3

UAS in classes C2 and C3 need to be equipped with protection for the data command and control link against unauthorised access.

Also in this case, while the safety and security benefit is evident, there would be additional minor costs for the design and production of the affected UAS. It was considered that the current technology allows for inexpensive solutions, and the majority of the UAS on the market already implement some kind of protection for the data link. The possibility of extending the requirements to UAS in class C1 was also evaluated but, considering the limited kinetic energy of this class of UA, it was decided not to mandate this.

| Criteria | Impact |
|----------|--------|
| Economic | – |
| Safety | ++ |
| Total | + |

2.5.2.7. Speed limit for UAS in class C0

The speed of UAS in Class C0, if they are not already compliant with the Directive on the safety of toys, has been limited to 19 m/s.

From a safety point of view, this should be very beneficial, considering that these UAS could be flown over people. However, this is expected to have a negligible impact from an economic point of view, since the manufacturers are also required to consider this in their declarations to show compliance with the technical requirements.

| Criteria | Impact |
|----------|--------|
| Economic | – |
| Safety | ++ |
| Total | + |

2.5.2.8 Unique serial number (SN) for UAS in classes C1, C2 and C3

UAS in classes C1, C2 and C3 are each required to have a unique SN.

This is expected to have a negligible economic impact, while bringing a positive safety impact, especially when, in the future, U-Space will need to be able to uniquely identify a UA in order to maintain its separation from other traffic.

| Criteria | Impact |
|----------|--------|
| Economic | – |
| Safety | ++ |
| Total | + |

2.5.3. Conclusion on the changes introduced to the proposal

Further to the analysis provided, overall, the impact of all the changes in the technical requirements could be considered to be neutral in terms of the economic impacts, and positive from a safety point of view.

| Criteria | Impact |
|----------|--------|
| Economic | –/+ |
| Safety | + |
| Total | + |

2.5.4. Analysis of modules

2.5.4.1. Problem definition

As already highlighted in paragraph 2.4.2.2., one key aspect to be tackled in detail when drafting new product harmonisation legislation is the selection of the procedures provided to economic operators to undertake the conformity assessment of their products. Decision No 768/2008/EC defines 8 different modules and their variants, covering the definition and/or the production phase. Their

combinations provide 15 different possible procedures²⁷ from which the legislator usually selects the 3 that are most appropriate for the specific area of activity concerned. These procedures range from a simple declaration of conformity submitted by the manufacturer to a more detailed verification of the design and/or of each product, or the implementation of a quality assurance system, both involving the use of notified bodies (NBs).

If the set of modules to be used is not correctly selected, several consequences could result:

- the system could be too burdensome (e.g. expensive checks, long checks), which could lead some companies to exit the market, especially small to medium-sized enterprise (SMEs) that could face high initial costs;
- an inadequate level of product safety could lead to air risks (e.g. collisions with manned aircraft due to loss of control) or ground risks (e.g. injury to uninvolved persons).

The following is an example of the compliance of a product with the requirements defined in a market regulation, to be taken into consideration for the selection of modules. In 2015, the 7th joint cross border R&TTE Market Surveillance campaign focused on the compliance of UAS with the R&TTE Directive²⁸. This Directive allowed the use of the self-declaration procedure (module A). Market surveillance authorities found that '92 % of the devices did not fulfil all of the requirements'. Further reference to this has been included in the 'Report on the 7th joint cross border R&TTE Market Surveillance campaign (2015)'²⁹.

It needs to be considered that, given their nature, UAS will anyway be subject to other already established directives such as the Radio Equipment Directive (2014/53/EU)³⁰ and the Low Voltage Directive (2014/35/EU)³¹.

2.5.4.2. Objectives

The specific objectives are to:

- ensure an adequate level of safety when defining the modules;
- establish a proportionate set of modules, considering the potential costs and benefits.

2.5.4.3. Options

- A first principle guiding the choice of the legislator is to ensure that, when appropriate in terms of protection of public interest, the conformity assessment procedures used in the sector in question should be reflected in the modules selected. In the case of UAS, applicable directives, in particular the Radio Equipment Directive (2014/53/EU) and the Low Voltage Directive

²⁷ See CERTIF 2009–04, available at <http://ec.europa.eu/DocsRoom/documents/6280/>.

²⁸ Directive 1999/5/EC of the European Parliament and of the Council of 9 March 1999 on radio equipment and telecommunications terminal equipment and the mutual recognition of their conformity (OJ L 91, 7.4.1999, p. 10).

²⁹ <http://ec.europa.eu/DocsRoom/documents/13343/attachments/1/translations/en/renditions/native>.

³⁰ Directive 2014/53/EU of the European Parliament and of the Council of 16 April 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of radio equipment and repealing Directive 1999/5/EC (OJ L 153, 22.5.2014, p. 62).

³¹ Directive 2014/35/EU of the European Parliament and of the Council of 26 February 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of electrical equipment designed for use within certain voltage limits (OJ L 96, 29.3.2014, p. 357).



(2014/35/EU), provide the three following procedures: module A, module B + C and module H³². These modules will be the basis on which the different options will be built. They are described below:

- Module A: this represents the least stringent procedure, as it provides for conformity assessment to be undertaken by a self-declaration concerning the compliance of the design with the requirements, as well as of the product. It does not require the involvement of any independent third party or an accredited 'in-house' conformity assessment body.
- Module B: in this option, NBs undertake an examination of the technical design of a product to verify that it meets the applicable requirements. On the basis of an examination of the technical documentation and a specimen supplied by the manufacturer, the NB issues an EC-type examination certificate (for those product designs/specimens that meet the relevant legislative requirements). As module B only concerns the design phase, it must be followed by a module that covers the production phase and provides a conformity assessment in relation to the type described in the EC-type examination certificate (i.e. support for the manufacturer's declaration of conformity to type).
- Module C: this is analogous to module A, but it only covers the production phase. It is used when the product design has already been subjected to an examination of the technical design of a product (i.e. module B).
- Module H: in this option, a NB assesses the quality system of the manufacturer to determine whether it is suitable to ensure compliance with the requirements for both the design and production phases. After receiving a positive assessment, the manufacturer is entitled to declare that the products concerned satisfy the requirements, on their sole responsibility. In this way, it provides an alternative to product examination/testing by a third-party body, but it does require periodical surveillance.

The selection of the modules should take into consideration the following aspects:

- The level of the risk involved: the complexity of the modules should be proportionate to the risk and the complexity of the requirements. An operation-centric approach should be taken when analysing the risks related to the different classes. Such an analysis would lead to consider similar level of risks for all classes in the 'open' category as a higher UA mass is balanced by stricter UA requirements, operational restrictions and pilot competency (this was the approach taken in the NPA). However, this approach does not address enough possible misuse or failure of the UA. So, the following risks level are now considered for the selection of the modules:
 - Class C3 may have a high mass but should in principle be operated far from uninvolved people. However, a misuse or a product failure could happen. As a consequence, class C3 is considered to present a high risk.
 - Class C2 combines both a high mass (0.9 to 4 kg) and the possibility of flying close to people. This is considered to present the highest risk in the 'open' category.

³² Further reference can also be found in CERTIF 2009-03, available at <http://ec.europa.eu/DocsRoom/documents/6278>.

- Class C1 (due to the lower mass of the UA) and C4 (due to the fact that they are model aircraft and should be operated far from uninvolved people), are considered to present lower risks.
 - Class C0 (due to its very low mass) is considered to present the lowest risk.
- The complexity of the requirements: the technical requirements differ according to the class. Overall, class C2 is the one that includes more requirements (e.g. lost-link management, selectable height limit, low-speed mode, frangibility, and injury reduction in the event of an impact with a person), and class C4 has almost no technical requirements.
 - The size of the manufacturers involved (e.g. SMEs).
 - The complexity of the module and the related costs.
 - The length of the checks that could affect the time to market.
 - Involvement of a third party (i.e. ‘notified bodies’ (NBs)).

Option 0 — Do nothing

Option 0, ‘do nothing’, would mean that there was no need to request EU conformity assessments for UA products. Even if this option is not actually contemplated by the legislator, it is included in the document purely as a theoretical exercise to provide a benchmark for comparison with the other options described below. Indeed, it is very important in an impact assessment that the options analysed are compared with a baseline (which is option 0).

Option 1 — Module A is allowed for UAS in classes C0 to C4

For all classes, manufacturers could apply any of the following three sets of modules: A (internal production control), B (EC-type examination, involving NBs) + C (conformity to type based on internal production control), or H (full quality assurance, involving NBs). Module A would apply if standards were available, or for UAS in class C0, if the products complied with the Directive on the safety of toys.

| Class/‘Open’ category | Module(s) |
|-----------------------|---------------|
| C0 | A, B + C or H |
| C1 | A, B + C or H |
| C2 | A, B + C or H |
| C3 | A, B + C or H |
| C4 | A, B + C or H |

Option 2 — Module A is not allowed for UAS in class C2

For classes C0, C1, C3 and C4, manufacturers could apply any of the following three sets of modules: A, B + C or H, provided by the other applicable directives. Module A would apply if standards were available, or for C0, if the products complied with the Directive on the safety of toys.

Instead, for UAS in class C2, only modules B + C or H would be applicable.

| Class/‘Open’ category | Module(s) |
|-----------------------|---------------|
| C0 | A, B + C or H |
| C1 | A, B + C or H |
| C2 | B + C or H |
| C3 | A, B + C or H |
| C4 | A, B + C or H |

Option 3 — Module A is not allowed for UAS in classes C2 and C3

For classes C0, C1 and C4, manufacturers could apply any of the following three sets of modules: A, B + C or H, provided by the other applicable directives. Module A would apply if standards were available, or for class C0, if the products complied with the Directive on the safety of toys.

In contrast, for UAS in classes C2 and C3, only modules B + C or H would be applicable.

| Class/'Open' category | Module(s) |
|-----------------------|---------------|
| C0 | A, B + C or H |
| C1 | A, B + C or H |
| C2 | B + C or H |
| C3 | B + C or H |
| C4 | A, B + C or H |

Option 4 — Module A is not allowed for UAS in classes C1, C2, C3

For classes C0 and C4, manufacturers could apply any of the following three sets of modules: A, B + C or H, provided by the other applicable directives. Module A would apply if standards were available, or for class C0, if the products complied with Directive on the safety of toys.

Instead, for UAS in classes C1, C2 and C3, only modules B + C or H would be applicable.

| Class/'Open' category | Module(s) |
|-----------------------|---------------|
| C0 | A, B + C or H |
| C1 | B + C or H |
| C2 | B + C or H |
| C3 | B + C or H |
| C4 | A, B + C or H |

Overview of the options proposed

| Class/'Open' category | Option 1 | Option 2 | Option 3 | Option 4 |
|-----------------------|---------------|---------------|---------------|---------------|
| C0 | A, B + C or H | A, B + C or H | A, B + C or H | A, B + C or H |
| C1 | A, B + C or H | A, B + C or H | A, B + C or H | B + C or H |
| C2 | A, B + C or H | B + C or H | B + C or H | B + C or H |
| C3 | A, B + C or H | A, B + C or H | B + C or H | B + C or H |
| C4 | A, B + C or H | A, B + C or H | A, B + C or H | A, B + C or H |

2.5.4.4. Analysis of impacts

Economic

The following is a list of the information gathered during consultations with stakeholders, which included targeted meetings with some UAS manufacturers. This information has been considered throughout the analysis of options. The cost estimates included represent a partial view, due to the small number of replies received:

| Cost definition | Amount estimated |
|--|---------------------------------------|
| Type examination if tests are supplied by the manufacturers (e.g. module B) | EUR 3 000 |
| Type examination by NBs (e.g. module B) | EUR 7 000 to 50 000 |
| Annual factory inspection (e.g. module C), cost on top of module B | EUR 2 000 |
| Audit for approval of the quality system for design, initial cost | EUR 10 000 to 25 000 |
| Surveillance of the quality system (recurrent cost for NB examinations, every 2 years) | EUR 1 500 to 3 500 |
| Overall cost of conformity assessment/across modules | 2 to 5 % of total costs ³³ |

Option 0

Manufacturers: a lack of conformity assessment at the EU level might lead to fragmentation in terms of product checks, which could lead to high costs if there is fragmentation across Europe on how producers comply. Companies would face adaptation costs, given the different assessments and procedures. This would lead to high initial costs (for setting up tests) and recurrent costs.

Option 1

Manufacturers of UAS in the 'open' category classes would not face major costs, considering that they could apply module A (internal production control). In that case, the only costs would be for the in-house development of checks. Overall, very minor costs are expected for manufacturing companies.

Considering the negative experience regarding compliance with the R&TTE Directive, as mentioned in the problem definition, the authorities would need a large amount of resources for enforcement, considering that NBs would not be involved (except if companies decide to select modules B + C or H). Therefore, negative impacts are expected.

Option 2

Manufacturers: in option 2, only class C2 UAS would have to bear the additional burden of the involvement of a NB, including the cost of issuing a certificate for the design, and where module H is chosen, the approval of an in-house control system and surveillance of the quality system. Class C2 UAS represent a large part of the market according to research included in NPA 2017-05 (B)³⁴. The burden is expected to be of limited impact, assuming that the production runs are very large and that companies producing this type of UA may already have well-developed quality assurance systems that allow them to rely on module H. Overall, minor costs are expected for manufacturing companies.

Notified bodies (NBs): this option could bring some market opportunities considering the number of UAS in C2 UAS that would need to go through the checks.

³³ The range depends on the UAS segment (e.g. consumer, prosumer, pro).

³⁴ At page 10 of NPA 2017-05 (B) of RMT.0230, Graph 2 on the UAS divided by MTOM according to operators' feedback shows that circa 92 % of the UAS would be below 4 kg, therefore, in general, fitting in categories C0, C1 and C2.

Authorities: a smaller amount of resources in comparison with option 1 would need to be dedicated to enforcement, considering the checks performed by NBs for UAS in class C2.

Option 3

Manufacturers: in this option, NBs would also be involved in the conformity assessment of UAS in class C3. Therefore, the costs mentioned in option 2 would also apply to UAS in class C3. These do not represent a large part of the UAS market according to the research included in NPA 2017-05(B)³⁴; however, the UAS market is expected to grow in the near future. However, SMEs who produce UAS in class C3 might face negative impacts, especially when products are produced in low numbers (e.g. < 100 units). Overall, costs are expected to be at the medium level for manufacturing companies.

Notified bodies (NBs): this option could bring significant market opportunities, considering the number of UAS in classes C2 and C3 that would need to go through the checks.

Authorities: a smaller amount of resources in comparison with option 2 would need to be dedicated for enforcement.

Option 4

Manufacturers: in this option, as with the previous one, NBs would also be involved in the conformity assessment of class C1 UAS. The assessment required could, in addition, delay the launch of products in class C1 where the time to market is key (e.g. for small UA often used for leisure and facing high competition). Overall, very high costs are expected for manufacturing companies, especially where the costs could not be spread over a series of products.

Notified bodies (NBs): this option could bring significant market opportunities (more than option 3), considering the C1, C2 and C3 products that would need to go through the checks.

Authorities: a smaller amount of resources in comparison with option 3 would need to be dedicated for enforcement.

Safety

Option 0

No EU-wide conformity assessment process would exist, which would lead to uncertainty on the adequacy of the checks performed, and as a consequence, a significant safety risk because of the likely high level of non-conformity. Considering the likely growth of the UAS market in the future, this could lead to negative safety impacts.

Option 1

Self-declaration would be authorised for all classes. This could lead to serious safety concerns, as product conformity would not be checked by NBs. This would be an issue, especially for UAS belonging to subcategory C2. Overall, high negative safety impacts are expected.

Option 2

In this option, the involvement of a NB would be required for UAS in class C2, involving a high level of risk. Self-declaration would be accepted for all other classes.

For UAS in class C2, this provides an acceptable safety level. UAS in classes C1 and C3 may instead present a high rate of non-conformity. However, this is considered to be acceptable for UAS in class C1, given the lower level of risk involved, but this could be potentially critical for UAS in class C3, given the greater masses of the UA in this class. Overall, slight negative safety impacts are expected.

Option 3

Module B + C or H would apply for UAS in classes C2 and C3. Therefore, in comparison with option 2, the risks highlighted for UAS in class C3 would be mitigated. Overall, a positive safety impact is expected.

Option 4

Modules B + C and H would apply to all classes except C0 and C4. Overall, a very high positive safety impact is expected.

Social

No major impact is expected for any of the options.

Environmental

Detailed checks on the noise emissions of UAS during the conformity assessment process would positively contribute to minimise environmental impacts by ensuring that noise requirements were fulfilled. Options 3 and 4 would bring more positive impacts, considering the application of modules B + C or H to several classes, while for options 1 and 2, minor positive impacts are expected.

2.5.4.5. Comparison and conclusion

| Criteria | Option 0 | Option 1 | Option 2 | Option 3 | Option 4 |
|----------------------|----------|----------|----------|----------|----------|
| Economic | 0 | +/- | +/- | +/- | - |
| Safety | - | -- | - | + | ++ |
| Environmental | 0 | 0/+ | 0/+ | + | + |
| Total | 0 | +/- | +/- | + | +/- |

Option 3 is the preferred one, as it ensures an adequate level of safety and it includes a proportionate set of modules, considering the potential costs and benefits. Indeed, this option strikes a good balance between conformity assessment costs and safety concerns.

For UAS manufacturers: a non-burdensome self-declaration procedure, module A, would apply for UAS in classes C0, C1 and C4, considering the safety risk. On the contrary, modules B + C or H for UAS in classes C2 and C3 would provide an appropriate level of safety, taking into account the potential safety risks for these two UAS classes (e.g. risks of collision on the ground and collisions with manned aircraft in the air).

For authorities: the expected amount of resources to be dedicated to check product compliance would be lower in comparison with options 0, 1 and 2, taking into consideration the important role of NBs in compliance checks.

For NBs: there would be positive economic impacts, taking into account the number of UAS that would need to go through a check performed by an accredited body (for UAS in classes C2 and C3).

With regard to option 4, even if more detailed checks were performed on a very small part of the affected market, in comparison with option 3, this would lead to much higher costs.

Therefore, overall, in comparison with the other options, option 3 would provide the best outcome.

2.6. How do we monitor and evaluate the rules

Monitoring and evaluation of the rules were already proposed in Chapter 8 'Monitoring and evaluation' of NPA 2017-05 (B).

Done at Cologne, 6 February 2018.

Patrick KY
Executive Director



3. References

3.1. Affected regulations

Not applicable.

3.2. Related decisions

Not applicable.

3.3. Other reference documents

Not applicable.



4. Appendix

Appendix to Opinion No 01/2018 *'Introduction of a regulatory framework for the operation of unmanned aircraft systems in the "open" and "specific" categories'*:

CRD to NPA 2017-05: To be published in 2018/Q1.

